



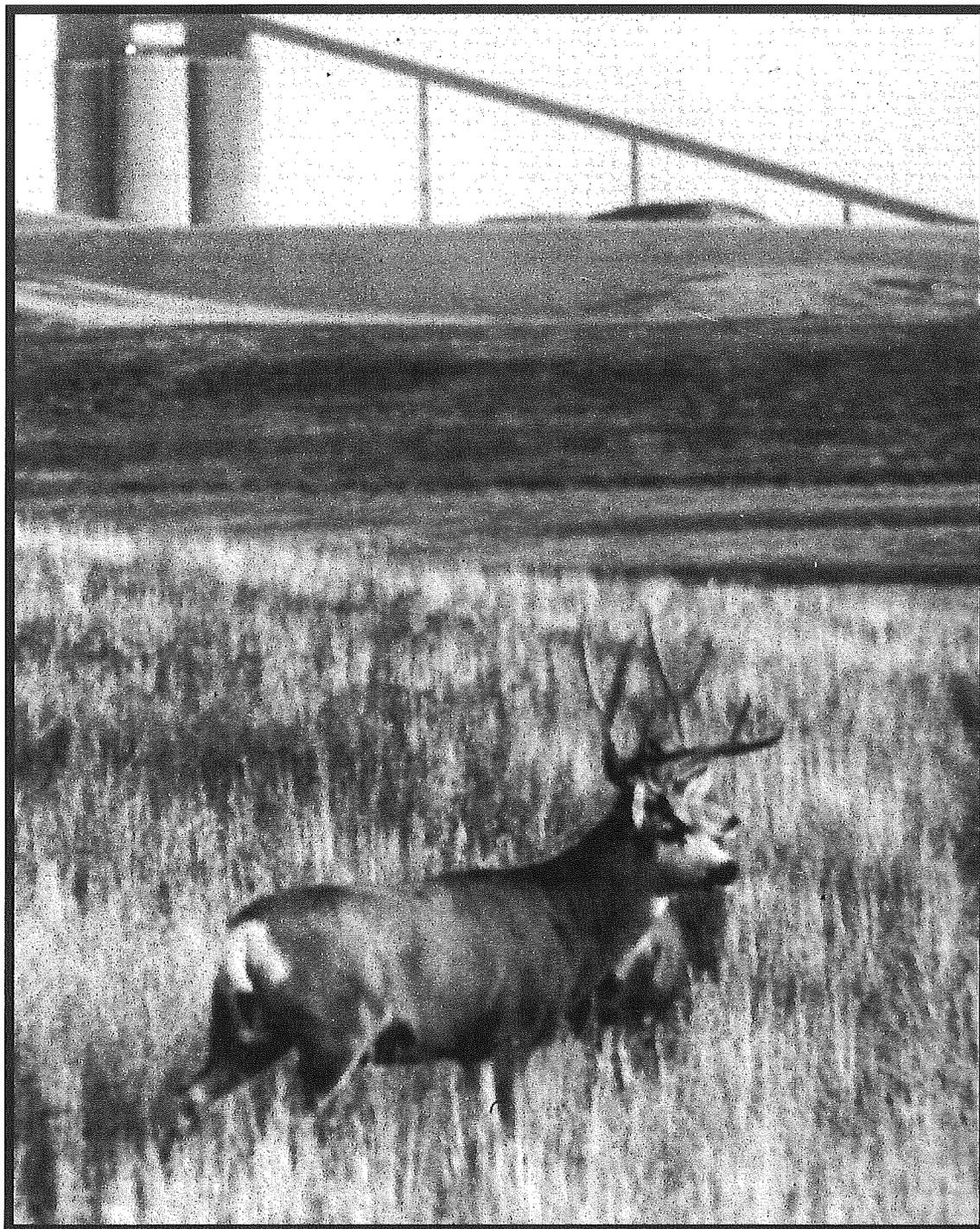
U.S. Department of the Interior
Bureau of Land Management

Casper District Office

June 1994



Final Eagle Buttes Environmental Assessment



The Bureau of Land Management is responsible for the balanced management of the public lands and resources and their various values so that they are considered in a combination that will best serve the needs of the American people. Management is based upon the principles of multiple use and sustained yield; a combination of uses that take into account the long term needs of future generations for renewable and nonrenewable resources. These resources include recreation, range, timber, minerals, watershed, fish and wildlife, wilderness and natural, scenic, scientific and cultural values.

BLM/WY/ES-94/020+4110

**Final
Environmental Assessment
of the
Eagle Butte Coal Lease Application
as applied for by AMAX Land Company
(Federal Coal Lease Application WYW124783)**

EA # WY061-3EA106

**Prepared by
Casper District
Bureau of Land Management**

**Cooperating Agency:
U.S. Office of Surface Mining Reclamation and Enforcement**

June 1994

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SUMMARY

AMAX Land Company applied to the Bureau of Land Management (BLM) for a lease for federal coal adjacent to AMAX Coal West, Inc.'s existing Eagle Butte Mine on July 24, 1991. The proposed tract, referred to as the Eagle Butte Lease-By-Application (LBA) tract, is located approximately three miles north of Gillette, Wyoming, and is contiguous with the existing Eagle Butte federal coal lease to the north and east.

This environmental assessment has been prepared to evaluate the potential environmental impacts which could be expected to occur if the proposed Eagle Butte LBA tract is leased and mined. It considers the existing coal mining in the basin and the pending and previously issued LBAs, and the previously prepared regional and site-specific impact analyses in evaluating the cumulative impacts of leasing this tract of coal.

The following five alternatives are considered in this environmental assessment:

Alternative 1) Lease the tract as applied for by AMAX Land Company as a maintenance-type tract for the existing Eagle Butte Mine. This case assumes that the applicant is the successful bidder.

Alternative 2) Lease the tract with revised boundaries to include coal that might be bypassed if not mined in conjunction with the tract as it was applied for. The modified tract would be leased as a maintenance-type tract for the existing Eagle Butte mine. This alternative also assumes that the applicant is the successful bidder. Alternative 2 is the preferred alternative of the BLM.

Alternative 3) Do not lease the coal; this is the no action alternative.

Alternative 4) Lease the coal to open a new, stand-alone mine. This alternative assumes that the applicant is not the successful bidder.

Alternative 5) Postpone the lease sale.

Under Alternatives 1, 2, and 4, the lease would be offered after BLM's evaluation of the Fair Market Value is completed. A competitive lease sale would be held, with the coal rights going to the company or individual that submits the highest qualified bonus bid that meets or exceeds the Fair Market Value for the property as determined by the BLM.

Under Alternative 1, the proposed action, the tract would be mined by AMAX in order to extend the life of the Eagle Butte Mine. Coal would be recovered from beneath about 915 acres of land adjacent to and southwest of the existing Eagle Butte coal leases. The tract contains approximately 150 million tons of coal. Assuming that all of the estimated coal reserves are

recoverable, and that the coal is produced at a rate of 16 million tons per year, the reserves requested in the application for the Eagle Butte LBA tract would extend the life of the mine between 9 and 10 years.

Alternative 1 would extend the duration of the impacts currently resulting from the mining of the current Eagle Butte lease. Water-level drawdowns in the coal aquifer due to mining at the current Eagle Butte Mine would be extended approximately one mile further to the south. Drawdowns in the overburden aquifer would also be extended further to the south. Soils and vegetation are similar to those on the adjacent Eagle Butte Mine, where reclamation is already occurring. Impacts to wildlife would include loss of habitat on the lease area during mining and reclamation. The current plan to mitigate impacts to raptor nests would have to be updated to include the newly leased area. The proposed tract has been surveyed for cultural resources, and no such resources eligible for the National Register of Historic Places were located on the tract. No significant paleontological resources have been identified on the tract. Visual impacts would not be different from those under the current mine plan at Eagle Butte. Both the existing Eagle Butte lease and the proposed Eagle Butte LBA extend approximately one mile into the Gillette Buffer Zone. As a result, the impacts to Gillette's air quality would be similar to those predicted for mining the current lease, but these effects would remain for almost ten additional years. Economic benefits would be realized from the bonus bid, royalty payments, production taxes and fees, and maintaining present employment levels for almost ten additional years.

Alternative 2, the preferred alternative of the BLM, would add approximately 145 acres to the tract, to provide for recovery of federal coal located between the proposed Eagle Butte LBA tract and U.S. Highway 14-16. This coal would logically be mined with the Eagle Butte LBA tract, and could be bypassed if not mined along with the Eagle Butte LBA tract. Alternative 2 would add approximately 6 million additional tons of minable coal lying east of Highway 14-16 to the tract. The coal recovered under Alternative 2 would add an additional one-third of a year to the life of the mine.

The environmental impacts of Alternative 2 are substantially the same as those for Alternative 1. No additional surface would be disturbed by mining because the surface of the land added by Alternative 2 would be disturbed by mining-related activity under Alternative 1. There would be a slight increase in the impacts to coal and overburden aquifers and in the duration of air quality effects. Economic benefits and term of employment would increase as well, from the additional 6 million tons of coal that would be mined under this Alternative.

Alternative 3, the No Action Alternative, would leave the Eagle Butte LBA tract essentially as it now exists. A portion of the north and east edges of the tract would be disturbed by overstripping along the existing lease boundary in order to mine the coal in the existing Eagle Butte leases. Economic and employment benefits associated with the mining of 150 million tons of coal would be foregone. After the coal in the existing Eagle Butte leases is mined, and the surface is reclaimed, the coal in this tract would be isolated by coal removal and reclamation to the north and west, by the Gillette Buffer Zone on the south, and by the airport and Highway 14-16 on the west. If this tract is not mined with Eagle Butte's current operation, it could be bypassed for many years,

if not forever.

Alternative 4, leasing the tract for a new stand-alone mine, would have different, probably increased, environmental and economic impacts than Alternatives 1 or 2. Alternative 4 was not analyzed in detail. There are not enough reserves in the tract as applied for or as revised to economically justify the expense of a new mine start in the current market. The tract is constrained to the north and east by the existing Eagle Butte coal leases, to the west by U.S. Highway 14-16 and the Campbell County airport, and to the south by the City of Gillette buffer zone. Because of these constraints, the coal in this tract is not accessible to the other mines in this area, rail access would entail a prohibitively long spur line to avoid leased or leasable coal reserves, and there is no suitable location for facilities for a new mine.

Alternative 5 would delay leasing on the premise that if the price of coal in the region increases, the government could receive a larger bonus up-front from the lease sale. This alternative was not analyzed in detail. Coal prices are unpredictable, and most of the income to the government from federal coal is from royalties, which are based on the price of the coal when it is mined. The impacts of issuing the lease at a later date could be the same as for Alternatives 1 or 2 if leasing is not delayed beyond the time where the tract could be mined with the existing Eagle Butte leases. The impacts of delaying the lease sale could be the same as Alternative 3, the No Action Alternative if the delay extends beyond the time that Eagle Butte Mine can reasonably incorporate the LBA tract into the mine plan. In that case, the coal may never be recovered, for the reasons cited under Alternative 4.

ENVIRONMENTAL ASSESSMENT
of the
EAGLE BUTTE COAL LEASE APPLICATION
AS APPLIED FOR BY AMAX LAND COMPANY
(Federal Coal Lease Application WYW124783)
June 1994

I. INTRODUCTION

A. Purpose and Need

On July 24, 1991, Meadowlark Farms, Inc. (now AMAX Land Company) filed an application for a coal lease on federal coal reserves located southwest of and adjacent to the Eagle Butte Mine, in accordance with U.S. Department of the Interior regulations and Powder River Regional Coal Team guidelines. The mine is operated by AMAX Coal West, Inc, which is a subsidiary of Cypress-Amox. The coal lease application was filed with the Bureau of Land Management (BLM), the administrative agency responsible for leasing federal coal.

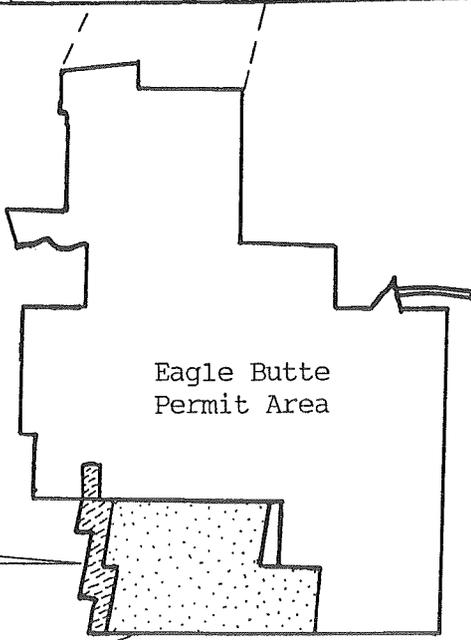
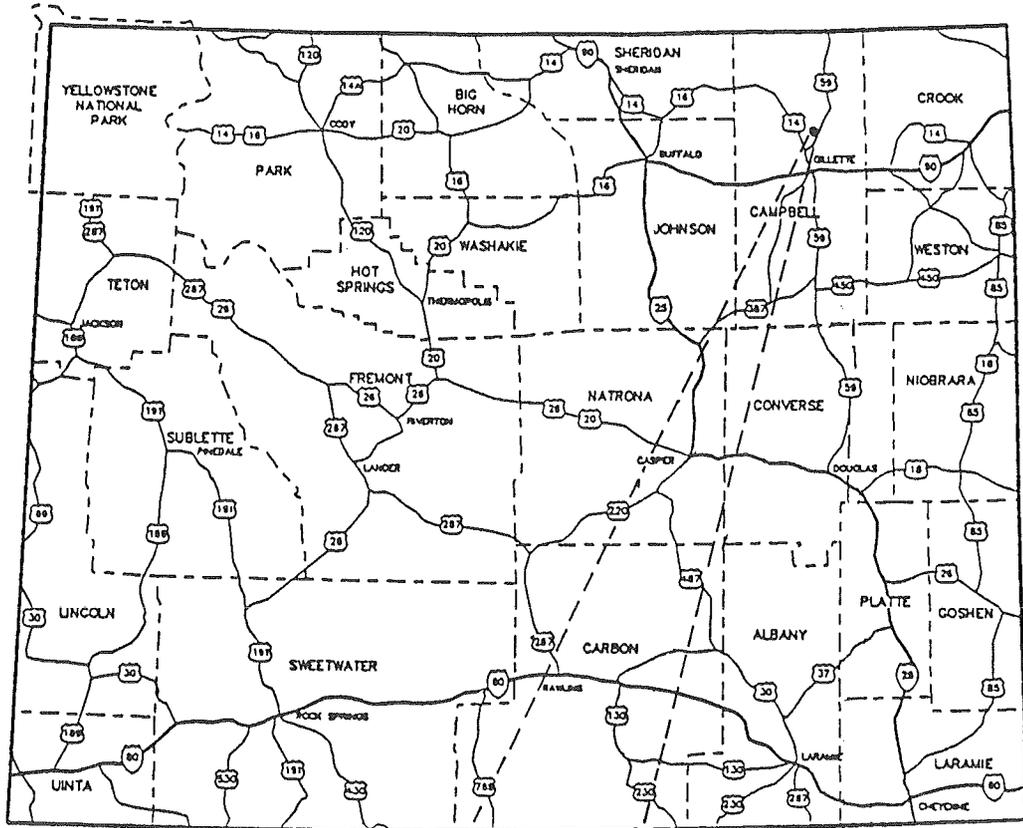
The lands applied for are located in Campbell County, approximately three miles north of Gillette, Wyoming. Figure 1 is a map showing the location of the area. The proposed lease contains approximately 915 acres of federal coal in Campbell County, Wyoming. Figure 2 is a map showing the location of the proposed lease relative to the adjacent federal leases held by AMAX Land Company (i.e. the existing Eagle Butte Mine). The surface of the proposed lease area is owned by private interests with the majority being owned by AMAX Land Company. As applied for, the proposed lease would be mined as part of the existing operations at the Eagle Butte Mine. After mining, the land would be reclaimed for livestock grazing, farming, and wildlife habitat as is the current practice at the Eagle Butte Mine.

The Eagle Butte coal lease application was reviewed by the BLM, Wyoming State Office in Cheyenne, Wyoming. It was determined the application and the lands involved met the requirements of regulations governing coal leasing on application (43 CFR 3425).

The proposed Eagle Butte lease lies within the decertified Powder River Federal Coal Production Region. The Eagle Butte coal lease application was reviewed and approved for processing as a lease-by-application (LBA) by the Powder River Regional Coal Team at the June 15, 1992 meeting in Gillette, Wyoming. Although the Powder River Federal Coal Production Region was decertified as a Federal coal production region in January, 1990, the Regional Coal Team has remained active and has reviewed proposed coal leasing in the region on a yearly basis. The most recent Powder River Regional Coal Team meeting was held on June 16, 1993, in Billings, Montana.

Four LBAs have been issued in the Wyoming portion of the Powder River Federal Coal Region since the region was decertified. There are currently four pending coal lease applications

THE STATE OF WYOMING



Eagle Butte Permit Area

Eagle Butte LBA Tract Alternative 2

Eagle Butte LBA Tract Alternative 1

Figure 1. General Location Map of Eagle Butte LBA Tract

**EAGLE BUTTE LBA
BOUNDARIES FOR
ALTERNATIVES 1 AND 2**

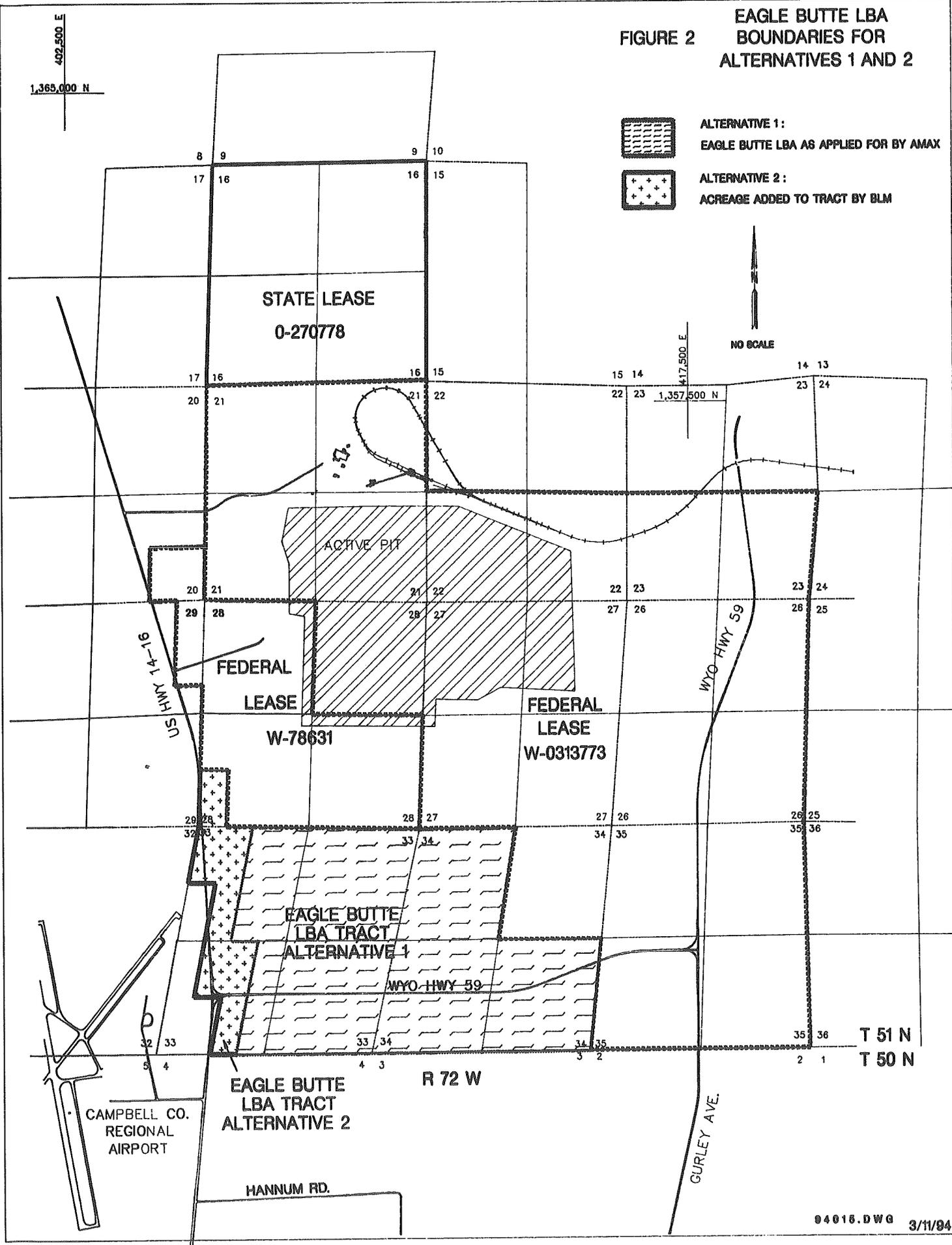
FIGURE 2



**ALTERNATIVE 1:
EAGLE BUTTE LBA AS APPLIED FOR BY AMAX**



**ALTERNATIVE 2:
ACREAGE ADDED TO TRACT BY BLM**



in the Powder River Federal Coal Region. Three, including the Eagle Butte application, are in Wyoming, and one pending application is in Montana. The pending and previously issued LBAs in the region are summarized in Table 1.

The BLM must complete three actions for an LBA to be processed: a planning and environmental review, a geologic and mine plan review, and an economic review of the proposed lease area. Leasing by application is a competitive bidding process, and the leases are not issued if the high bid does not meet or exceed the fair market value of the tract as determined by BLM. A public hearing is required for each LBA to take public comments on the environmental analysis, the fair market value, and the maximum economic recovery of coal in each proposed tract.

This Environmental Assessment (EA) satisfies the planning and environmental review portion of the LBA process. It has been prepared to assist the BLM to make a decision on the proposed lease, to provide a basis for public review, and to comply with the requirements of the National Environmental Policy Act of 1969 (NEPA).

B. Conformance With Land Use Plan

The BLM's principal authority to manage public lands is established by the Federal Land Policy and Management Act of 1976 (FLPMA). Through this authority, the BLM is responsible for managing resources on public lands in a manner that maintains or improves them. The BLM planning regulations are set forth in 43 Code of Federal Regulations (CFR) 1600. The Buffalo Resource Area Resource Management Plan (RMP), and its associated Environmental Impact Statement (EIS) is the plan which governs the management of lands and minerals in Campbell County (BLM, 1985). The Buffalo Resource Area consists of Campbell, Johnson, and Sheridan counties. The proposed action is in conformance with the current land use plan.

A buffer zone around the City of Gillette in which coal leasing is not allowed was established at the request of the city in 1979, when the Buffalo Management Framework Plan was first amended. The Gillette buffer zone was carried forward into the Buffalo RMP in 1985. The purpose of the buffer zone, which extends 3 miles beyond the Gillette Planning District (Figure 3), is to allow for community expansion and open space. The RMP states that new leasing is not allowed within the 3-mile buffer zone, although there are pre-existing leases within it, along the north and east boundaries (Figure 3).

In 1987, Wyodak Resources Development Corporation applied for a lease modification for coal that was within the Gillette Buffer Zone. If this coal was not mined, it would be bypassed. The City of Gillette passed a resolution in favor of approving Wyodak's lease modification.

In response to Wyodak's application and the resolution from the City of Gillette, the Buffalo RMP was amended in 1988 to allow limited coal leasing within the Gillette Buffer Zone

Table 1:

POWDER RIVER FEDERAL COAL REGION LEASING SUMMARY							6/94
LEASE BY APPLICATIONS (LBAs): SALE HELD							
WYOMING							
LBA LEASE NO. APPLICANT	APPLICATION DATE	AS APPLIED FOR ESTIMATED LEASE SIZE & COAL TONNAGE	STATUS	AS OFFERED LEASE SIZE & EST. TONS OF MINEABLE COAL	SALE INFORMATION	AVERAGE COAL QUALITY DATA FROM LEASE SALE NOTICE	
JACOBS RANCH Jacobs Ranch Mine WYW117924 Kerr-McGee	10/10/89	1465.16 Acres 123 MM Tons	Sale Held: 9/26/91; EA unsuccessfully appealed by PRBRC*, WOC*, and Sierra Club; Lease Effective: 10/1/92; Motion by PRBRC* for IBLA reconsideration denied	1708.62 Acres 132,681,204 Tons	1 bid received: \$20,114,930.00 \$11,770.00/acre; 15.1 cents/ton Accepted	Btu/lb=8540 Ash=5.4%, Sulfur 0.47% Strip Ratio=2.46 BCY**/ton	
WEST BLACK THUNDER WYW118907 Black Thunder Mine Thunder Basin Coal Co.	12/22/89	3225 Acres 400 MM Tons	Sale held: 8/12/92, Bid Accepted Lease Effective: 10/1/92	3492.495 Acres 417,834,298 Tons	1 bid received: \$71,909,282.69 \$20,586.68/acre, 17.2 cents/ton Accepted	Btu/lb=8839 Ash=4.40%, Sulfur=0.25% Strip Ratio=2.72 BCY**/ton	
NORTH ANTELOPE/ROCHELLE WYW119554 N.Ant & Rochelle Mines Powder River Coal Co.	3/2/90 Filed as two applications	N. Antelope 954 Acres, 120 MM Tons; Rochelle 1196 Acres, 150 MM Tons	Sale Held: 9/28/92, Bid Accepted Lease Effective: 10/1/92	Offered as One Tract: 3064.04 Acres 393,600,000 Tons	1 bid received, \$86,987,765.00 \$28,389.89/acre, 22.1 cents/ton Accepted	NA ROCH Btu/lb= 8804, 8700 Ash = 4.40%, 4.31% Sulfur=0.35%, 0.13% Ratio = 2.29, 2.16 BCY**/ton	
WEST ROCKY BUTTE WYW122586 Proposed Rocky Butte Mine Northwestern Resources Co.	12/4/90	390 Acres 50 MM tons	Sale Held: 12/3/92, Bid Rejected; Sale Held 1/7/93, Bid Accepted; Sale Procedure Appealed, Sale upheld by IBLA; Lease Effective 1/1/93; PRBRC* Reconsideration Request Denied; Logical Mining Unit Approved	463.205 Acres 55,000,000 Tons	12/3/92, 1 bid received, \$14,200,000 \$30,603.45/acre, 25.8 cents/ton Bid Rejected 1/7/92, 1 bid received, \$16,500,000 \$35,621.38/acre, 30.0 cents/ton Bid Accepted	Upper Coal(98% of coal) Btu/lb=8354 Ash=4.30%, Sulfur=0.27% Average Overall Strip Ratio=3.75BCY**/ton	
SUMMARY		ESTIMATED 999,115,500 RECOVERABLE TONS COAL LEASED, TOTAL BONUS \$195,511,977.69					
LEASE BY APPLICATIONS (LBA'S): PENDING							
WYOMING							
EAGLE BUTTE WYW124783 Eagle Butte Mine AMAX Land Co./ AMAX Coal West, Inc.	7/25/91	915 Acres 150 MM Tons	Scoping meeting held 4/14/93 in Gillette; Draft EA released 11/5/93; Public Hearing held on 12/8/93 in Gillette				
ANTELOPE WYW128322 Antelope Mine Antelope Coal Co.	12/29/92	462.2 Acres 60 MM Tons	Scoping Meeting held 2/17/94 in Douglas; Second scoping period ended May 16, 1994; EA is in preparation				
NORTH ROUNDUP WYW127221 North Rochelle Mine Ziegler Coal Co.(formerly Shell)	7/22/92	1439 Acres 140 MM tons	Regional Coal Team recommended processing on 6/16/93; EIS will be prepared				
MONTANA							
WESTERN ENERGY COMPANY MTM80697 Rosebud Mine Western Energy Co.	1/29/92	2061 Acres 39.3 MM Tons	Scoping Meetings Held during July and August, 1992; Draft EIS Released				

*PRBRC=Powder River Basin Resource Council, WOC=Wyoming Outdoor Council

**BCY = Bank Cubic Yards

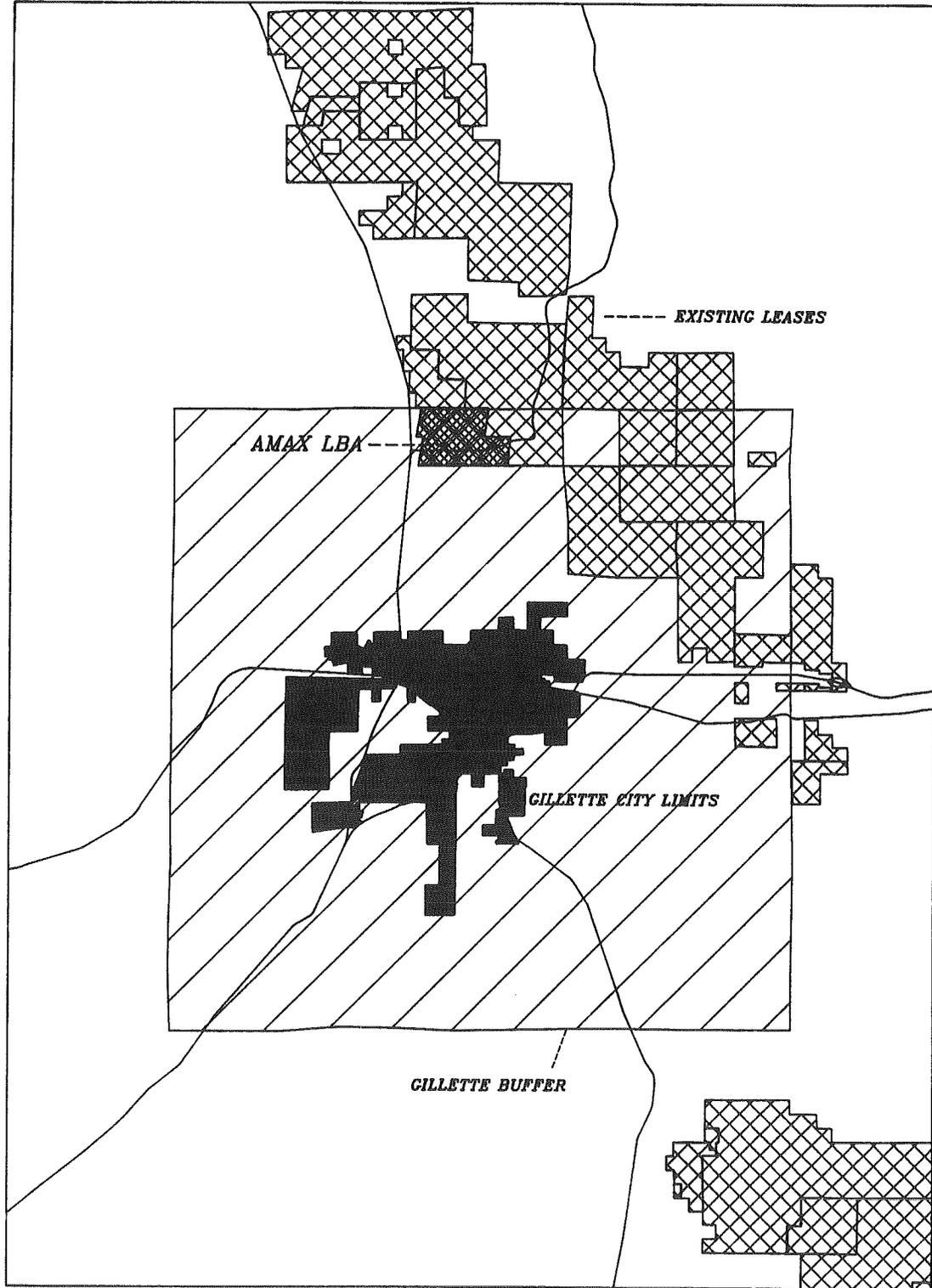
BLM - GILLETTE PLANNING AREA

446556.

473132.

4923736.

4923736.



AMAX LBA

EXISTING LEASES

GILLETTE CITY LIMITS

GILLETTE BUFFER

446556.

SCALE 1: 100000.

473132.

CHAR06959>RMP>M. GILLETTE
CHAR06959
04/13/93 10:55

4886874.

4886874.

Figure 3: City of Gillette Buffer Zone

in situations where coal adjacent to existing mines would be bypassed if leasing was not allowed within the buffer zone, and where coal leasing would not conflict with city planning. In August of 1988, the decision was approved "...to amend the Buffalo RMP so that the Bureau can consider new applications for emergency coal leases, exchanges, or lease modifications within the 3-mile buffer zone surrounding the Gillette Planning District. All applications within the Gillette Buffer Zone would have to be adjacent to an existing mining operation and extend no more than 1 mile beyond existing coal lease boundaries....".

The regulations which are applicable to the above types of coal leasing actions are as follows: 43 CFR 3425--Leasing on Application for emergency coal leases; 43 CFR 3435--Lease Exchanges for coal lease exchanges; and 43 CFR 3432--Lease Modifications for coal lease modifications.

The LBA process is also a part of the 43 CFR 3425 regulations. LBAs were not specifically listed in the amendment to the Buffalo RMP because that process could not be used until the Powder River Basin was decertified as a federal coal producing region in January of 1990. Since the Buffalo RMP was amended in 1988 to allow leasing within the Gillette Buffer Zone under the regulations at 43 CFR 3425, it is not necessary to amend the plan to include LBAs. An RMP plan change adding LBAs to the types of leasing actions that can be considered in the Gillette Buffer Zone was approved by the Buffalo Resource Area Manager on August 17, 1993. The City of Gillette passed a resolution in support of AMAX's proposed LBA on July 1, 1991.

The coal leasing unsuitability criteria listed in the Federal Coal Management Regulations (43 CFR 3461) have been applied to the lease application area. Table 2 summarizes the unsuitability criteria (column 1), describes the findings for the entire area of the Buffalo Resource Area RMP (column 2), and presents a validation of these findings for the Eagle Butte LBA tract, including the lands under Alternatives 1 and 2 (column 3). The table shows that none of the lands located on the tract were found unsuitable for leasing, and therefore the tract is available for further consideration for leasing.

C. Relationship To Statutes, Regulations, Or Other Plans

The Eagle Butte coal lease application was submitted and is being processed and evaluated under the following authorities: Mineral Leasing Act of 1920 as amended; Multiple-Use Sustained Yield Act of 1960; National Environmental Policy Act of 1969 (NEPA); Federal Coal Leasing Amendments Act of 1976 (FCLAA); Federal Land Policy and Management Act of 1976 (FLPMA); and the Surface Mining Control and Reclamation Act of 1977 (SMCRA).

The leasing of federal coal is the responsibility of the BLM under FCLAA. This environmental assessment has been prepared to evaluate the potential impacts which could be expected to occur if the proposed lease is issued and mined. If the proposed Eagle Butte LBA

Table 2. Validation of Unsuitability Criteria for Eagle Butte LBA Tract

UNSUITABILITY CRITERIA	FINDINGS FROM THE BUFFALO RESOURCE AREA RMP (BLM, 1985)	VALIDATION FOR EAGLE BUTTE LBA TRACT
<p>1. Federal Land Systems. All federal lands included in the following systems are unsuitable for leasing: 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.</p>	<p>None of the listed federal land categories are present within the Buffalo Resource Area coal development review area.</p>	<p>Not applicable to Eagle Butte LBA.</p>
<p>2. Rights-of-Way and Easements. Federal lands that are within rights-of-way or easements or within surface leases for residential, commercial, industrial or other public purposes, on federally-owned surface are unsuitable for leasing.</p>	<p>Rights of way and buffers for mainline railroads, I-25 and I-90 were declared unsuitable.</p>	<p>None of these rights of way are on the tract; the area is available for further consideration.</p>
<p>3. Dwellings, Roads, Cemeteries, and Public Buildings. Federal lands within 100 feet of a right-of-way of a public road or a cemetery or within 300 feet of any public building, school, church, community or institutional building or public park or an occupied dwelling.</p>	<p>Within the study area there were 390 acres around dwellings that were considered unsuitable.</p>	<p>The only buildings on or within 300 feet of the tract are owned by AMAX; the tract is therefore available for further consideration.</p>
<p>4. Wilderness Study Areas. Federal lands designated as wilderness study areas are unsuitable while under review for possible wilderness designation.</p>	<p>A portion of the Fortification Creek wilderness study area is within the review area, but not near the Eagle Butte Tract.</p>	<p>There are no unsuitable findings; the tract is available for further consideration.</p>
<p>5. Lands with Outstanding Scenic Quality. Scenic federal lands designated by visual resource management analysis as Class I (outstanding visual quality or high visual sensitivity) but not currently on the National Register of Natural Landmarks are unsuitable.</p>	<p>No lands on the review area meet the scenic criteria as outlined.</p>	<p>There are no unsuitable findings; the tract is available for further consideration.</p>
<p>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 are unsuitable for the duration of the study except where mining would not jeopardize the purpose of the study.</p>	<p>No lands on the review area are under permit</p>	<p>There are no unsuitable findings; the tract is available for further consideration.</p>
<p>7. Historic Lands and Sites. All publicly or privately owned places which are included in or eligible for inclusion in the National Register of Historic Places and an appropriate buffer zone are unsuitable. Sites with potential for listing on the National Register will be reviewed with the State Historic Preservation Office for acceptability for mining if they are under consideration for leasing.</p>	<p>On the basis of consultation with the State Historic Preservation Office there were no unsuitable findings under this criterion in the review area. No sites in the area are listed on the NRHP.</p>	<p>There are no unsuitable findings; the tract is available for further consideration.</p>

UNSUITABILITY CRITERIA	FINDINGS FROM THE BUFFALO RESOURCE AREA RMP (BLM, 1985)	VALIDATION FOR EAGLE BUTTE LBA TRACT
8. Natural Areas. Federal lands designated as natural areas or National Natural Landmarks are unsuitable.	The Dry Creek Petrified Tree Natural Area was identified as unsuitable. This is not on or near the tract.	There are no unsuitable findings; the tract is available for further consideration.
9. Critical Habitat for Threatened or Endangered Plant and Animal Species. Federally designated critical habitat for T & E plant and animal species, and scientifically documented essential habitat for those species are unsuitable.	There is no federally designated critical habitat for T & E plant or animal species within the review area. Prairie dog towns were considered acceptable pending study.	*There are no unsuitable findings; the tract is available for further consideration.
10. State Listed 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 T & E shall be considered unsuitable.	Wyoming does not maintain a state list of T & E species of plants or animals. Therefore, this criterion does not apply.	There are no unsuitable findings; the tract is available for further consideration.
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 the eagles will not be disturbed during the breeding season or unless golden eagle nests will be moved.	About 116,000 acres were declared unsuitable under this criterion, and about 1,360 acres were found suitable pending further study.	*No eagle nests were found on or near the Eagle Butte LBA tract. There are no unsuitable findings; the tract is available for further consideration.
12. Bald and Golden Eagle Roost and Concentration Areas. Bald and golden eagle roost and concentration areas on federal lands during migration and wintering are unsuitable unless mining can be conducted in such a way as to ensure that eagles shall not be disturbed.	No golden eagle roost or concentration areas occur on the review area. Bald eagle roosts and buffer areas encompassing about 980 acres were declared unsuitable.	*No bald eagle roosts are on or near the tract; the tract is available for further consideration.
13. Federal lands containing an active falcon (excluding kestrel) cliff nesting site and a suitable buffer zone shall be considered unsuitable.	About 5,700 acres were determined unsuitable because of prairie falcon nests and buffer areas.	*None of the sites are on the Eagle Butte LBA tract; the tract is available for further consideration.
14. Habitat for Migratory Bird Species. Federal lands which are high priority habitat for migratory bird species of high federal interest shall be considered unsuitable.	About 460 acres were declared unsuitable due to two active merlin nests.	*Neither site is on the LBA tract; the tract is available for further consideration.
15. Fish and Wildlife Habitat for Resident Species. Federal lands which the surface management agency and state jointly agree are fish and wildlife habitat of resident species of high interest to the state, and which are essential for maintaining these priority wildlife species, shall be considered unsuitable.	About 13,300 acres were declared unsuitable under this criterion.	No unsuitable areas are on the tract; the tract is available for further consideration.

UNSUITABILITY CRITERIA	FINDINGS FROM THE BUFFALO RESOURCE AREA RMP (BLM, 1985)	VALIDATION FOR EAGLE BUTTE LBA TRACT
16. Floodplains. Federal lands in riverine, coastal, and special floodplains shall be considered unsuitable unless stipulated methods of mining can be undertaken without substantial threat of loss of life or property.	After consultation with the USGS, it was determined that floodplains can be mined with site specific stipulations and resource protection safeguards to be developed during mining and reclamation planning. Therefore, all lands within the review area are available for further consideration.	There are no unsuitable findings; the tract is available for further consideration.
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 municipal watersheds within the review area.	There are no unsuitable findings; the tract is available for further consideration.
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 considered unsuitable.	There are no natural resource waters within the review area.	There are no unsuitable findings; the tract is available for further consideration.
19. Alluvial Valley Floors. All 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 damage the quality or quantity of water in surface or underground systems that would supply AVFs, the land shall be considered unsuitable.	Lands along prominent drainages were considered potential AVFs pending a final determination by the state. These lands are placed in an "available pending further study" category and are not considered unsuitable.	The WDEQ/LQD has determined that potential AVF lands on and adjacent to the Eagle Butte LBA tract are not significant to farming (April 22, 1993 letter from Lou Harmon (DEQ) to M. Nicholson (AMAX)).
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.	The state has no applicable criteria and there is no Indian tribe located in or near the planning area. Therefore there is no unsuitability finding.	Various tribal entities were notified during the scoping process. None expressed concerns. Thus the tract is available for further consideration.

* Based on consultation with the U.S. Fish and Wildlife Service, see comment letter 2, Appendix B

tract is leased, the lessee will be required to obtain a coal mining permit prior to mining the coal. As a part of that process, a new Mine and Reclamation plan must be developed. Specific impacts which will occur during the mining and reclamation of the tract will be addressed in that proposed Mine and Reclamation Plan and specific mitigation for any anticipated impacts will be described.

After a coal lease is issued, 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 Wyoming Department of Environmental Quality (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 non-federal 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 (PAP) to OSM and WDEQ for any proposed coal mining and reclamation operations on federal lands in the state. WDEQ reviews the PAP to ensure that the permit application complies with the permitting requirements and that the coal mining operation will meet the performance standards of the approved Wyoming state permanent program. OSM, BLM, and other federal agencies review the PAP to ensure that it complies with the terms of the coal lease, the Mineral Leasing Act of 1920, NEPA, and other federal laws and their attendant regulations. If the PAP does comply, WDEQ issues the applicant a permit to conduct coal mining operations. OSM recommends approval, approval with conditions, or disapproval of the mining plan to the Assistant Secretary of the Interior, Land and Minerals Management. Before the mining plan can be approved, the BLM must concur with this recommendation.

WDEQ enforces the performance standards and permit requirements for reclamation during the mine's operation and has primary authority in environmental emergencies. OSM retains oversight responsibility for this enforcement. BLM has authority in those emergency situations where WDEQ or OSM cannot act before significant environmental harm or damage occurs.

There is a significant amount of permitting in addition to the coal mining permit required before mining can commence. Table 3 lists the state and Federal regulatory agencies which must be consulted prior to mining and the additional permits that may be needed.

Table 3: Federal and State Permitting Requirements and Agencies

FEDERAL	STATE
Coal Lease (Bureau of Land Management)	Coal Lease (State Land Commission)
Scoria Lease (Bureau of Land Management)	Scoria Lease (State Land Commission)
Exploration Drilling (Bureau of Land Management)	Permit to Mine (WDEQ-Land Quality Division)
Dept. of Interior Permit to Mine/ SMCRA Oversight (Office of Surface Mining)	Permit to Construct (WDEQ-Air Quality Division)
Drinking Water (Environmental Protection Agency)	Industrial Siting (Industrial Siting Commission)
Wastewater (National Pollution Discharge Elimination System)	Water Rights (State Engineer's Office)
Water Impoundment (Mine Safety and Health Admin.)	NPDES Impoundments (WDEQ-Water Quality Division, WDEQ-Land Quality Division)
Wetlands (Army Corps of Engineers)	Sedimentation Reservoirs (WDEQ-Land Quality Division)
Hazardous Waste I.D. Number (Environmental Protection Agency)	Storm Water Discharge (WDEQ-Land Quality Division)
Nuclear Source (Nuclear Regulatory Commission)	Solid Waste (WDEQ-Land Quality)
Explosives (Bureau of Alcohol, Tobacco and Firearms)	
Radio (Federal Communications Commission)	

D. Public Participation

The Eagle Butte lease application was reviewed by the Powder River Regional Coal Team at their last three yearly public meetings (September 6, 1991 in Cheyenne, Wyoming; June 25, 1992 in Gillette, Wyoming; and June 16, 1993 in Billings, Montana). The company presented information about the Eagle Butte Mine and the lease application to the regional coal team at the June 25, 1992 meeting.

Preliminary scoping for developing the initial draft EA was based upon the issues considered in the previously prepared environmental analyses and detailed mine permits in the Powder River Coal Region. In March, 1993, more than 160 notices of a scheduled scoping meeting were mailed to federal state agencies, local governments, conservation groups, commodity groups, and individuals who may be impacted by this lease application. A scoping meeting was held in Gillette, Wyoming, on April 14, 1993. Five written comments were received on the Eagle Butte lease application, and several additional oral comments were made at the scoping meeting. Issues identified and concerns expressed during the scoping meeting have been addressed in this draft EA where possible.

The draft EA was issued in November, 1993. A public hearing was held on December 8, 1993 in Gillette, Wyoming. Forty three comment letters were received. These comment letters and responses are included as Appendix A in this final document. This final document includes revisions made in response to the comments received on the draft document.

Additional review and coordination with state and federal agencies was also done. Specifically, letters were written to appropriate agencies advising of the pending lease application and requesting their concerns. Results are discussed below in the sections dealing with the respective environmental disciplines.

II. PROPOSED ACTION AND ALTERNATIVES

A. Alternative No. 1: Sale of Lease As Applied For To Be Mined With Existing Mining Operation

Under this alternative, the Eagle Butte LBA tract would be offered for competitive sale as applied for, subject to standard and special lease stipulations. The boundaries of the tract would be consistent with the tract configuration proposed in the AMAX lease application (See Figure 2). This alternative assumes that the applicant (AMAX) is the successful bidder on the tract.

Coal resources for the proposed lease have been preliminarily estimated at around 150 million tons. This estimate of coal resources is used for the draft and final EA because it is based on publicly available information. A more accurate estimate of recoverable reserves based on the geologic and engineering evaluation of the tract will be included in the sale notice when the tract is offered for sale. The legal description of the proposed coal lease lands as applied for under Alternative 1 by AMAX is as follows:

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

Sec. 33: Lots 1-3 (All), Lots 6-10 (All), E1/2 Lot 11,
E1/2 Lot 14, Lots 15-16 (All);

Sec. 34: Lots 3-6 (All), Lots 9-16 (All)

TOTAL (applied for) 914.53 acres more or less

This legal description and acreage are based on approved U.S. Department of the Interior, Bureau of Land Management plats filed in Cheyenne, Wyoming.

The following special lease stipulations will be required when the lease is issued:

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 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 office 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 Assistant Director of the Western Support Center of the Office of Surface Mining, the authorized officer of the BLM, if activities are associated with the 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 Assistant Director or Authorized Officer to protect cultural resources on the lease lands. The lessee shall not commence the surface disturbing activities until permission to proceed is given by the Assistant Director or Authorized Officer.

(2) The lessee shall protect all cultural resource properties 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 plan or exploration plan.

(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 Assistant Director or Authorized Officer, or the Authorized Officer of the surface managing agency. The lessee shall not disturb such resources except as may be subsequently authorized by the Assistant Director or Authorized Officer. Within two (2) working days of notification, the Assistant 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 surface managing agency 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 a paleontological resource, either large and conspicuous, and/or of significant scientific value is discovered during any surface disturbing activities, the find will be reported to the Authorized Officer immediately. Surface disturbing activities 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 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 a 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 interest discovered during the operation.

(c) OIL AND GAS RESOURCES

The BLM realizes that coal mining operations conducted on leases issued within producing oil and gas fields may interfere with the economic recovery of oil and gas; just as oil and gas leases issued in a coal lease may inhibit coal production. BLM retains complete authority to alter and/or modify coal operations or oil and gas operations on lands covered by Federal leases so as to obtain maximum resource recovery of either or both resources with due regard to valid existing rights.

(d) RESOURCE RECOVERY AND PROTECTION

Any proposed bypass of Federal coal determined to be economically recoverable must have the written approval of the authorized officer of the BLM in the form of an approved modification to the Resource Recovery and Protection Plan (R2P2) prior to the Federal coal being bypassed (43 CFR 3482.2(c)(2)). Failure to comply with this requirement shall result in the issuance of a Notice of Noncompliance by the authorized officer. The Notice of Noncompliance will include the amount of damages to be assessed for the unauthorized bypass of Federal coal as determined by the authorized officer. The amount of damages, at a minimum, will be the amount of royalty to be assessed as determined by the authorized officer to compensate the Federal government for the unauthorized bypassed Federal coal.

(e) 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 Public Lands of the United States". The survey will be recorded in the appropriate county records, with a copy sent to the authorized officer.

If AMAX acquired the proposed Eagle Butte tract, it would be mined as part of the existing Eagle Butte mining operation. A new Mining and Reclamation Plan would be developed to show a logical mining sequence into the acquired lease. The current Eagle Butte Mine plan indicates that a total of 5706 surface acres is currently permitted for disturbance by the existing mine as a result of mining or mining-related activities such as overstripping, roads and diversions (approximately 4690 acres will be disturbed by actual coal removal and approximately 1016 acres will be disturbed by related activities). Approximately 250 acres of the surface of the proposed lease would need to be disturbed by overstripping to mine the existing lease, but this disturbance is not yet permitted in the existing mine permit. Addition of the proposed lease would increase the currently permitted disturbance area by approximately 1210 acres (915 acres for actual coal removal plus 295 acres for mining-related activities). The total area of surface disturbance under the proposed action (the existing mine plus the proposed lease) would be 6916 acres (5706 acres currently permitted for disturbance plus 1210 additional acres with the LBA). Based on the location and movement of the existing pit, it is estimated that coal removal would begin in approximately 2003. Topsoil removal would begin in approximately 2002. Both these dates assume that the required mining permits are obtained in a timely fashion.

With or without the LBA tract, coal production at Eagle Butte is estimated to be 14 million tons per year until 2003, when it is projected to increase to 16 million tons per year (mmtpy). The addition of the LBA tract would extend the life of the mine by between 9 and 10 years, assuming that all of the estimated 150 million tons of coal are recoverable and that they are produced at a rate of 16 mmtpy. Employment is predicted to increase slightly over the life of the mine, as the overburden ratio and haul distance increase from the current situation, where both are minimal.

The AMAX application for the coal in the Eagle Butte LBA tract was based on the fact that it is a logical southwestern extension of the Eagle Butte Mine operation. No other existing operator is in a position to recover the coal reserves in this tract. The tract is bounded by the existing Eagle Butte leases to the north and east, and by U.S. Highway 14-16 and the Campbell County Airport to the west. As discussed above in Section I. B., the City of Gillette Buffer Zone limits mining to the south. If this coal is not mined in conjunction with the existing Eagle Butte lease, it is not likely that it will be recovered in the future.

B. Alternative 2: Sale Of Lease As Amended By BLM To Be Mined With Existing Mining Operation

To prevent a potential coal bypass situation in the future, the BLM is considering adding additional lands to the tract (Figure 2). The legal description of the coal lease lands proposed for addition to the Eagle Butte LBA tract by the BLM is as follows:

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

Sec. 28: W1/2 Lot 13;

Sec. 33: Lot 4, E1/2 Lot 5, W1/2 Lot 11, E1/2 Lot 12,
W1/2 Lot 14

TOTAL ADDED TO LEASE BY BLM: 144.645 acres more or less

TOTAL APPLIED FOR: 914.53 acres more or less

TOTAL UNDER ALTERNATIVE 2: 1,059.175 acres more or less

This legal description and acreage are based on approved U.S. Department of the Interior, Bureau of Land Management plats filed in Cheyenne, Wyoming.

Under this alternative, the Eagle Butte LBA tract with amended boundaries would be offered for competitive leasing. Alternative 2 would add approximately 140 acres to the tract to provide for recovery of federal coal located between the Eagle Butte LBA tract as applied for and U.S. Highway 14-16. Alternative 2 is the preferred alternative of the BLM.

The special lease stipulations required for Alternative 1 would also be required for Alternative 2 (see special stipulations (a) through (e) listed under Alternative 1). In addition, the following special lease stipulation would be included if Alternative 2 is selected:

(f) COAL RESOURCES ADJACENT TO U. S. HIGHWAY 14-16

The lessee is required to recover all coal that is economically, legally, and administratively recoverable east of the center line of U.S. Highway 14-16 within the boundaries of the lease.

Alternative 2 also assumes that the applicant is the successful bidder on the tract if it is offered for sale. It allows for recovery of small wedges of coal east of Highway 14-16 that would not be recovered by mining the tract as applied for. This coal would be logically mined with the Eagle Butte LBA, and this coal could go unrecovered if not mined with the Eagle Butte LBA tract. Coal resources in this expanded area were preliminarily estimated at 34 million tons of federal coal. This preliminary estimate of coal resources in the expanded area is used in the draft and final EAs because it is based on publicly available information. A more accurate

estimate of coal resources underlying this area based on BLM's geologic and engineering evaluation of the tract will be included in the sale notice when the tract is offered for sale.

The boundary of the expansion area was designed to allow maximum recovery of the coal east of Highway 14-16. Much of the coal underlying the expanded area would not be recoverable due to a required buffer zone along Highway 14-16. No mining activities, including overburden stripping, can occur within 100 feet of the outside right-of-way of any public road. Additional coal reserves would be left in place beyond this buffer zone so that a stable highwall situation can be maintained. As a result, coal recovery would increase by only 6 million tons under this Alternative. The total surface disturbance under this alternative would be the 1210 acres, as in Alternative 1. No additional surface disturbance would occur under this alternative, because the surface of the land added under Alternative 2 would be disturbed by mining-related activity under Alternative 1.

Mining further west in the immediate area is not currently feasible because of the highway and the airport. Coal could potentially be recovered closer to the airport if Highway 14-16 were moved in the future. At this time, there does not appear to be a feasible alternate location for the highway as the existing Eagle Butte Mine is located east of the highway and the airport lies west of the highway. Airport safety considerations might also limit the extent of mining near the airport if a feasible alternate route for Highway 14-16 is located.

C. Alternative 3: No Action Alternative

Under this alternative, the BLM would reject the coal lease application, the tract would not be offered for sale. If this coal is not mined with Eagle Butte's current operation, it would be isolated by coal removal and reclamation on the north and east, the Gillette Buffer Zone on the south, and the airport on the west. As a result, over 150 million tons of coal could be bypassed for decades to come, if not forever. The impacts associated with extending the life of the existing mine by nine to ten years would be avoided. The potential income from the bonus bid, future royalties and taxes on over 150 million tons of coal, and the economic benefits of ten additional years of operation by the mine would be foregone. A portion of the surface of the proposed lease area (approximately 250 acres) would be disturbed due to overstripping to mine the contiguous Eagle Butte coal lease.

D. Alternatives Considered But Not Analyzed In Detail

1. Alternative No. 4: Proposed Lease Sale For A New Stand-Alone Mine

The lease-by application process is a competitive leasing process. LBA coal tracts are nominated for leasing by companies with an interest in acquiring them, but the coal is sold by a competitive bidding process which is not restricted to the company nominating the lease. If

a lease sale is held for the Eagle Butte tract, someone other than AMAX could be the successful bidder at that lease sale. The successful bidder would then have ten years to produce one percent of the estimated coal reserves or lose the coal due to failure to meet the diligence requirements of FCLAA.

Under this alternative, the Eagle Butte LBA tract would be offered for competitive leasing, subject to standard and special lease stipulations, but it is assumed that AMAX would not be the successful bidder. The same special lease stipulations would be required as for Alternative No. 1 (see section II.A. of this report). The boundaries of the tract would be consistent with one of the tract configurations designated in Alternatives 1 or 2 (see Figure 2). This alternative assumes that the successful bidder would acquire the lease in order to open a new stand-alone surface mine on the tract. The existing Eagle Butte lease lies between the LBA tract and the other coal mines north of Gillette. As a result, the tract probably could not be efficiently mined by one of these mines.

A stand-alone mine would require new surface facilities including offices, shop facilities, warehouses, coal processing facilities, and coal loadout, that would not be required if the tract were developed as an extension of the existing Eagle Butte Mine. The cost of these facilities could exceed \$100 million. A further obstacle to the development of a new stand-alone surface mine on this LBA tract is the lack of an appropriate location for surface facilities within or adjacent to the tract. The LBA tract is physically constrained on all sides, the existing Eagle Butte coal lease borders the proposed tract on the north and east, Highway 14-16 and the Campbell County Airport border it on the west, and the City of Gillette buffer zone borders the tract on the south (Figure 2 and Figure 3). Placing the facilities on the tract itself would mean that the coal underlying the facilities would not be mined (which would significantly decrease the coal available for mining), or that the facilities would have to be moved at some point during the life of the mine to make the underlying coal available for mining (which would be very expensive).

A stand-alone mine would also require access to a rail line in order to haul the coal to its customers. Several existing mines lie between the Eagle Butte LBA and the existing main rail line. As a result, any railroad spur reaching the Eagle Butte LBA would have to be at least 10 miles long in order to avoid the existing mines. The estimated cost to build a rail line is \$2 million to \$3 million per mile.

If the site and railroad constraints could be overcome, it is not likely that the Eagle Butte tract contains sufficient reserves to economically justify opening a new mine for the following reasons:

- Acquiring the coal, permitting a mine and constructing facilities are very expensive undertakings requiring years to complete. During this time, there would be no return on these investments.

- Any operator acquiring this coal for a new start mine would have to compete for

customers with established mines in a market that is already very competitive.

--This tract is located in an area of relatively uniform overburden. None of the coal is located along the coal outcrop line. As a result, there is not an area with lower overburden, such as an outcrop area, to start mining. Most of the other mines in the basin are mining in areas with lower ratios of overburden to coal, which would put an operator opening a new mine on this tract at an additional economic disadvantage.

There are not sufficient coal reserves in the Eagle Butte LBA tract to economically justify a new mine start in the current market. Additional coal reserves are not accessible because of the constraints listed above. The tract is not accessible to other existing mines north of Gillette because the existing Eagle Butte lease lies between these mines and the LBA tract. Consequently, the probability of this tract being purchased by another company is very low, and Alternative 4 was not analyzed in detail. The environmental impacts of Alternative 4 would be greater than for Alternatives 1 or 2 because of new facilities, new employment, and an additional source of dust and blasting.

2. Alternative No. 5: Postpone Lease Sale

Under this alternative, the sale of the Eagle Butte tract would be postponed under the assumption that coal prices would rise in the future and that would increase the value of the coal so that the Federal government would receive a larger bonus bid up-front from the lease sale. The main source of revenue to Federal and state governments from the leasing and mining of Federal coal is the 12.5 percent royalty payment that is collected on all Federal coal at the time it is sold. However, an increase in spot and term prices could increase the fair market value of the coal in the ground, and thus result in an increase in bonus bids at the time the coal is leased.

Spot prices for Powder River Basin coal were at an all time low in 1993. A rise in new spot and term prices has been predicted by some for Powder River Basin coal as a result of incentives favoring low sulfur coal in the Clean Air Act of 1990. Production of Powder River coal increased significantly in 1993, after a decline in production in 1992. Spot prices have risen in early 1994 as a result of unexpected coal shortages in the basin, but the duration or extent of the coal shortages and the price increase is uncertain (Riley; Casper Star Tribune, March 14, 1994).

Since the 12.5 percent royalty payments are the major source of revenue to the Federal and state governments and they are collected when the coal is sold, the mechanism is already in place for government revenues to increase if coal prices rise. Postponement of the lease sale may mean that a price rise can't be fully taken advantage of, since there generally is a significant time lag (several years) between the time the prices escalate and the time additional coal could be brought to market to respond to that price rise. This lag is due to the time necessary for leasing, baseline data collection, permitting, and initiating a logical mining plan.

Also, postponement could result in lower royalty revenues to the government if the operator must sell the coal on the cheaper spot market, because he cannot anticipate having the reserves to negotiate higher-priced, long-term contracts.

The environmental impacts for Alternative 5 could be the same as for Alternatives 1, 2, or 3. If the sale is not postponed beyond the time when the tract could be logically mined with the existing Eagle Butte operations, the impacts would be the same as for Alternative 1 or 2. If the sale is delayed beyond the time the tract could logically be mined with the Eagle Butte operations, the impacts could be the same as for Alternative 3.

The mine plan for the Eagle Butte LBA tract, if mined along with the current Eagle Butte Mine coal lease, shows coal removal in 2003, with topsoil removal approximately one year in advance. Permitting, which is also a time-consuming procedure, would need to be done in advance of that. If coal sales increase, these dates could be earlier. Assuming that coal sales do not increase, the lease sale could be postponed several years and still be mined with the existing tract, in which case, the impacts would be the same as Alternative 1 or 2 (depending on the tract configuration). If coal prices were higher at that time, a delay could result in a higher bonus bid at the time of leasing. If coal prices were lower at that time, the bonus bid could be negatively affected. A delay would not result in higher royalty income for the coal, since that will automatically increase or decrease based on the price of coal. A delay could potentially have a negative effect on royalty income if the company had to rely on spot sales of the coal because they could not negotiate higher-priced contracts for the sale of the coal before it was leased.

If the sale were postponed beyond the time the LBA tract could be mined in logical sequence with the Eagle Butte Mine (i.e., after the adjoining acreage on the existing lease was mined and reclaimed), it would be infeasible for Eagle Butte to mine the tract. The tract is not accessible to other existing mines north of Gillette or economical as a stand-alone mine, as discussed in Alternative 4. Additional coal is not available to add to the tract because it is bounded on the north and east by the existing Eagle Butte lease, on the south by the Gillette buffer zone, and on the west by Highway 14-16 and the airport. In this case, postponing the lease sale could have the same impacts as Alternative 3 (the No Action Alternative), with the resulting reduction in the life of the existing mine and the loss of potential income from the bonus bid and future royalties from the tract.

For the above reasons, this alternative is not analyzed in detail.

III. AFFECTED ENVIRONMENT

A. General Setting

The proposed lease area is within a region which has been evaluated by several federal environmental analyses which describe the existing and affected environment in the area of the current proposed lease-by-applications. These documents contain analyses of the impacts to be expected as a result of surface coal mining in this area. They are available for viewing at the Casper District Office of the BLM. The relevant publications are as follows:

- Part 1: Regional Analysis, Final Environmental Impact Statement, Eastern Powder River Coal Basin of Wyoming, Volumes I and II, BLM, October 1974;
- Final Environmental Statement, Eastern Powder River Coal, BLM, March 1979;
- Final Environmental Impact Statement, Federal Coal Management Program, BLM, April 1979;
- Amendment to Wyoming Land Use Decisions: Eastern Powder River Basin Area Management Framework Plan: Gillette Review Area, Casper, Wyoming, 1980;
- Final Environmental Impact Statement, Powder River Coal Region, BLM, December 1981;
- Powder River Coal Regional Tract Summaries, Cheyenne, Wyoming, 1983;
- Draft Environmental Impact Statement, Round II Coal Lease Sale, Powder River Region, BLM, January 1984;
- Buffalo Resource Area, Resource Management Plan (RMP) and Final EIS, BLM, October 5, 1985;
- Final Environmental Impact Statement Supplement, Federal Coal Management Program, BLM, October 1985.
- Coal Bed Methane Environmental Assessment, Eastern Campbell County and Western Johnson County, Wyoming WY-061-0-EA064, Casper BLM, March 1990 (for part of the socioeconomic data);
- Jacobs Ranch Federal Coal Lease Application Environmental Assessment, Casper BLM, June 1991;
- Final Environmental Assessment for the West Black Thunder Coal Lease Application, Casper BLM, March 1992;

- Final Environmental Assessment for the North Antelope and Rochelle Coal Lease Applications for Powder River Coal Company, Casper BLM, May 1992;
- Final West Rocky Butte Coal Lease Application Environmental Impact Statement, Casper BLM, June 1992.

The Eagle Butte Mine has been specifically evaluated in several Federal and state environmental analyses. These documents contain analyses of the impacts to be expected as a result of surface coal mining at the Eagle Butte Mine. They are available for viewing at the Casper District Office of the BLM. The relevant publications are as follows:

- Final Environmental Statement, Proposed Mining and Reclamation Plan, Eagle Butte Mine, Amax Coal Co., Coal Lease W0313773, Campbell County, Wyoming, U.S. Geological Survey, FEIS 77-33, 1977;
- Technical Environmental Analysis, Amax Eagle Butte Mine, Wyoming DEQ, TFN 6/212, 1985, included in Mining Plan Approval Document, Eagle Butte Mine, Amax Coal Company, Federal Lease W0313773, 7/86;
- Environmental Assessment, Amax Coal Co., Eagle Butte Mine, OSM, 1986, included in Mining Plan Approval Document, Eagle Butte Mine, Amax Coal Company, Federal Lease W0313773, 7/86;
- Supplemental Report, Amax Coal Co., Eagle Butte Mine, Permit No. 428-T2, Wyoming DEQ, 1990; included in Mining Plan Approval Document, Eagle Butte Mine, Federal Lease W78631, 1991;
- Environmental Assessment, Eagle Butte Mine, Federal Lease W78631 Mining Plan, Campbell Co., Wyoming, OSM, 1991; included in Mining Plan Approval Document, Eagle Butte Mine, Federal Lease W78631, 1991.

The affected environment also is described in detail in the Eagle Butte Mine's 428-T2 Permit Application (10 Volumes, plus Supplements), which was approved by the Wyoming Department of Environmental Quality, Land Quality Division (WDEQ/LQD) on October 22, 1990. This document is on file and available for public review at the WDEQ offices in Sheridan and Cheyenne, Wyoming. Moreover, detailed environmental baseline information for the proposed lease area has been gathered by AMAX and various consultants to comply with the WDEQ/LQD requirements for a mine plan submittal. This information includes land use, climatology, geology, soils, vegetation, ground water hydrology, surface water hydrology, archaeology, history, air quality, and wildlife.

These studies have revealed that the following elements of the human environment are either not present in the proposed lease area or would not be affected: Areas of Critical Environmental Concern (ACEC), prime or unique farmlands, threatened and endangered species,

sole source drinking water, riparian areas, wild or scenic rivers, or wilderness.

The area is substantially similar to the adjacent Eagle Butte Mine, for which detailed site-specific environmental data have been collected and environmental analyses have been prepared by AMAX to secure the necessary mining permits. These permits and assessments have been previously reviewed in detail and approved by BLM as providing an adequate environmental assessment and employing appropriate environmental stipulations and reclamation measures.

The proposed lease area is located southwest of and adjacent to the existing Eagle Butte Mine as shown on Figures 1 and 2. The southern edge of the tract is about 3 miles north of the city limits of Gillette, Wyoming as shown in Figure 3. Access to the mine is provided by U.S. Highway 14-16.

Eagle Butte is a surface coal mine owned and operated by AMAX Coal West, Inc. Coal is currently mined by a truck/shovel operation. Coal production occurs from 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. Existing facilities at the mine include crushing, storage, loading, administrative, and equipment maintenance facilities. Railroad access is provided for unit trains operated by the Burlington Northern Railroad. Both rail and highway access are shared with The Carter Mining Company's Rawhide Mine, and Triton Coal Company's Buckskin Mine, both located north of Eagle Butte. Rail access for Western Fuels Association's Dry Fork Mine, east of Eagle Butte, is also provided by the rail spur that serves the above three mines.

Construction of the Eagle Butte Mine facilities began in 1976. The initial mine permit for Eagle Butte Mine (No. 428) was issued on May 5, 1976; the 428-T1 permit was issued on December 19, 1985. The first coal was shipped on October 11, 1978. Current production is about 14 million tons per year. Eagle Butte's current air quality permit allows production of up to 29 million tons of coal per year.

The Eagle Butte LBA tract is situated in the Powder River structural basin of northeastern Wyoming. Elevations on the tract generally range from 4300 to 4400 feet above mean sea level. The climate of the region is semi-arid. Precipitation averages about 13 inches per year, with 75 percent of the average precipitation occurring during the growing season, which is from April through September. Summer precipitation is often in the form of brief, intense thunderstorms. Annual evaporation exceeds annual precipitation. The prevailing winds are from the northwest quadrant and the mean annual wind speed is about 8 to 10 mph. The Powder River Basin is part of the Northwestern Great Plains Ecoregion of Omernik (EPA, 1993). This area is characterized as an ecological transition zone between the true short grass plains to the east, and the northern desert shrub type to the west. Within the Wyoming portion of the basin, the potential natural vegetation is a mixture of sagebrush steppe, grama-needlegrass-wheatgrass, and wheatgrass needlegrass (Kuchler; USGS, 1985).

All streams on the proposed lease tract are ephemeral, meaning they flow only in direct response to precipitation or snowmelt runoff events. The principal drainage, East Prong Little Rawhide Creek, crosses the tract from east to west, joining Little Rawhide Creek just west of the tract boundary and U.S. Highway 14-16 (Figure 4). Portions of Little Rawhide Creek downstream of the proposed lease area are intermittent (in contact with the local ground water table), although very little flow is attributable to groundwater discharge. Little Rawhide Creek flows north and northeast, passes through the current Eagle Butte permit area, and joins Rawhide Creek north of Eagle Butte. Rawhide Creek is a tributary of the Little Powder River, which flows into the Powder River, which joins the Yellowstone River in Montana.

B. Affected Resources

1. Geology and Topography

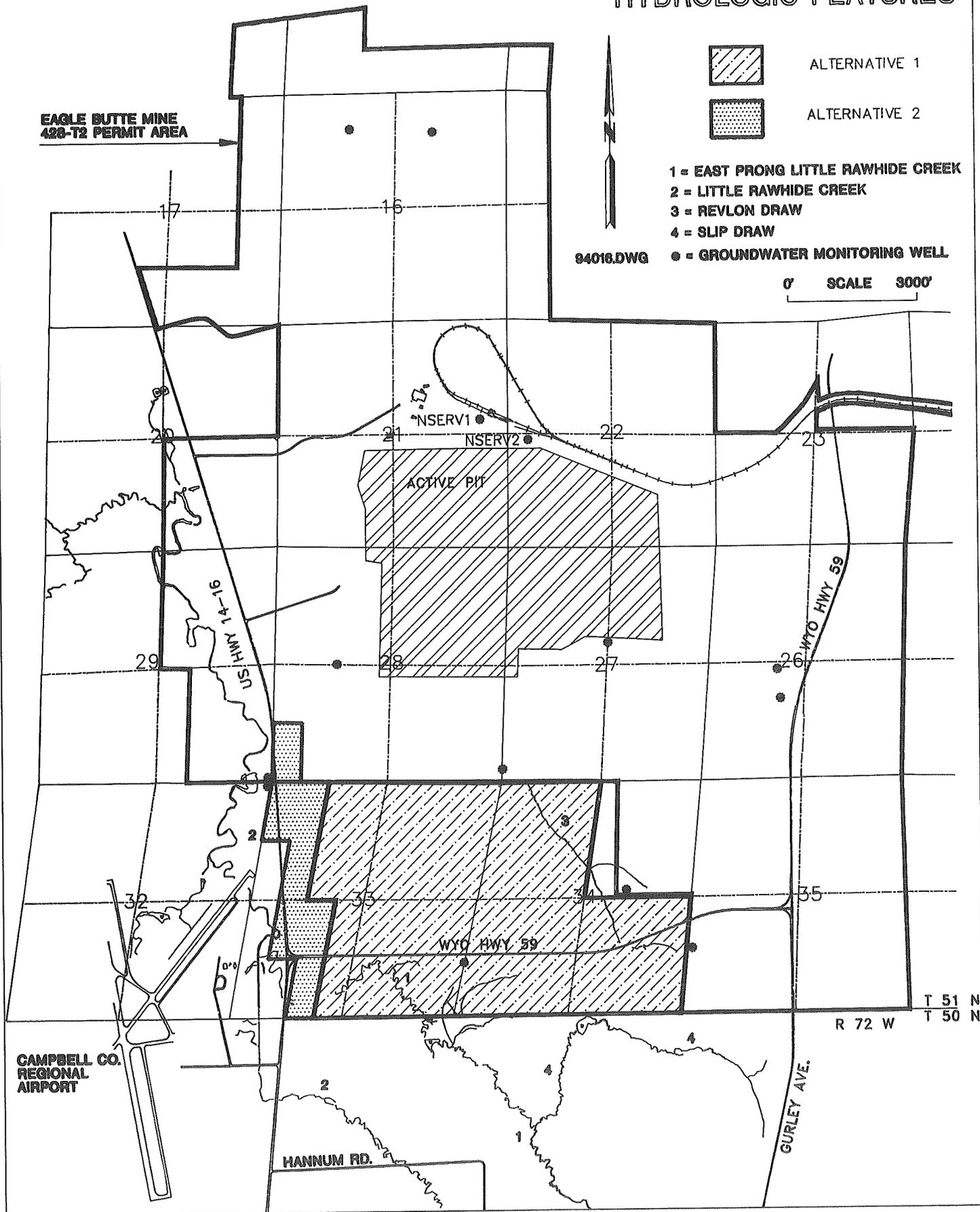
The Powder River Federal Coal Region of northeastern Wyoming lies within the boundaries of the Powder River structural and topographic basin. The structural basin is a broad northwest-southeast trending syncline bounded on the west by the Big Horn Mountains, on the east by the Black Hills, and to the south by the Casper Arch, Laramie Mountains, and the Hartville Uplift. The basin extends northward into Montana. The syncline is asymmetrical and the axis of the syncline (the deepest part of the basin) is west of the geographical center of the basin.

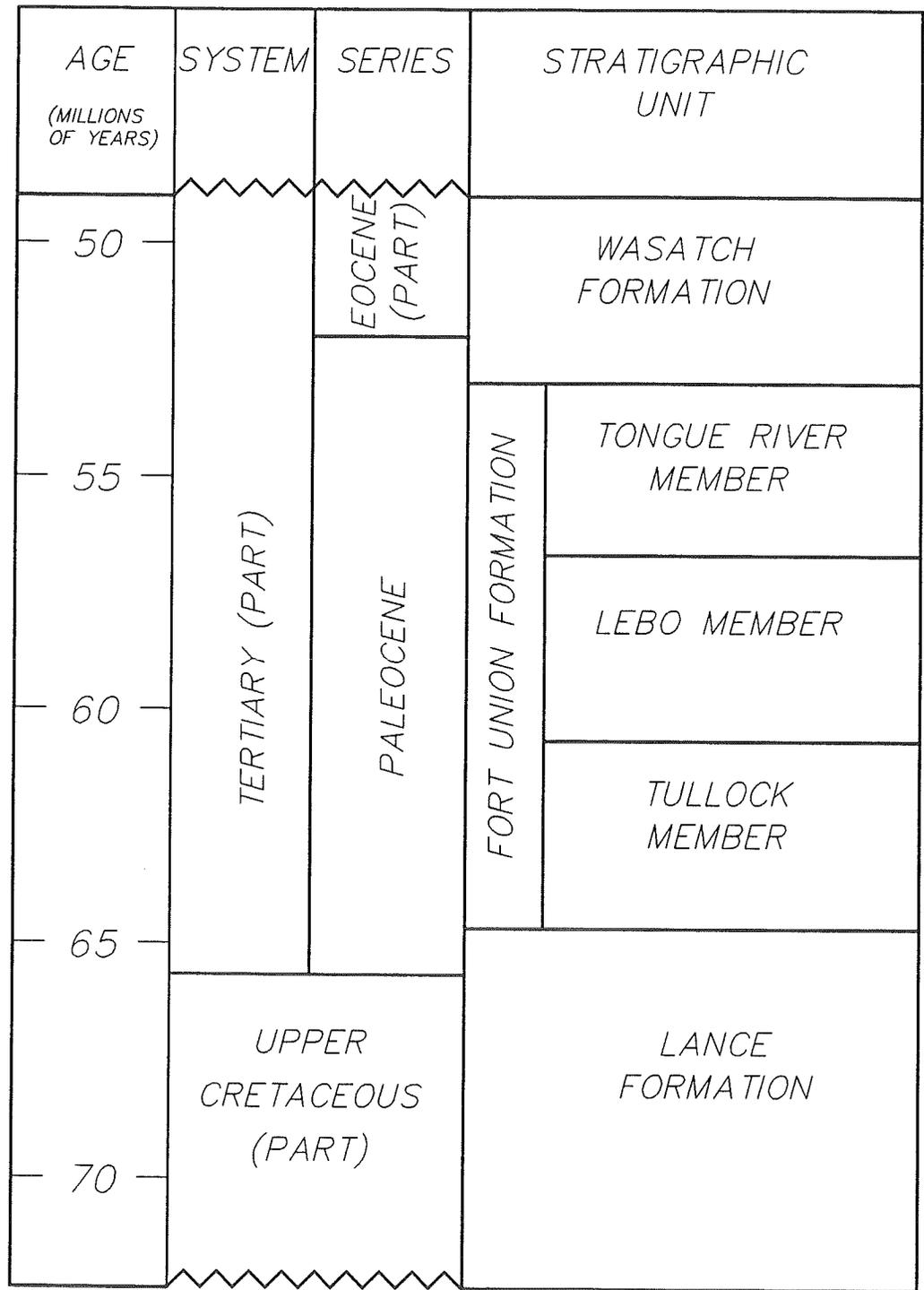
The Eagle Butte Mine is located on the eastern limb of the structural basin. The regional dip in the area of the mine is approximately one degree to the west-northwest. There are local areas within the basin where the shallow strata dip at higher angles. This is generally due to local folding or faulting. There is some faulting and folding, and associated steeper dips in the coal beds in the northwestern part of the existing Eagle Butte Mine, but no faults or folds have been mapped within the study area.

In general, the coal in the LBA tract is as deep as the coal in the existing lease. This means that approximately as much overburden must be removed from the proposed lease as from the existing lease in order to mine the coal.

Stratigraphic units of interest in the mine area include, in descending order, recent (Quaternary age) alluvial deposits, the Eocene age Wasatch Formation which comprises the overburden, and the Paleocene age Fort Union Formation (Figure 5), which contains the coal being mined. In the area where coal is being mined in the basin, the contact between the Fort Union Formation and the Wasatch Formation is informally picked at the top of the main coal seam in the Fort Union Formation. The main coal seam being mined in the southern portion of the Wyoming Powder River Basin is called the Wyodak-Anderson. In the Gillette area, the coal being mined is in two seams. At the Eagle Butte Mine, the upper seam is referred to as the Roland seam and the lower as the Smith seam. According to the Wyoming Geological Survey, the two coal seams in the area of the Eagle Butte Mine are more appropriately called

FIGURE 4. EAGLE BUTTE LBA
HYDROLOGIC FEATURES





From Brown, USGS, 1993, & Law, Rice, & Flores, RMAG, 1991

Figure 5. Generalized Stratigraphic Chart for the Latest Cretaceous and Early Tertiary Periods, Powder River Basin, Wyoming

the Anderson and Canyon seams, respectively (see comment letter 6, from the Geological Survey of Wyoming). For the purposes of this document, the coal seams being mined will be referred to as Roland(Anderson) and Smith(Canyon). These coal beds are roughly equivalent to the Wyodak-Anderson coal seam being mined further south. A shale parting of variable thickness separates the two coal seams in the area of the Eagle Butte LBA tract.

Within the LBA, alluvial deposits are present along East Prong Little Rawhide Creek (Figure 4). They consist primarily of unconsolidated, discontinuous beds of clay, silt and sand.

The Wasatch Formation consists of interbedded shales, siltstones, thin discontinuous coals, and lenticular sandstones. Where sandstones in the Wasatch Formation are of sufficient porosity and areal extent, they serve as aquifers for stock and domestic uses.

The Fort Union Formation consists of non-carbonaceous to highly-carbonaceous shales, mudstones, siltstones, lenticular sandstones, and coal. It is less than 3000 feet thick in the area of the Eagle Butte LBA tract (Lewis and Hotchkiss; U.S. Geological Survey, 1981), but it reaches thicknesses of 6200 feet in the basin (Law, Rice and Flores; Rocky Mountain Association of Geologists, 1991). The Fort Union Formation is divided into three members, which are the Tongue River, Lebo Shale, and Tullock members in descending order (Figure 5).

The Tongue River member consists of sandstone, conglomerate, siltstone, mudstone, limestone, coal and carbonaceous shale. It reaches thicknesses of 1,750 feet in the Powder River Basin (Law, Rice, and Flores; Rocky Mountain Association of Geologists, 1991). It is around 1000 feet thick and consists of approximately 60 percent sand in the area of the proposed lease (Lewis and Hotchkiss, U.S. Geological Survey, 1971). The Roland(Anderson) and Smith(Canyon) coal seams are located at the top of this member in the lease application area. The coal is sub-bituminous in rank, and is generally a low sulfur, low ash coal deposit. Glass (Wyoming Geological Association, 1991) reported average ash, sulfur and Btu/pound values of 5.1 percent, 0.36 percent, and 8580 respectively for coals in the eastern Powder River Basin of Wyoming that are currently being mined. In the current Eagle Butte Mine lease area, the combined thickness of the Roland and Smith coal seams is between 100 and 110 feet (Denson and Pierson, U.S. Geological Survey, 1991). A more accurate estimate of the thickness, average heating value, ash content and sulfur content of the coal in the lease application area based on the geologic and engineering report will be included in the sale notice for the tract. Below the major coal seams [Wyodak-Anderson or Roland(Anderson) and Smith(Canyon)], the Tongue River member consists of interbedded shales, siltstones, sandstones, and thinner, less extensive coal beds.

The middle member of the Fort Union Formation is the Lebo Shale Member. It reaches a maximum thickness of approximately 3000 feet in the Powder River Basin, and consists of sandstone, siltstone, mudstone, coal and carbonaceous shale (Law, Rice and Flores; Rocky Mountain Association of Geologists, 1991). In the area of the proposed lease, it is around 600 feet thick, and consists of 40 to 45 percent sand (Lewis and Hotchkiss; U.S. Geological Survey, 1981).

The lower member of the Fort Union is the Tullock, described as follows by Brown (U.S. Geological Survey, 1993). The Tullock Member ranges in thickness from 370 feet in the northwestern Powder River Basin, in Montana, to 1440 feet in the southeastern Powder River Basin, in northwestern Converse County and northeastern Niobrara County. It consists of fine-grained sandstone, sandy siltstone, shale, rare thin limestone and coal. Where the Tullock crops out along the southeastern edge of the Powder River Basin west of Bill, Wyoming, it consists of greater than 75 percent siltstone and mudstone with minor zones of coal and carbonaceous shale. Thin, lens-shaped sandstone beds comprise the remainder of the member. In the area of the proposed lease it is around 800 feet thick, and consists of greater than 60 percent sand (Lewis and Hotchkiss; U.S. Geological Survey, 1981).

A fourth geologic unit, clinker (also called scoria), is baked or fused rock formed by spontaneous prehistoric burning of coal seams. Clinker formed by burning of the Wyodak-Anderson coal seam is present along the outcrop of the Wyodak-Anderson coal seam. In the Eagle Butte area, clinker is located along the northern and eastern boundaries of the current mine area. No clinker is found within the proposed lease area.

The dominant surficial geologic unit in the area of the lease application is residuum on the Wasatch Formation, which is material derived from weathering of the Wasatch Formation in place. There are small outcrop areas of Wasatch in the eastern and southeastern portions of the lease area, and the alluvial deposits discussed above (Williams; U.S. Geological Survey, 1978).

Methane, the natural gas used to heat homes, occurs in association with coal beds because it is a by-product of coal maturation. Some of the methane produced by coal beds escapes from the coal beds, migrates upward, and is dispersed in the atmosphere. Some of it is trapped in the coal by overburden pressure and the pressure of water that occupies fractures in the coal. Generally, there is more methane in coal beds that are deeper, and less gas in shallow coal beds because there are lower pressures at shallower depths, which trap less gas. Under certain geologic conditions, however, methane from coal beds can be trapped at shallow depths both in and above the coal beds. These geologic conditions include low matrix porosity and permeability in the coals, association of the gas with structurally high features in structurally deformed areas, and the existence of effective seals (Law, Rice and Flores; Rocky Mountain Association of Geologists, 1991). Without the existence of these conditions, which act to trap the gas in shallow coals or adjacent shallow sandstones, the gas in shallow coals escapes to the atmosphere.

Most of the gas generated by the coal beds in the Powder River Basin has gradually escaped to the atmosphere because the coals in the Powder River Basin are at shallow depths and not much methane is held in the coal by overburden and water pressure. Producing amounts of methane do occur at shallow depths in the Powder River Basin, probably due to geologic conditions like those described above.

Methane has historically been reported flowing from shallow water wells and coal exploration drill holes in the Powder River Basin. According to DeBruin and Jones (Wyoming Geological Association, 1989), most of the documented historical occurrences have been in the northern Powder River Basin. Olive (U.S. Geological Survey, 1957) references a water well in T54N, R74W which has produced gas for domestic use since 1916. Occurrences of methane gas in shallow wells in and around Gillette have also been the subject newspaper articles in the Gillette News-Record over the years (for example: "Gas Accompanies Flow of Water in Railroad's Well", 1/18/36, well located in the railroad yard, depth 740 feet; "Vein of Gas Struck on L.C. Reed Ranch", 5/25/48, location 30 miles northwest of Gillette, depth to gas 262 feet; "Gas Struck in Water Well on Ted Barlow Ranch", 4/5/51, ranch location 13 miles west of Gillette, depth to gas 305 feet; and "City Paying \$464,000 to Get Gas Out of Water", 7/10/84, referring to six Fort Union water wells in the city).

In some areas of the country, most notably in the San Juan Basin of Colorado and New Mexico and the Black Warrior Basin of Alabama, methane from coal beds is being commercially produced in significant quantities. There is a tax incentive for non-conventional fuels which can be applied to methane produced from coal beds and sold for wells which were drilled before January 1, 1993.

There has been commercial production of coal bed methane in the Powder River Basin at Rawhide Butte Field since 1989. Rawhide Butte Field is located just west of the Eagle Butte Mine. Methane leakage at the ground surface was known in that general area for many years. The gas accumulation in the coal at Rawhide Butte Field is in an area that is structurally deformed (Law; Wyoming Geological Association, 1976), and the coal beds in the basin are interbedded with shales which form effective seals. There is greater gas production and less water production from wells in relatively higher structural positions in this field. The increase in production in structurally higher wells is probably due to proximity of the coal to the top of the water table (Law, Rice and Flores; Rocky Mountain Association of Geologists, 1991). In the late 1980s, methane leakage became a serious hazard at two subdivisions (Rawhide Village and Horizons) located near the Eagle Butte Mine, and a number of houses in the Rawhide Village Subdivision had to be moved or abandoned. The State of Wyoming prepared a report on the methane hazards in the subdivisions in support of the Governor of Wyoming's appeal to the President of the United States to declare the area a major disaster area (Office of the Governor, et al.; State of Wyoming, 1987). Two of the producing wells in the Rawhide Butte Field were initially drilled at the request of the WDEQ, to investigate the methane leakage in the subdivisions.

AMAX conducted an investigation of the geologic and hydrologic conditions in the area of Rawhide Village in response to requests from the State of Wyoming, specifically the WDEQ. The purpose of this investigation was to evaluate the impact of future mining operations at the Eagle Butte Mine on the situation at Rawhide Village. The investigation concluded that "there is no evidence that mining activities at the Eagle Butte Mine have caused or aggravated the historic phenomenon of gas seepage in the area of Rawhide Village." The study and its results are included as Appendix 3.5-9 in Eagle Butte's 428-T2 permit renewal document.

The topography in the vicinity of the lease area is gently rolling. There are no habitat features such as playas, cliffs or rock outcrops on the LBA tract. Overall, the Eagle Butte LBA tract is somewhat more level than the existing permit area, where slopes range from flat to over 20 percent, and average about 8.4 percent. Slope analyses will be done if the lease is issued, after the tract boundary is finalized and the necessary permit amendment boundary is defined.

2. Water Resources

a. Ground Water

The Quaternary alluvial deposits in the vicinity of the Eagle Butte Mine range in thickness from 0 feet in the upper reaches of tributaries to Little Rawhide Creek to a maximum of about 25 feet along Little Rawhide Creek near of the LBA tract. The valley fill deposits range from coarse sand and gravel near the base to silty, clayey sediment near the surface.

The Wasatch Formation, which comprises the overburden, is not a regional aquifer due to its discontinuous lithology. It is a matrix of siltstones and shales interbedded with lens-shaped sandstones and thin discontinuous coal seams. Clinker is present locally along coal outcrop areas. Where saturated, the Wasatch sandstones and coal seams can provide water to stock and domestic wells, but they generally do not have the areal extent of the Fort Union coal seam. Recharge to the Wasatch Formation is from infiltration of precipitation and lateral movement of water from adjacent clinker bodies. Regionally, water is discharged by evaporation and transpiration, by pumping wells, and by small springs and seeps along stream drainages. No such springs or seeps occur in the LBA area.

Regional flow in the Wasatch Formation in the vicinity of the LBA is generally toward the north, although the flow pattern is poorly defined due to the discontinuous nature of permeable units in the formation. Previous studies show little or no convergence of flow on Little Rawhide Creek (Map 2, Western Water Consultants, 1986) in this vicinity. To the north, however, the potentiometric surface indicates that ground water flow converges on Little Rawhide Creek locally. The quantity of water involved is small and the rate of movement is slow because of the low permeabilities within the Wasatch Formation. Martin, et al. (U.S. Geological Survey, 1988) reported that hydraulic conductivity in this formation ranges from 10^{-4} ft/day to 10^2 ft/day, and that geometric means of hydraulic conductivity range from 0.2 ft/day to 0.35 ft/day.

The coal beds are the most continuous hydrologic units in the area. The use of coal beds as aquifers is due more to continuity and thickness than permeability and quality. Recharge to the coal aquifer occurs primarily from clinker along the outcrop areas. The combined Roland(Anderson) and Smith(Canyon) coal seams in the vicinity of the Eagle Butte Mine are 100 to 110 feet thick (Denson and Pierson; U.S. Geological Survey, 1991). A shale parting of variable thickness separates the upper [Roland(Anderson)] from the lower [Smith(Canyon)] seam.

Within the mining areas where the parting is generally less than five feet thick, the premining potentiometric heads in the two coal seams were similar; however, in a westerly (down-dip) direction, the parting thickness and the potentiometric heads in the two seams are quite different (AMAX, 1990).

The regional flow pattern in the coal is northwestward from the outcrop toward discharge areas in the northern reaches of the Powder River structural basin (Daddow; U.S. Geological Survey, 1986). Near outcrop areas, alluvial systems can be local discharge points for the coal aquifer. Locally, the flow in the coal aquifer is to the west and northwest through the Eagle Butte Mine permit area. Local flow shifts to the east and northeast in the Rawhide and Buckskin Mine permit areas, located north of the Eagle Butte Mine. Because of its westward dip and relatively small yields, the coal seam ceases to be an economically viable aquifer as overburden increases westward from the outcrop. There has been little exploitation of the coal as an aquifer where it is more than a few hundred feet deep because the shallower sandstones and coal seams in the overlying Wasatch Formation can generally provide adequate water of similar quality more economically.

The typical range of coal permeabilities used to model drawdowns at the Eagle Butte Mine was from 0.9 ft/day to 10 ft/day for both seams (AMAX, 1990). The model used by AMAX is MODFLOW, which was developed by the USGS (McDonald, M.G. and A.W. Harbaugh; U.S. Geological Survey, 1984). This model is used by USGS, OSM and WDEQ as well as mines and consultants. Martin, et al. (U.S. Geological Survey, 1988) reports a range a range in coal permeability from 0.003 ft/day to 3200 ft/day, with a geometric mean of 0.8 ft/day.

The sub-coal Fort Union aquifers are separated from the coal aquifer by a thick shale sequence. The sub-coal Fort Union can be divided into three hydrologic units: the Tongue River aquifer, the Lebo Member and the Tullock aquifer (Law; Wyoming Geological Association, 1976). The Tongue River aquifer consists of lenticular fine-grained shale and sandstone. The Lebo Member, also referred to as "the Lebo Confining Layer", is typically more fine-grained than the other two members and generally retards the movement of water (Lewis and Hotchkiss; U.S. Geological Survey, 1981). The Tullock aquifer consists of discontinuous lenses of sandstone separated by interbedded shale and siltstone. Transmissivities are generally higher in the deeper Tullock aquifer, and many mines in the Powder River Basin have water-supply wells completed in this interval (Martin, et al.; U.S. Geological Survey, 1988). The average transmissivity for this member as reported in McIntosh, et al. (Office of Surface Mining, 1984) is 290 ft²/day.

Flow patterns in the sub-coal Fort Union aquifer are similar to those of the coal, with recharge occurring in outcrop areas to the east of the coal outcrop and regional flow trending to the west and north.

The clinker is the most permeable geologic unit in the Eagle Butte area. It has a high recharge capacity. Clinker can supply large volumes of water to aquifers, depending on its areal

extent and saturated thickness. Saturated clinker is an important recharge source for the coal, and is so permeable relative to coal that drawdowns in coal normally do not appreciably affect water levels in the clinker. Pump testing the clinker in the vicinity of the Eagle Butte Mine has produced estimates of permeability ranging from typical values found for coal up to several million ft/day (AMAX, 1990).

The saturated thicknesses of the various hydrologic units give an indication of the extent of the ground water resource present in each. At the Eagle Butte Mine, the thickness of saturated overburden varies from zero to about 150 feet and the coal aquifer contains from zero to about 110 feet of saturated thickness. According to Martin, et al. (U.S. Geological Survey, 1988), the sub-coal Fort Union aquifers average 2,000 feet thick (all saturated), of which the deeper Tullock member comprises an average of 785 feet.

Ground water in the Wasatch Formation in the Eagle Butte Mine area is typically a calcium or sodium sulfate type. TDS concentrations range from about 897 mg/L to about 8,650 mg/L. Water in the clinker is a sodium-magnesium sulfate type with TDS concentrations ranging from less than 1000 mg/L to greater than 7000 mg/L. In the alluvium of Little Rawhide Creek, ground water is typically a magnesium, sodium-sulfate or a magnesium calcium sulfate type and the TDS concentration ranges from 2,000 to 20,000 mg/L.

Water quality in the coal aquifer varies as a function of distance from the outcrop. Near the outcrop, where recharge occurs from the clinker and overburden, the dominant ions are calcium, magnesium, sodium and sulfate. As water moves down-dip away from recharge areas, sulfate is reduced and the water becomes dominated by sodium and bicarbonate ions. At the Eagle Butte Mine, water from the coal aquifer is generally a sodium bicarbonate type. Total dissolved solids (TDS) concentrations in the water from the coal aquifer on the Eagle Butte Mine have ranged from about 895 mg/L to about 3,316 mg/L. The 895 mg/L is within the range generally considered suitable for irrigation (limit of 2,000 mg/L), while the 3,316 mg/L is not. The 3,316 is, however, below the maximum level of 5,000 mg/L for livestock consumption (WDEQ/Water Quality Division (WQD), 1980).

Water from the sub-coal Fort Union wells is a sodium bicarbonate type with TDS concentrations below 300 mg/L. This water is generally suitable for domestic, stock and agricultural purposes.

Water supply for the Eagle Butte Mine is obtained from two water supply wells (NSERV1 and NSERV2, Figure 4) and from pit dewatering. Both water-supply wells are completed in the sub-coal Fort Union Formation. Combined, their production averages about 33 million gallons per year. These wells are used to supply water to the office, shop and coal preparation facilities at the mine. Water for dust suppression on haul roads is generally obtained from pit inflows and sedimentation ponds.

According to information provided in the Eagle Butte Mine permit document (AMAX, 1990), there are valid water rights for four water-supply wells on the LBA tract. All four are

stock-water wells and one is also permitted for domestic use. Two of the wells are completed in the Wasatch overburden and two in the coal seam.

b. Surface Water

The drainage system on and near the proposed lease area is illustrated on Figure 4. The lease area contains a small portion of the valley of Little Rawhide Creek and a portion of East Prong Little Rawhide Creek, a westward flowing tributary of Little Rawhide Creek. The channel of Little Rawhide Creek lies south and west of the lease area and drains north to Rawhide Creek, which ultimately enters the Little Powder River. In the vicinity of the lease area, Little Rawhide Creek is ephemeral and has a vegetated bottom. Downstream of the lease area Little Rawhide Creek is characterized as an intermittent stream. East Prong Little Rawhide Creek is an ephemeral drainage throughout its length. Minor drainages in the lease area include Revlon Draw (a tributary of Little Rawhide Creek), and Slip and Bare Draws (tributaries of East Prong Little Rawhide Creek). These drainages are also all ephemeral, and cannot sustain aquatic life and or fish yearlong.

Little Rawhide Creek itself has a drainage area of 0.13 square miles within the Eagle Butte LBA tract. East Prong Little Rawhide Creek has a total drainage area of 0.50 square miles within the proposed lease area. Revlon Draw has a drainage area of 0.68 square miles within the area, and Slip and Bare Draws comprise 0.12 square miles of drainage within the tract. Little Rawhide Creek and its tributaries have a drainage area of approximately 2.19 square miles upstream of the proposed lease area.

The main stream channel of Little Rawhide Creek is 20.89 miles long and has a drop of 415 feet. In general, the channel bank-full capacity is slightly less than the two-year event. Premining reservoirs and diversions have modified nearly all the channels considerably. Small stock reservoirs slow channel flow and allow deposition to occur. The Eagle Butte Mine 428-T2 Permit (AMAX, 1990) indicates the low flow channel has an average capacity of 325 cubic feet per second (cfs), while the high flow channel has an average capacity of 3,720 cfs. This stream is typical for the region, and flow events are closely reflective of precipitation patterns. Flow events of relatively small magnitude can result from snowmelt during the late winter and early spring. Although peak discharges from such events are small, the duration and therefore percentage of annual runoff volume can be considerable. During the spring, general storms (both rain and snow) increase soil moisture, hence decreasing infiltration, and can result in both large runoff volumes and high peak discharges.

Little Rawhide Creek flows and water quality are monitored upstream and downstream of the Eagle Butte permit area and reported annually. Pools within Little Rawhide Creek downstream act to remove settleable colloidal material. Water quality, both upstream and downstream of the permit area, is poor when compared to recommended limits for drinking water and standards for irrigation waters. Water quality varies with time, as does the flow. A general improvement in total quality is noted in the spring; a decrease in quality is seen during

low flow periods in late summer and fall. The improvement in water quality is attributed to the flushing effect of fresh water from spring runoff. TDS on East Prong Little Rawhide Creek, which runs through the LBA tract, was sampled during or shortly after several flow events in 1992 and 1993. TDS for these samples ranged from less than 200 mg/L to over 4000 mg/L.

c. Alluvial Valley Floors

Little Rawhide Creek and its tributaries within and adjacent to the Eagle Butte Mine have been subjected to detailed studies to determine the presence or absence of alluvial valley floors (AVFs). Following the completion of these studies, the WDEQ/LQD declared that portions of the Little Rawhide Creek valley meet the regulatory requirements for AVFs, but that these AVFs are not significant to agriculture. These areas are located west of the current mine area and north of the LBA tract (AMAX, 1990).

Lands bordering portions of Little Rawhide Creek and its tributaries within and adjacent to the LBA tract could potentially be classified as AVFs. The WDEQ/LQD has determined that these potential AVF lands are not significant to agriculture (April 22, 1993 letter from L. Harmon (WDEQ) to M. Nicholson (AMAX); State of Wyoming, 1993), and therefore, they can be mined. The extent and characteristics of AVFs on and adjacent to the LBA are currently the subject of a detailed study. Results of this study will be used to determine how to reclaim the AVF after mining. The results will be presented in the application for a permit to mine the LBA tract.

d. Wetlands

Although no formal detailed wetland inventory has yet been undertaken on the LBA site, site-specific vegetation and soils data were gathered during baseline studies, and no clear indicators of wetlands were identified. Neither of the native vegetation types present on the proposed lease (the Sagebrush Grassland and the Drainage Bottomland vegetation types) include hydrophytic vegetation. In neither type is there a predominance of species considered to be wetland obligates or wetland indicators (OBL, FACW, FAC+, or FAC ratings; Reed; U.S. Fish and Wildlife Service (USFWS), 1988). In conformance with techniques outlined in the U. S. Army Corps of Engineers (USCE) Wetland Delineation Manual (USCE, 1987), vegetation to be regarded as hydrophytic must have over 50% of dominant species listed as FAC, FAC+, FACW, or OBL. Dominant species in the Drainage Bottomland vegetation type (Canada bluegrass, meadow barley, green needlegrass, and western wheatgrass) are either not listed in Reed (USFWS, 1988), implying upland (UPL) rating, or are listed as usually occurring in uplands (FACU rating). Of the minor grasses and grass-like species, both slender spikerush and common spikerush, which were found with very low frequency, are rated as OBL, but in no case did they constitute the dominant species in the vegetation cover.

The rolling uplands of the region often contain small man-made stock ponds that support

wetland vegetation at least along the edge of typical high water line; however, the nearest stock pond that is known to support wetland vegetation is south of the LBA lease boundary. Playas, which are undrained depressions typical of many areas of native vegetation in Campbell County, are not found in the proposed lease area. Soil survey work conducted on the Eagle Butte LBA in 1992 found hydric soils limited to six acres of a single unit, Kim clay loam (wet). In order to be classified as a jurisdictional wetland, an area must possess three indicators: hydric vegetation, hydrophytic soils, and wetland hydrology. Based on vegetation and soils, it is unlikely that any portion of the proposed lease area could be considered a wetland.

3. Soils

A partial Soil Conservation Service (SCS) Order 3 soil survey was completed in 1979 on the eastern boundary of the proposed Eagle Butte LBA tract. Existing SCS Order 3 mapping borders the LBA tract on the north, south, and east. Additional SCS mapping within the lease area was completed in 1992, and preliminary results were reviewed and have been included wherever possible. The SCS mapping is part of the ongoing Soil Survey of Campbell County, Northern Part, which is as yet unpublished (SCS, 1992a). In addition, AMAX completed a detailed Order 1-2 soil survey of the Eagle Butte LBA in 1992. The acreage estimates of specific mapping units in Table 4 represent preliminary results of that survey. Soil series within the proposed tract were verified according to previously established Eagle Butte Mine permit information, i.e., previously established soil series. Newly encountered soil series from the existing permit area were described and sampled for chemical analysis according to techniques and procedures of the National Cooperative Soil Survey.

Nineteen mapping units are located within the Eagle Butte LBA tract; these consist of sixteen soil series and a Disturbed type. The Disturbed type is a mapping unit, but not a true soil series; it is associated primarily with former oil and gas well drilling sites. Soil series and relative amounts are similar to those on the current Eagle Butte Mine permit area. The 1982/1985 soil baseline assessments in the mine permit document (AMAX, 1990) contain complete physical descriptions and laboratory data for these soils. Table 4 is a list of the soils series/map units found on the 915-acre LBA tract and their approximate acreage. The soils considered hydric are noted in the table (SCS 1991).

Hydric soils are of extremely limited extent on the proposed lease area, and are limited to a single unit. The area of concern for possible hydric soils is located on the southwestern corner of the study area, within alfalfa-mixed grass hayfields. Review of the current SCS Campbell County hydric soils list (SCS, 1991) indicates that some of the mapped series are contained on the Northern Campbell County list. However, they are listed as inclusions on playas or wet depressions and those particular landscape features are not present within the Eagle Butte LBA. However, the mapped Kim clay loam (wet) on the LBA tract contains several mottles throughout the described 60-inch limit. This mottling is primarily a result of man-made activity, since many of these soils occur up-drainage from dams.

Several historic agricultural fields are present on the western half of the LBA tract. The majority of these areas are located in deep or moderately deep soil series. Plow layers are evident from 5-8 inches; however, actual series could still be determined from underlying material and general topographic position. According to the SCS, no prime farmland exists on the proposed lease area (SCS, 1992b).

Table 4. Soils Series/Map Units and Their Approximate Acreage on the Eagle Butte LBA Tract

Soil Series/Map Unit*	Acreage on Tract
Maysdorf fine sandy loam, 0-6% slope	1.9
Maysdorf fine sandy loam, 6-10% slope	4.9
Kim clay loam 0-6% slope (Kishona)	71.3
Kim clay loam (wet), 0-6% slope (Kishona)-hydric**	6.1
Fort Collins loam, 0-6% slope (Forkwood)	148.8
Bidman clay loam, 0-6% slope	30.7
Olney fine sandy loam, 0-6% slope (Hiland)	63.9
Cushman sandy loam, 3-15% slope	124.8
Bowbac sandy loam, 3-15% slope	6.1
Decolney loam, 0-6% slope	24.0
Nelson sandy loam, 3-15% slope (Turnercrest)	9.1
Pugsley sandy loam, 3-15% slope	45.5
Renohill clay loam, 6-15% slope	2.5
Briggsdale fine sandy loam, 6-15% slope (Parmleed)	40.5
Shingle clay loam, 3-15% slope	79.2
Theedalund loam, 3-15% slope (Theedle)	110.3
Ulm loam, 0-6% slope	35.6
Shingle-Rock-Samsil Complex, 16-60% slope	71.9
Disturbed	7.9
<p>* Soils are identified by the series outlined in the original permit document. Wherever applicable, the current SCS series name is in parentheses. ** Kim clay loam (wet) is not listed on the SCS hydric soils list (SCS, 1991)</p>	

4. Vegetation

Baseline vegetation studies were conducted on the Eagle Butte LBA and a half-mile buffer area during 1992. The vegetation on the 915-acre Eagle Butte LBA tract is typical of that found in the northern part of the Powder River Basin and is very similar to the premining vegetation on the existing Eagle Butte Mine permit area. Much of the area has had original native rangeland modified to support "improved pasture", dominated by mostly crested wheatgrass. Some areas are mowed for hay (128 acres), while some is used solely for livestock grazing (78 acres). Slightly over 3 acres are planted in alfalfa that is also mowed for hay. There are also a few small areas of land cultivated for production of annual crops (169 acres) including barley, millet and, in 1992, a small area of safflower. In addition there are 56 acres that have been disturbed mostly by previous oil and gas drilling activities; these areas for the most part have been revegetated with crested wheatgrass. Some of the disturbed acreage is associated with Wyoming Highway 59 and its right-of-way.

Besides the agricultural/disturbed lands, there are also areas of native rangeland occupying gently rolling upland sites. The two native vegetation types present are Sagebrush Grassland and Drainage Bottomland. In both, the amount of big sagebrush present may vary from nearly none to a substantial cover. These two vegetation types cover about 53 percent of LBA tract (481 acres).

Dominant species in Sagebrush Grassland vegetation type include (in addition to Wyoming big sagebrush) perennial grasses and grass-like species such as needle-and-thread grass, blue grama, prairie Junegrass, threadleaf sedge, thickspike wheatgrass, and western wheatgrass. In some years, annual grasses such as cheatgrass and, especially, Japanese brome may rank among the dominant species. Forbs are not among the most abundant species, but they may include Hood's phlox, common dandelion, western yarrow, American vetch, narrowleaf scurfpea, and silverleaf scurfpea. Weedy annual forbs that may be present in usually small amounts include allyssum, Russian thistle, littlepod falseflax, summercypress, shepherd's purse, and Sawatch knotweed. The ground-dwelling lichen Parmelia chlorochroa is locally abundant. Besides big sagebrush, there may be small amounts of other shrub and subshrub species including Gardner saltbush, winterfat, snakeweed, and rubber rabbitbrush. Big sagebrush foliar cover varies from zero to about 26 percent in the Sagebrush Grassland native rangeland areas.

The Drainage Bottomland vegetation type is found in small upland swales with no perennial flow of water and no inundation for any period of time beyond the duration of storms events. Drainage Bottomland vegetation is distinguished from the sagebrush grassland type by not only its topographic position in the bottoms of drainages, but also by the increased abundance of mesic grass species such as green needlegrass, western wheatgrass, Canada bluegrass, meadow barley, and, occasionally, Agassiz bluegrass. Minor grasses and grass-like species occasionally present include common spikerush, slender spikerush, Japanese brome, cheatgrass, smooth brome, and slender wheatgrass. Forbs typically present include common dandelion, western yarrow, and timber milkvetch. Many of the forbs listed above for Sagebrush

Grassland also occur in small amounts in the Drainage Bottomland. Shrub cover in the type is typically quite low, but in a few locations may range up to about 20%. The principal shrub is Wyoming big sagebrush, with occasional silver sagebrush.

According to a December 1992 Wyoming Natural Diversity Database (WNDD) search, there are no federally listed threatened or endangered plant species known to occur in Campbell County (or anywhere in Wyoming); likewise no species strongly likely to be listed (in the form of Category C1 species) are known to occur in Campbell County (The Nature Conservancy, 1992). Barr's milkvetch (*Astragalus barrii*) is presently listed as Category C2 and is known to occur in Campbell County. The WNDD has recommended to the U. S. Fish and Wildlife Service that this species be reduced to 3C status. The only other species with Federal status to occur in Campbell County is *Oryzopsis contracta*, listed as 3C. Neither of these species were found on the proposed lease area during monthly surveys from April to September 1992, and no species of interest to WNDD at the state level have been found on the LBA tract.

5. Ownership And Use Of Land

The surface on the Eagle Butte LBA tract is privately owned by AMAX Land Company, and Dry Fork Coal Company. Surface land ownership for the LBA tract is shown on Figure 6. There are no other surface landowners on adjacent surface that may be affected by overstripping or surface disturbance. Eagle Butte Mine currently has a surface agreement with Dry Fork Coal Company that covers overstripping for the current mine plans.

The LBA tract is currently used for livestock grazing, and dryland hay and crop production. Native rangeland in the area has an approximate grazing value of 0.2 animal unit months per acre, while improved pasture yields approximately 0.4 animal unit months per acre. Haylands on the area produce about 0.8 tons per acre. Crop production varies with crop type. Ranching and agricultural lands are similar within the expanded tract configuration of Alternative 2.

In addition to agricultural uses, the proposed lease area has supported oil and gas exploration. All oil and gas rights underlying the tract are all privately owned, there are no state or federal oil and gas leases on the tract. There are currently no producing wells on the tract, but there are seven abandoned oil and gas wells, several of which encountered shows of oil and gas during drilling. According the oil and gas development potential analyses prepared for the ongoing update of the Buffalo RMP, the oil and gas occurrence potential and the oil and gas development potential for the lease application area are both high (B.L.M., Fred Crockett, Personal Communication, 8/93). Areas of high oil and gas development potential have an average of two or more wells drilled per township per year.

Transportation facilities within the proposed lease area include gas pipelines owned by MGTC and K-N Energy. A portion of Wyoming Highway 59 was relocated across the LBA tract in 1983. No other transportation facilities lie within the tract as applied for, under

FIGURE 6

SURFACE OWNERSHIP MAP
OF EAGLE BUTTE
LBA TRACT



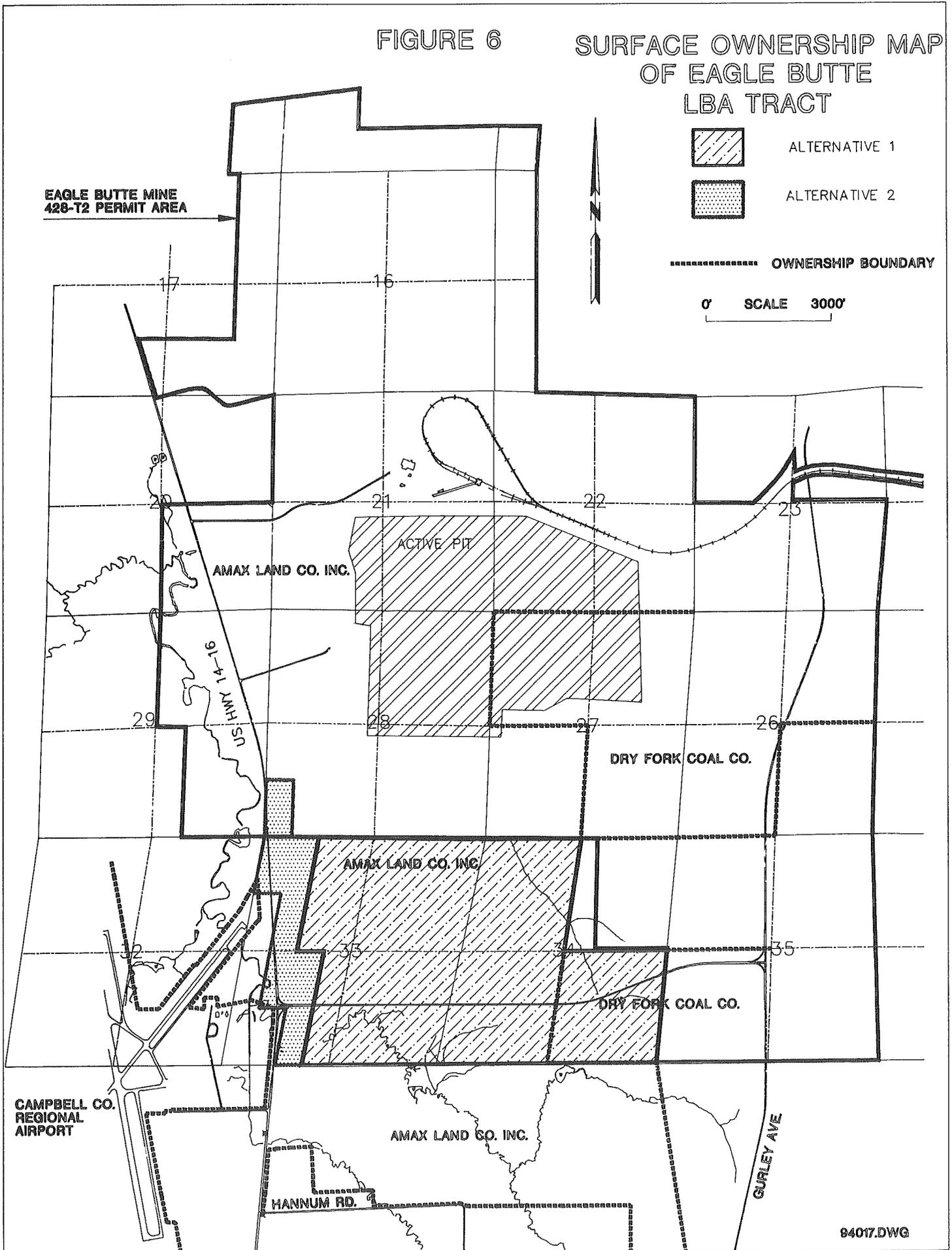
ALTERNATIVE 1



ALTERNATIVE 2

OWNERSHIP BOUNDARY

0' SCALE 3000'



Alternative 1. The added lands under Alternative 2 include portions of U. S. Highway 14-16, and also small parcels of land belonging to the Campbell County Airport. Neither Alternative 1 nor Alternative 2 would include mining these lands. The mine plans for both alternatives show all mining disturbance remaining east of Highway 14-16.

No occupied dwellings occur on the proposed lease area. The nearest residence is about 300 feet south of the proposed lease area, and is owned by AMAX Land Company. The next nearest residence is the Campbell County Regional Airport manager's residence, approximately one-half mile to the west. There are also two mobile homes located at the airport. The Rachel Fulkerson residence lies approximately three-quarters of a mile to the southwest of the lease area. A mobile home park is located on Hannum Road, approximately two-thirds of a mile south of the LBA tract. No authorized public recreation use occurs on the LBA tract because the LBA land surface is privately held.

6. Wildlife

Long-term background information on wildlife in the proposed lease area is available from annual monitoring data collected for the adjacent Eagle Butte Mine. Many of the Eagle Butte surveys (including those for big game, raptors, and upland game birds) cover a large perimeter around the permit area that completely encompasses the LBA tract. Site-specific survey work was conducted on the proposed lease area in 1992. The following descriptions of habitats, faunal occurrence, and faunal abundance are drawn from both sources.

The western part of the tract is characterized by man-made habitats; hayland and some annual cropland. The eastern portion of the area is dominated by native habitat; primarily sagebrush-grassland. Big sagebrush is the principal shrub in this habitat, as is discussed in Section III. B. 4. Some bottomland exists along East Prong Little Rawhide Creek in the southwest corner of the tract. The character of much of the bottomland has been influenced heavily by grazing and haying. Bottomland on the LBA tract is, for the most part, dry except during infrequent flow events caused by precipitation or snow melt. One small reservoir on the area generally holds some water, provided by the overflow from an adjacent livestock watering tank. No other semi-permanent or permanent water sources exist on the Eagle Butte LBA tract. The only trees that occur on the tract are a few small willows along East Prong Little Rawhide Creek, and two small tree windbreaks--one at a former homestead site, the other near a set of former industrial buildings.

Three big game species occur in the vicinity of the Eagle Butte LBA: pronghorn, mule deer, and white-tailed deer. No critical big game habitat is recognized by the Wyoming Game and Fish Department (WGFD) in this area. Winter aerial big game surveys have been conducted annually on the Eagle Butte Mine and its two-mile perimeter (56 square miles). In 1992, the survey area was slightly expanded to include the entire two-mile perimeter of the LBA tract (expanded area of 60 square miles). Eagle Butte Mine's seasonal trend counts for both pronghorn and deer are conducted along set driving routes that pass through the LBA. These

counts provide big game herd composition and habitat use data in seasons other than winter.

Pronghorn are, by far, the most common big game species in the area. All proposed lease land east of U. S. Highway 14-16 is classified by the WGFD as winter/year-long habitat. This part of the area lies within the North Black Hills Herd Unit, which has 2,080 square miles of occupied habitat. The WGFD estimated the post-season pronghorn population in 1992 was at objective at 14,000. This equates to an average population density of 6 to 7 animals per square mile.

That portion of the amended lease (Alternative 2) west of U. S. Highway 14-16 is classified as yearlong pronghorn habitat. It lies within the Gillette Herd Unit, which has 1,362 square miles of occupied habitat. The WGFD estimated 1992 post-season population was 16,000 (11 to 12 animals per square mile), which is significantly over the objective of 11,000.

Winter aerial survey data from Eagle Butte for the last five years (1988-1992) has shown pronghorn densities between 5 and 12 animals per square mile on the Eagle Butte survey area, which includes portions of both the North Black Hills and Gillette herd units. Density was highest in 1992, after a series of mild winters.

Pronghorn are present in the Eagle Butte area in substantial numbers all year long. During winter surveys, the majority of sightings are generally in sagebrush-grassland habitat. This habitat is common in the area, and pronghorn use it during all seasons. However, from spring through fall, many pronghorn are recorded in grassland, hayland, reclaimed grassland, and other habitats as well.

Mule deer are present in the vicinity of the LBA tract in small to moderate numbers year-round. The tract (including the amended boundary of Alternative 2) is entirely within the Powder River Herd Unit, which has 4,375 square miles of occupied habitat. The WGFD estimated the 1992 post-season population to be 65,000; the herd objective is 52,000. Currently, the lease area is classified by WGFD as "unoccupied" deer habitat, but the area will likely be reclassified as yearlong (O. Oedekoven, WGFD; State of Wyoming, 1993).

Data from Eagle Butte Mine's annual monitoring program has shown that small groups of mule deer are regularly sighted on or near the proposed lease area, especially in the vicinity of East Prong Little Rawhide Creek and Little Rawhide Creek. Favored habitats are hayland, cropland, and bottomland. Deer also commonly frequent tree windbreaks on and near the area. North of the LBA tract, at Eagle Butte Mine, mule deer are observed all year long on reclaimed and disturbed areas.

On a few occasions in the past several years, lone white-tailed deer have been recorded near Eagle Butte and the LBA tract. This species is uncommon in the vicinity of the Eagle Butte Mine, although they are often seen several miles north. White-tailed deer tend to frequent larger drainages and more wooded areas than are found at Eagle Butte.

There are no recognized elk herd units in the lease application area, and no elk are known to occur in the vicinity of the Eagle Butte LBA tract. The nearest population is in the Fortification Unit, approximately 15 miles to the west. No appropriate habitat for elk is found in the area of the LBA.

Surveys for nesting raptors have been conducted at Eagle Butte since 1984. A raptor survey was conducted by Powder River Eagle Studies as part of the 1992 wildlife baseline study on the LBA. The area is also within the area surveyed annually during Eagle Butte Mine's wildlife monitoring efforts. Results of previous surveys have been presented each year in the Eagle Butte Mine's annual report to WDEQ/LQD. A mitigation plan for raptor nests in the Eagle Butte area was developed in March 1989 in conjunction with the submission of the Eagle Butte 428-T2 permit application. The mitigation plan was subsequently approved by the U.S. Fish and Wildlife Service (USFWS).

Raptor nests on and within one mile of the LBA tract are shown on Figure 7. The only raptor nest on the proposed lease area is a stick nest in a tree windbreak in SW 1/4 NE 1/4 Section 33, T51N, R72W. It has been used sporadically by both Swainson's hawks and red-tailed hawks. This nest has been active in 3 of the past 5 years (1988-1992).

Surveys for wintering raptors in the Eagle Butte area have shown very low winter populations. Lagomorphs (rabbits and hares) are an important prey item for many raptors. Annual spotlight surveys indicate that lagomorph abundance in the vicinity of the Eagle Butte Mine and the LBA tract is very low.

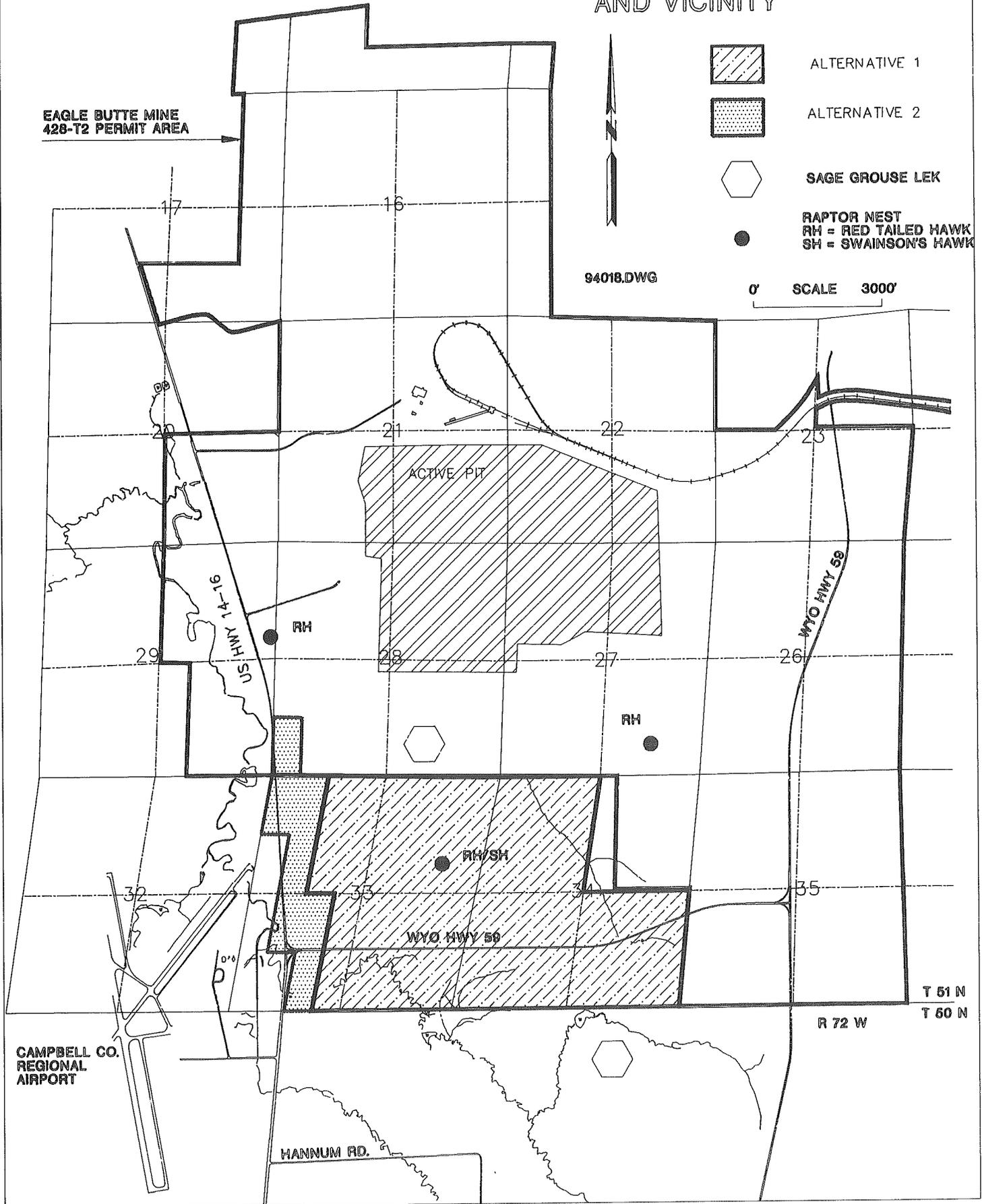
The primary upland game bird species in the vicinity of the Eagle Butte LBA is the sage grouse. The proposed lease area is within the area that has been surveyed by Eagle Butte Mine for game bird leks annually since 1984. There are no leks on the proposed lease area, but two leks monitored by Eagle Butte are situated nearby (Figure 7). Meadowlark lek, established in 1988, is just north of the LBA tract on the Eagle Butte permit area in SE1/4 Section 28, T51N, R72W. Schiermiester lek, discovered in 1988, is southeast of the LBA tract, in NE1/4 Section 3, T50N, R72W. Combined peak male attendance at these leks has ranged between 20 and 50. No sightings of sage grouse broods have been made on the LBA tract, and few have been recorded at Eagle Butte Mine. However, sage grouse sign has been observed in sagebrush grassland habitat on the LBA.

Gray partridge and sharptailed grouse are rarely observed in the vicinity of the Eagle Butte LBA. These species are more commonly associated with grassland and agricultural habitats than with sagebrush grasslands. No turkey sightings have been made in the area; no appropriate habitat for this species is present.

The USFWS and WDEQ have expressed concern about seventeen avian species or subspecies in the Powder River Federal Coal Region. These are classified as "migratory birds of high federal interest" (MBHFI). In 1987, a records search and field surveys were performed to document the occurrence and status of MBHFI at Eagle Butte Mine. Annual surveys for

FIGURE 7.

WILDLIFE FEATURES OF EAGLE BUTTE LBA TRACT AND VICINITY



MBHFI are conducted on and within one-half mile of the permit area. In 1992 the survey area was expanded to encompass the LBA tract and its half-mile perimeter.

Eleven of the seventeen species of MBHFI have been recorded through time on or near the Eagle Butte permit area (Table 5). Conclusions regarding MBHFI at Eagle Butte have not changed since the 1987 report. No MBHFI nest on or regularly use the proposed lease area. Suitable staging or breeding habitats for the non-raptor MBHFI species do not exist to any significant extent on or near the permit area or the proposed permit extension which would encompass the Eagle Butte LBA tract. Nesting habitat for burrowing owls (badger burrows) is present, but no nesting pairs have been found near the proposed lease area. No suitable nesting habitat for other raptor MBHFI species exists on or adjacent to the LBA tract.

Table 5. MBHFI Status in Northeast Wyoming and Expected Occurrence Near Eagle Butte

Species	Seasonal Status/Breeding Records in NE Wyoming*	Sighting Records in Eagle Butte Mine Area**	Expected Occurrence in Eagle Butte Mine Area
White pelican	Summer/Nonbreeder	PRES	Rare
Double-crested cormorant	Summer/Breeder	None	Rare
Canvasback	Summer/Breeder	EB, PRES	Uncommon
Ferruginous hawk	Summer/Breeder	EB, B, R	Common
Golden eagle	Resident/Breeder	EB, B, R	Common
Bald eagle	Winter/Nonbreeder	EB, B, R	Common in Winter
Osprey	Summer/Breeder	None	Rare
Prairie falcon	Resident/Breeder	EB, B, R	Uncommon
American peregrine falcon	Migrant/Historical breeding records	PRES	Rare
Richardson's merlin	Resident/Breeder	EB	Uncommon
Whooping crane	Never Recorded	None	Very Rare
Sandhill crane	Migrant/Nonbreeder	B, PRES	Uncommon
Mountain plover	Summer/Breeder	None	Uncommon
Long-billed curlew	Summer/Breeder	None	Rare
Burrowing owl	Summer/Breeder	B, PRES	Uncommon
Lewis' woodpecker	Summer/Breeder	None	Rare
Dickcissel	Summer/Breeder	EB, PRES	Rare

* Compiled from Wyoming Game and Fish Department (1982), includes Campbell and Adjacent Counties
** Sighting Record References: EB = Eagle Butte Mine Permit
B = Buckskin Mine Permit
R = Rawhide Mine Permit
PRES = Powder River Eagle Studies, unpubl. data

The USFWS has determined that the Eagle Butte LBA area contains potential habitat for three threatened or endangered (T or E) species: the bald eagle, peregrine falcon, and black-footed ferret. Bald eagles are relatively common winter visitors in northeastern Wyoming. No roosting habitat (wooded canyons or large tree groves) exists on or within one mile of the proposed lease area. Bald eagles have been observed foraging on and near the area, but no unique source of prey occurs there.

No suitable nesting habitat (cliffs) for peregrine falcons exists on or near the LBA area. Peregrines may pass through the area during migration, but there is no unique source of prey to attract them to the area. Only one observation of a peregrine falcon, during spring migration, has been made in the vicinity of the Eagle Butte Mine or proposed lease area.

Black-footed ferrets have been known to reside almost exclusively in prairie dog towns. No ferrets have been sighted in the vicinity of the proposed permit extension, and no prairie dog towns exist within one mile of the LBA area.

7. Cultural Resources

In March 1992, Frontier Archaeology of Worland, Wyoming, conducted a Class III cultural resource inventory on 1,279 acres that encompassed the proposed permit extension area, including all lands that would potentially be disturbed by mining under either Alternative 1 or Alternative 2 (Light and Rosenberg; Frontier Archaeology, 1992). The area of examination included portions of Sections 33 and 34, T51N, R72W; and Sections 3 and 4, T50N, R72W. All lands within the current Eagle Butte permit area have been previously surveyed at the Class III level.

A Class III survey is a professionally-conducted, intensive inventory of a target area, designed to locate all cultural properties which have surface and exposed profile indications. Cultural properties are recorded and sufficient information collected on them to allow evaluation for possible inclusion on the National Register of Historic Places (NRHP). That determination is made by the managing federal agency in consultation with the State Historic Preservation Officer (SHPO).

Once a Class III survey is completed, site-specific testing or limited excavation is utilized, if necessary, to gather additional data which will: 1) determine the final evaluation status of a site and/or 2) form the basis of additional work that will be conducted during implementation of a treatment plan if the site is 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 mitigative measures as avoidance (if possible), large scale excavation, complete recording, Historic American Building Survey/Historic American Engineering Record documentation, archival research and other acceptable scientific practices.

A total of six cultural or paleontological sites were identified on the proposed permit extension, five within the LBA lease area and one outside the LBA but within the proposed permit area. These included three isolated artifacts, two historic sites, and one paleontological site (Table 6). The paleontological site was not an aboriginal tool material source; there is no evidence of quarrying or tool manufacture. The utility of the material for lithic tools was rated very low, as it apparently has a low silica content and exhibits a fibrous rather than a conchoidal fracture. None of the sites were eligible for nomination to the NRHP. Ineligible sites require no further work prior to mining. Results of the survey suggest that the proposed project will have no effect on any significant cultural resources. Cultural resource clearance was recommended for the lease.

8. Native American Consultation

Native American consultation and coordination as required by the Archeological Resources Protection Act and the American Indian Religious Freedom Act were conducted during the draft EA public review and final EA preparation periods. Affected tribes were sent copies of the draft EA with certified letters requesting their comments concerning any religious or cultural areas within or near the Eagle Butte LBA tract. The list of people included in the special mailing appears in Chapter VII of both the draft and final EA.

Table 6. Status of Known Cultural and Paleontological Sites Within the Eagle Butte LBA Proposed Permit Extension Area

Site	Type	Location	NRHP Status
48CA-314	Paleontological	Lease	Ineligible
48CA-2734	Historic	Lease	Ineligible
48CA-2735	Historic	Lease	Ineligible
Iso. Artifact FA92-7-IF-1	Historic	Lease	Ineligible
Iso. Artifact FA92-7-IF-2	Prehistoric	Lease	Ineligible
Iso. Artifact FA92-7-IF-3	Prehistoric	Lease	Ineligible

9. Paleontological Resources

The sedimentary Eocene Wasatch Formation, which is known to contain fossil remains, is exposed on the surface of the Eagle Butte LBA. As indicated in the discussion of surficial geology in Section III. B. 1., the surface of the Eagle Butte tract is primarily material derived

from weathering of the Wasatch Formation in place. One paleontological site has been identified on the LBA tract (Table 6). This is an area of fossilized tree stumps, logs and fragments that overlaps the LBA tract and the adjacent Eagle Butte permit area. It is one of two such sites identified during the initial archaeological and paleontological survey on the permit area in 1974 (AMAX, 1990). This initial survey noted that fossil wood is common in the Gillette area, and that the site was not considered significant enough to warrant preservation. The site has been located and reevaluated by two subsequent surveys, with no new findings and the same conclusions. One significant fossil wood site has been identified in the Buffalo Resource Area. This is the Dry Creek Petrified Tree Outstanding Natural Area, located just east of Buffalo (BLM, 1985).

Vertebrate fossils are considered most significant because of their rarity, and for their scientific value to ongoing research in paleontology, evolutionary biology and paleoecology. Vertebrate fossil remains were described from the Wasatch Formation of the Powder River Basin in the early 1900s, and include specimens of fish, turtle, chamosaur, crocodile, alligator and mammals. No significant vertebrate paleontological localities have been recorded on federal lands within the Buffalo Resource Area, which encompasses the project area (BLM, 1985). No vertebrate fossils have been located prior to or during the course of mining at the adjacent Eagle Butte Mine.

10. Visual Resources

The Eagle Butte Mine facilities and some mining activity are currently visible from Highways 14-16 and 59. Under the mine plan for the existing lease, mining will approach public roads closely at times, and be plainly visible to passers-by. This would also be true of the proposed lease. Many of those travelling these roads are commuting to work at Eagle Butte or nearby coal mines, and do not object to visible mining. In several places in Campbell County, mining is readily visible from public roads. These locations attract tourists who are curious about Gillette and its large surface mines.

For management purposes, the BLM conducts an inventory that evaluates visual resources on all land under its jurisdiction. Once inventoried, these lands are classified into various visual resource management (VRM) classes. These classification ratings range from I to V 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 to a point where rehabilitation is needed to bring it up to the level of one of the other four classifications.

When development is proposed, the degree of contrast between the proposed activity and the existing landscape is measured. This is called a contrast rating. In this process, various factors such as form, line, color, texture variety, contrast and lighting are evaluated.

The lands in the proposed lease area are generally classified as VRM Class V with some Class IV. The natural character of the landscape on and adjacent to the LBA tract is already interrupted by numerous disturbances. Highways, an airport, industrial developments, and existing mining activity are visible from most sites on the lease. Mining activity would not encounter any visual classification that would prohibit or restrict surface coal mining. Contrast would remain virtually unchanged.

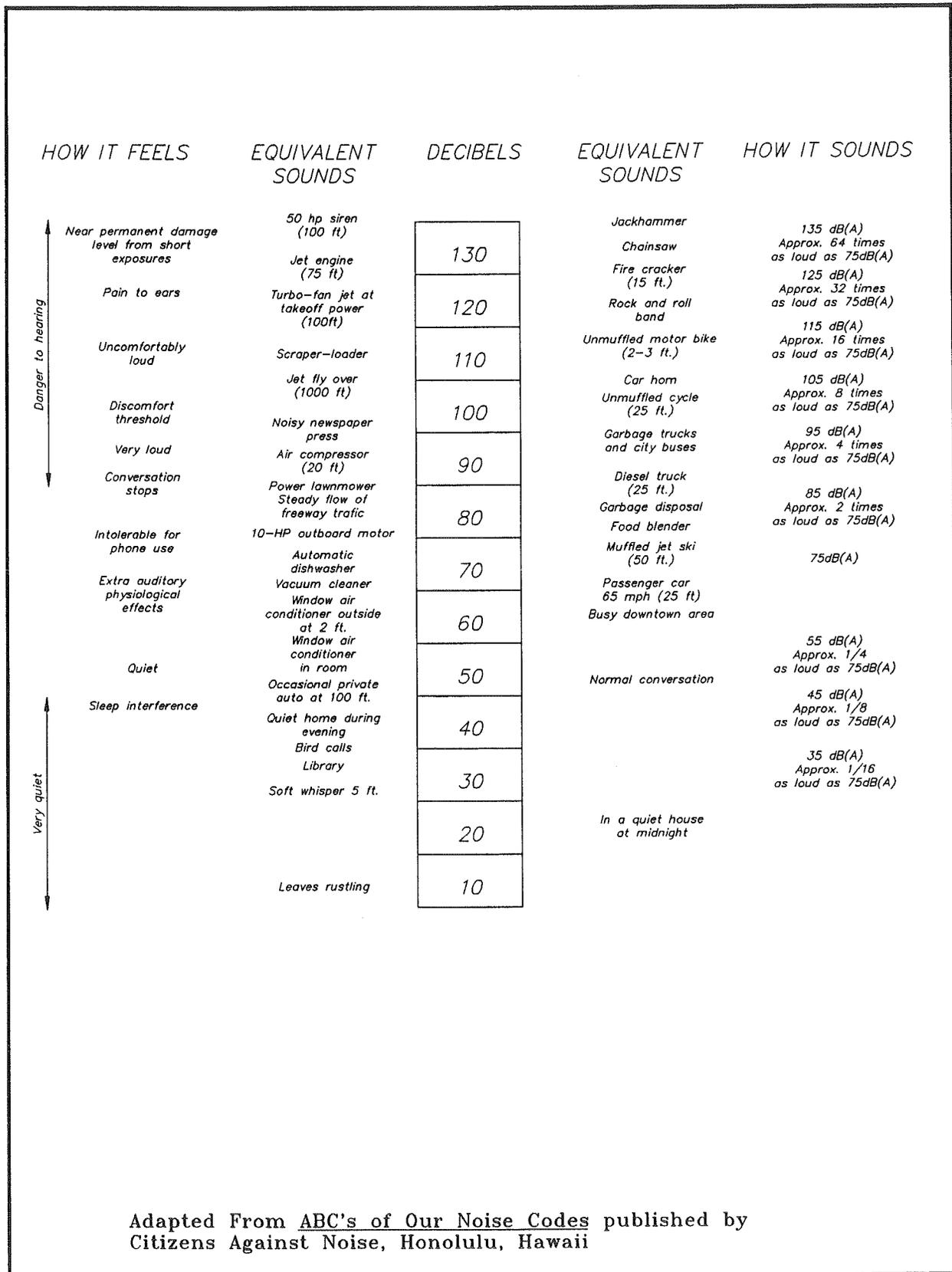
11. Noise

An individual's judgement of the loudness of a noise correlates well with the A-weighted sound level (dBA) system of measurement. The A-weighted sound level, or A-scale, has been used extensively in the U.S. for the measurement of community and transportation noises. Figure 8 relates A-scale decibel readings to equivalent sounds of daily life. Existing noise sources in or near the proposed LBA are: two highways, an airport, coal mining activities, wind, and agricultural activities. From these sources, the current noise level is estimated to be in the range of 40 to 60 decibels (and possibly higher), depending on time of day and location. The noise level on the LBA would increase to a range of 85 to 95 decibels in the area of actual mining operations if the lease is issued.

12. Air Quality

The air quality of the Powder River Basin area is generally good with average annual geometric mean for total suspended particulate (TSP) concentrations of 15 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). Visibility for more than 60 miles is common. Significant reductions in visibility are generally weather-related, although major forest fires to the west and northwest have impaired visibility in the Powder River Basin in past years.

The basic regulatory framework which governs air quality in Wyoming is the Environmental Quality Act, the accompanying Air Quality Rules and Regulations, and the State



Adapted From ABC's of Our Noise Codes published by Citizens Against Noise, Honolulu, Hawaii

Figure 8. Relationship Between A-Scale Decibel Readings and Sounds of Daily Life

Implementation Plan approved by the Environmental Protection Agency (EPA) under the Clean Air Act. This regulatory framework includes state air quality standards, which must be at least as stringent as National Ambient Air Quality Standards (NAAQS), and allowable increments for the prevention of significant deterioration (PSD) of air quality. The air quality standards which apply to coal mining are listed in Table 7.

The PSD program is designed to protect air quality from significant deterioration in areas already meeting state standards. In other words, an increase or increment is allowed above baseline pollution levels so long as the state standard is not exceeded. The size of the increment

Table 7. Regulated Air Emissions for Wyoming

Emissions	Averging Period	Wyoming Standard (ug/m ³)	National Standard (ug/m ³)
Total Suspended Particulates (TSP)	24-hour ^a	150	---
Particulate matter finer than 10 microns (PM-10)	24-hour ^a	150	150
	annual ^b	50	50
Nitrogen oxides (NO _x)	annual ^b	100	100
Photochemical oxidants (O ₃)	1-hour ^a	160	235
Sulfur dioxide (SO ₂)	3-hour ^a	1,300	---
	24-hour ^a	260	365
	annual ^b	60	80
Carbon monoxide (CO)	1-hour ^a	40,000	40,000
	8-hour ^a	10,000	10,000

^a Standards not to be exceeded more than once per year.
^b Annual arithmetic mean not to be exceeded

allowable under PSD depends on the area's designation as a Class I, II, or III area, with Class I areas allowed the smallest increment and Class III the largest. The mine area is Class II, as is all of Wyoming outside the National Parks and wilderness areas. According to WDEQ/Air Quality Division (AQD), the nearest Class I areas to the proposed project are the Rosebud Indian Reservation in Montana and Wind Cave National Park in South Dakota. Devils Tower National Monument has been recommended for designation as Class I by the Department of Interior, however, the State of Wyoming has received no request for such a redesignation (See Letter 1 and response, Appendix A). Devils Tower is approximately 45 miles northeast of the Eagle Butte Mine.

Particulates are the most significant emission source at surface coal mines. The large areas of disturbed land, crushing, loading and hauling of coal, and blasting associated with mining all produce dust. Wyoming's PSD standards for particulates (Table 8) are identical to federal standards, except that Wyoming has not adopted Class III standards.

The current particulate standards in Wyoming are for an annual average of 50 ug/m³ and 24-hour average of 150 ug/m³ both for particulate matter 10 micrometers and less in diameter (PM10) and a 24-hour average of 150 ug/m³ for TSP. The 24-hour standards are not to be exceeded more than once per year. Initially, the TSP standard was the Federal particulate standard. It was based on measuring all particle sizes that could be trapped using a high volume air pump and a specific type of filter. Recently, the federal standards was amended to PM10, which measures particles less than 10 micrometers in diameter. Wyoming has kept the 24-hour TSP standard in addition to the PM10 standard.

Table 8. Maximum Allowable Increases for Prevention of Significant Deterioration of Air Quality in Wyoming: Particulates

EMISSION	AVERAGING TIME	MAXIMUM ALLOWABLE INCREMENTS OF DETERIORATION (micrograms per cubic meter)		
		Class I	Class II	Class III
Total Suspended Particulate (TSP)	Annual Mean 24-hour ¹	5	19	37
		10	37	75

¹ Maximum allowable increment may be exceeded once per year at any receptor site.

The various motor vehicles used in mining and transport of coal and people produce carbon monoxide, nitrogen oxides, sulfur dioxide and by secondary processes, ozone, though these are seldom at levels to cause regulatory concerns at Wyoming's surface coal mines.

A detailed description of the air quality of the area was produced for the BLM in 1983 (PEDCo; BLM, 1983). Prior to and subsequent to that study, air quality monitoring has been conducted in the areas where mining is occurring. In November 1990, the State of Wyoming submitted to the EPA a proposed revision to the State Implementation Plan. One purpose of the revision was to modify Section 24, which covers PSD. Prior to submission to the EPA, the WDEQ/AQD held a series of public hearings. During one of the hearings, the WDEQ/AQD presented testimony documenting that the air quality resource had not been diminished during the period from 1980-1988, although coal production increased significantly during that period. Air quality data from this report is provided as Table 9. Subsequent to the preparation of the report in 1989, a change was made from calculating geometric means to calculating arithmetic means. As a result, data for the years following 1988 that are directly comparable to the data in the table are not available without additional recalculation.

During the period covered in the WDEQ/AQD report, the number of mines producing coal in the Wyoming portion of the Powder River Basin increased from 10 to 16 while coal production escalated from 58.8 million tons to 139.1 million tons. The number of mines monitoring air quality increased from 12 to 16. The number of actual monitoring sites varied from a low in 1980 of 29 to a high of 46 in 1986. In 1988 there were 45 operating sites. Some

of these sites include more than one sampler, so the number of actual high volume air samplers is greater than the number of monitoring sites.

In an effort to summarize the monitoring data in comparative form, averages of the geometric means from all sites were calculated for each calendar year. The averages ranged from a high of 30.8 ug/m³ in 1980 to a low of 20.5 ug/m³ in 1986. Over 23,000 samples were collected during this period.

Table 9 shows that the average of the geometric means went up during 1987 and 1988. The cause of this increase is not clear at this time. Speculation is that it was due to mining activity approaching monitoring sites and to dry conditions due to the regional drought. The third quarter of 1988 could also have been impacted by emissions from the forest fires in Yellowstone Park.

Table 9. Summary of Air Quality Monitoring in Wyoming's Powder River Basin, 1980-1988

Year	Number of Mines Producing/ Monitoring	# Sites	Coal (MMTPY*)	Overburden (MMBCY*)	TSP Average of All Geometric Means (ug/m ³)	Eagle Butte Geometric Mean TSP (ug/m ³)
1980	10/12	29	58.8	93.2	30.8	29.8
1981	11/13	34	68.9	108.0	30.4	26.2
1982	11/15	43	81.4	120.7	23.1	20.4
1983	13/15	41	88.0	157.2	24.3	21.0
1984	14/15	44	106.8	166.6	24.3	24.2
1985	16/15	45	113.8	196.3	24.3	25.6
1986	16/16	46	114.6	169.6	20.5	19.4
1987	16/16	45	124.6	180.9	25.6	23.8
1988	16/16	45	139.1	209.8	29.3	23.6

Note: Mines included are Buckskin, Rawhide, Eagle Butte, Fort Union, Clovis Point, Wyodak, Caballo, Belle Ayr, Caballo Rojo, Cordero, Coal Creek, Jacobs Ranch, Black Thunder, North Antelope/Rochelle, Antelope, and North Rochelle.
 *MMTPY = million tons per year, MMBCY = million bank cubic yards
 Taken from a 1989 WDEQ/AQD study of Powder River Basin air quality for the years 1980-1988 (State of Wyoming; WDEQ/AQD, 1989). Since that time, arithmetic means have been calculated instead of geometric means.

The WDEQ/AQD has researched air quality data in the Powder River Basin. The data set includes numerous monitoring sites where TSP monitors are co-located with PM-10 monitors. Since 1985, the historic data set consistently indicates that PM-10 is 30 percent of TSP at sites near mining activities. This correlation is the basis of all emission inventories conducted in the Powder River Basin by AQD since 1985. These emission inventories are, in turn, the basis of all permits approved by the WDEQ/AQD since 1985.

The rightmost column in Table 9 shows the annual geometric mean TSP concentrations for the Eagle Butte Mine. Before the TSP annual standard was replaced by the PM-10 standard, the TSP annual standard was 60 ug/m³. As the table shows, the annual averages are well below this former standard. Assuming that PM-10, which was not monitored during the years shown in Table 9, was about 30 percent of the TSP values (as explained above), and further assuming that the geometric and arithmetic means are similar, it can be inferred from Table 9 that the Eagle Butte Mine has historically been well within the current annual PM-10 standard of 50 ug/m³.

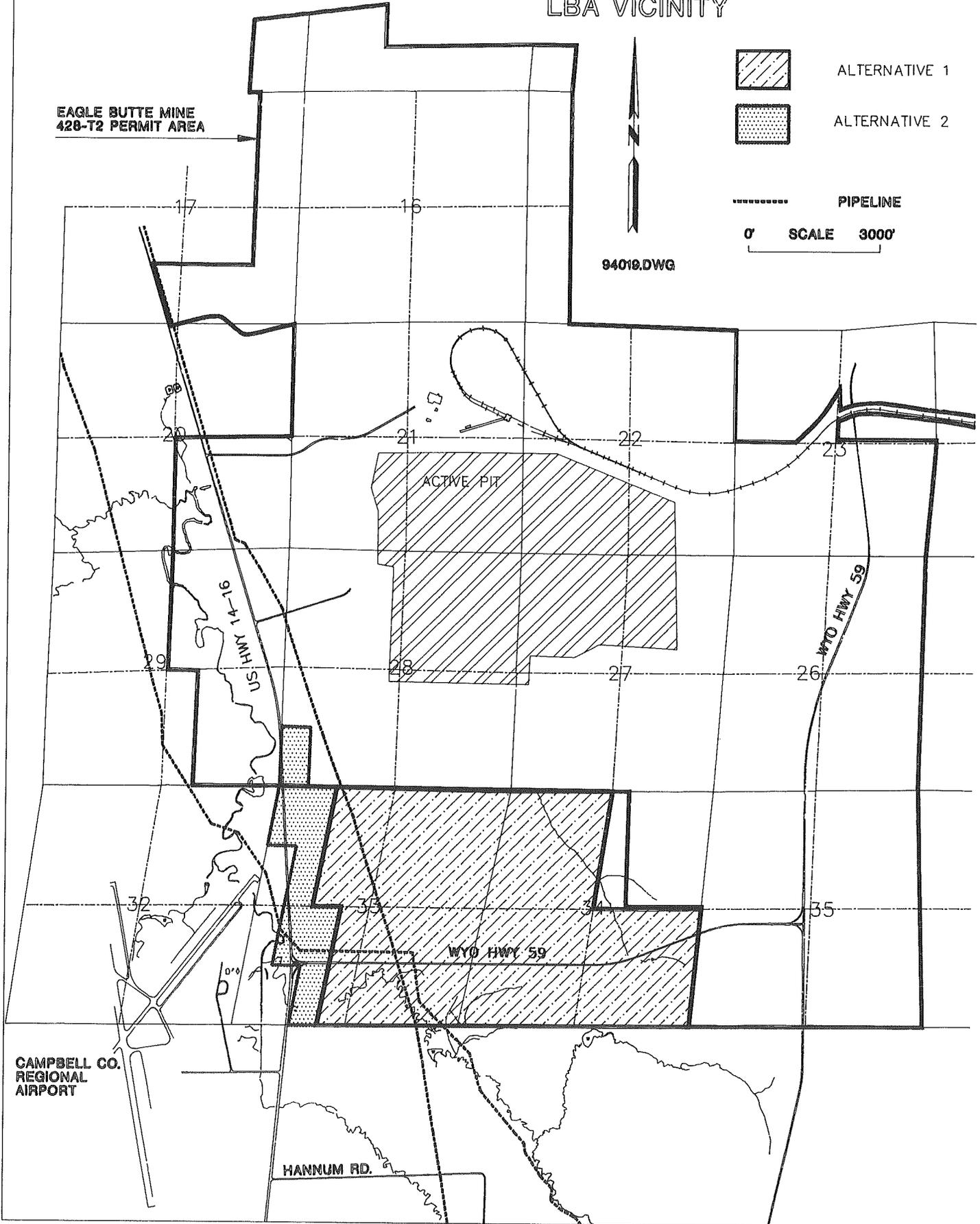
The information presented by the WDEQ/AQD indicates that air quality in the Wyoming portion of the Powder River Basin did not deteriorate while coal production increased nearly 2.5 times in the 1980-1988 period. This is due in part to the conditions that are attached to air quality permits. These conditions stipulate control measures that must be implemented by the mine operators in order to meet air quality standards. These measures include increased sprinkling, use of EPA approved chemicals to control dust, limiting the amount of disturbed area, temporary vegetation of disturbed areas, and contemporaneous reclamation.

The removal of coal on the Eagle Butte LBA tract would eventually require blasting and mining operations near Highway 14-16 and the Campbell County Regional Airport, and Highway 59 (see locations on Figure 9). This has the potential to affect highway travelers if blasting and/or fugitive dust cause visibility impairment or if flyrock approaches the right-of-way. These issues will be specifically addressed in the mine's blasting plan and in the air quality permit which must be obtained from WDEQ/AQD prior to mining the lease if it is issued. Portions of the existing Eagle Butte lease are located along to Highway 14-16, so the active pit has previously been within one-half mile of the highway (in Sections 16 and 28, T51N, R72W, see Figure 9) without creating dust- or blasting-related problems.

13. Transportation Facilities

Two highways, two pipelines, and an airport are proximate to the Eagle Butte LBA coal lease. Transportation resources are shown on Figure 9. U. S. Highway 14-16 is at the west edge of the Eagle Butte LBA coal lease. A relocated portion of Wyoming Highway 59 passes across the south half of the tract. This relocated segment was constructed in 1983, when the highway was moved south of its original location in order to recover coal reserves on the existing Eagle Butte Mine lease. MGTC and K-N Energy have gas pipelines situated on the LBA. A segment of one of these pipelines was previously relocated from its original path, to avoid conflict with existing mining at Eagle Butte. The Campbell County Regional Airport lies just west of U. S. Highway 14-16, and west of the LBA tract.

FIGURE 9. TRANSPORTATION RESOURCES IN THE EAGLE BUTTE LBA VICINITY



14. Socioeconomics

The proposed lease area lies in Campbell County within the Powder River Basin in northeastern Wyoming. The major Campbell County community of Gillette is located approximately 3 miles south of the southern boundary of the tract via Highway 14-16.

Gillette is the county seat for Campbell County. It is the major trade center and the largest community within the affected area of the proposed coal lease. It is the community within the region that is most likely to attract new area residents due to its current population level along with services and shopping amenities that exceed those of lesser populated communities within commuting distance of the proposed lease area.

Gillette had a population of 17,635 in 1990, according to the 1990 Census, relative to a 1990 population for Campbell county of 29,370. Moorcroft, a smaller community in Crook County with a population of 768 people, is home to approximately 5 percent of the Eagle Butte Mine employees. Campbell County ranked sixth in population among counties within the state in 1990.

With a total area of 4,769 square miles, Campbell County's population density was almost 6.2 persons per square mile in 1990, compared to an average of slightly over 4.6 persons per square mile for the state. The 1990 Census placed the state's population at 453,588.

According to the 1990 Census, Campbell County contained 11,538 housing units that year, of which 7,078 were in the town of Gillette. Vacant housing in Gillette in October 1992 was estimated to total about 355 units, excluding boarding and bunk house vacancies (see Table 10). The overall vacancy rate is about 5 percent. New workers entering the area in response to any growth in the local mining sector would probably find more vacant housing in Gillette than in other surrounding communities. As a maintenance tract, sale of the Eagle Butte Mine LBA lease would not directly create additional jobs. However, current available housing in Campbell County would be sufficient to accommodate over 500 additional workers.

Campbell County's economy is based largely upon coal mining, oil and gas development and extraction, energy production (specifically power generation), and agriculture. Campbell County's mineral valuation was \$1.21 billion for 1991 and \$1.10 billion for 1993. The state total was \$3.64 billion for 1992 and \$3.62 billion for 1993. Campbell County's coal valuation totaled \$756.51 million in 1992 and \$718.58 million in 1993, compared with state coal valuation figures of \$1.12 billion for both years. Based on this, Campbell County represents about 30 percent of the state's total mineral valuation, and more than 60 percent of the state's total coal valuation (State of Wyoming; Wyoming Department of Revenue, 1992 and 1993; Note: Mineral valuation for 1992 is based on 1991 production, and for 1993 is based on 1992 production).

Oil production in the county in 1993 was valued at \$363.67 million, or about 26 percent of the state's output of \$1.39 billion. The 1993 natural gas output in Campbell County was valued at \$20.39 million, which is about 2.4 percent of Wyoming's \$866.04 million valuation

for 1993 (State of Wyoming; Department of Revenue, 1993).

Table 10. Housing Availability in Gillette, Wyoming, October 1992.

UNIT	OCCUPANCY NO.	VACANCY NO.	% VACANCY RATE
Single Family (single homes)	3,376	141	4
Single Family Attached (townhouse/duplex)	916	79	8
Multiple Family (rentals)	1,600	89	5
Mobile Homes	902	46	5
Total	6,794	355	5
Source: Gillette Department of Community Development-Planning, Nov. 1992.			
Note: Boarding and bunk house vacancies are unknown.			

There were over 2,100 producing oil and/or gas wells in Campbell County in 1992; (State of Wyoming, Wyoming Oil and Gas Conservation Commission, 1992). Production from those wells represented 26 percent of the oil produced in the state in 1992, making Campbell County the leading oil producing county in the state. Campbell County produced 25.5 million barrels (Bbls) in 1989, 24.3 million Bbls in 1990, 24.6 million Bbls in 1991, and 22.4 million Bbls in 1992. Campbell County produced about 2 percent of the state's natural gas in 1992. Natural gas production in the county totaled 19.8 million cubic feet (MMCF) in 1989, 17.3 MMCF in 1990, 16.3 MMCF in 1991, and 14.3 MMCF in 1992. By comparison, the state's oil production totalled 100.35 million Bbls in 1989, 94.59 million Bbls in 1990, 88.02 million Bbls in 1991, and 84.64 million Bbls in 1992. Natural gas production was 621.50 MMCF in 1989, 690.36 MMCF in 1990, 700.80 MMCF in 1991, and 165.25 MMCF in 1992 (State of Wyoming; Department of Commerce, 1994).

Coal production for Campbell County and for Wyoming is shown on Table 11. Campbell County produced about 144 million tons of coal in 1989, 155 million tons in 1990, and 165 million tons in 1991. Production dropped to about 160 million tons in 1992, but increased substantially to over 180 million tons in 1993. This output represents 84 percent to 86.5 percent of the state's total coal output in those years. State output rose from 171 million tons in 1989 to 194 million tons in 1991, making Wyoming the largest coal producer among the 50 states. There was a drop in production to 190 million tons in 1992, and an increase to 209.9 million tons in 1993. In 1992, 97.3 percent of Wyoming produced coal was used in electrical generation in 23 states (Geological Survey of Wyoming, August, 1993). Wyoming coal production has recently been predicted to increase at about 4.3 percent annually (Geological

Survey of Wyoming, February, 1994). Production increased dramatically in 1993, after a decrease in production in 1992 (see Table 11). It is still too early in the year to determine if there will be another significant production increase in 1994, or if production will increase more gradually or perhaps level off. Eagle Butte Mine produced 13.6 million tons of coal in 1989, 15.4 million tons in 1990, 13.9 million tons of coal in 1991, and 13.7 million tons of coal in 1992, and 16.7 million tons in 1993.

Table 11. Historic Coal Production for Wyoming and Campbell County.

Year	Wyoming Million Tons	Percent Change	Campbell Co. Million Tons	Percent Change
1988	163.5	---	135.7	---
1989	171.1	+ 4.4	143.8	+ 6.0
1990	183.9	+ 7.0	154.7	+ 7.6
1991	193.9	+ 5.2	164.9	+ 6.6
1992	189.5	- 2.3	159.6	- 3.2
1993	209.9*	+10.8	181.6*	+13.4

* Personal Communication, Dan Vogler, Wyoming State Coal Geologist, Geological Survey of Wyoming, May, 1994.
Source: Wyoming Geo-Notes, No. 41, February, 1994

Employment in Wyoming's coal mining industry totaled 4,560 in 1989, 4,623 in 1990, 4,663 in 1991, and 4,648 in 1992. In comparison, Campbell County employed 2,630 in 1989, 2,590 in 1990, 2,671 in 1991, and 2,703 in 1992 within the coal mining sector (Geological Survey of Wyoming; 1990, 1991, 1992, 1993). The Eagle Butte Mine employed 253 persons in 1989, 205 in 1990, 205 in 1991, and 204 in 1992.

The average price of coal sold in Campbell County, Wyoming has declined from a peak of \$10.71 per ton in 1983 to only \$4.59 per ton in 1992 (State of Wyoming; Department of Commerce, 1993). The average coal price reflects a composite of historic contract prices that have escalated over time, new contract sales, open market (spot) coal sales, and renegotiated longer-term contracts. Contracts at \$12.00 to \$14.00 per ton are expiring and being renewed at \$3.00 to \$3.80 per ton (Geological Survey of Wyoming, May, 1993). Spot market, short-term contracts, and renegotiated longer-term contracts (all under \$5.00 per ton) comprised 5 percent of Wyoming's production in 1985, with a substantial increase to 37 percent in 1992, and a projected additional increase to 51 percent by 1995 (Geological Survey of Wyoming, May, 1993). Spot prices have risen in early 1994 as a result of an unforeseen shortage in coal supply in the basin (Riley; Casper Star Tribune, March 14, 1994).

The 1992 Wyoming Income and Employment Report (Department of Administration and Information, Division of Economic Analysis; State of Wyoming, 1992) shows that the County's agricultural sector employed 612 in 1987, 607 in 1988, 589 in 1989 and 589 in 1990. This compares to state figures of 12,937, 12,789, 12,349 and 12,338, respectively.

Labor force data for selected years are presented in Table 12. Average annual unemployment in Campbell County was 6.4 percent in 1992 and 5.8 percent in 1991. This compares to average statewide figures of 5.6 and 5.1 percent for 1992 and 1991, respectively. Average annual unemployment in the county was 1,015 in 1992 (State of Wyoming; Department of Employment, Research and Planning Division, July, 1993).

Table 12. Labor Force Data for Selected Years for Wyoming, Campbell and Crook Counties.

YEAR	WYOMING	CAMPBELL	CROOK
1980	273,871	16,594	2,879
1985	272,947	20,875	3,208
1991	261,978	18,033	3,068
Source:			
Wyoming Income and Employment Report, State of Wyoming, Department of Administration and Employment, Division of Economic Analysis, August, 1992.			

Total personal income in Campbell County was almost \$472.5 million in 1987, \$485.3 million in 1988, \$497.5 million in 1989 and \$532.1 million in 1990. This represented a 2.71 percent increase from 1987 to 1988, a 2.51 percent increase from 1988 to 1989 and a 6.95 percent increase in from 1989 to 1990. State personal income for those years totaled about \$6.28 billion, \$6.55 billion, \$6.84 billion and \$7.36 billion, respectively, which is a 4.30 percent increase from 1987 to 1988, a 4.43 percent increase from 1988 to 1989 and a 7.60 increase from 1989 to 1990 (the percentages are calculated on the non-rounded database by the State of Wyoming). In Campbell County, total personal income earned from all mining (including oil extraction) totaled over \$193.3 million in 1987, \$204.1 million in 1988, \$204.8 million in 1989 and \$221.1 million in 1990. Total personal income in the county's agricultural sector was \$4.04 million in 1987, \$5.08 million in 1988, \$6.10 million in 1989 and \$3.96 million in 1990. These figures are taken from the Wyoming Department of Administration and Information (State of Wyoming, 1992).

By comparison, earnings by place of work for the state totaled almost \$4.59 billion in 1987, \$4.78 billion in 1988, \$4.94 billion in 1989, and \$5.35 billion in 1990. Earnings from

coal mining amounted to about \$238.57 million in 1987, \$251.02 million in 1988, and \$257.15 million in 1989. Earned income from oil and gas extraction state wide was about \$319.17 million in 1987, \$333.72 million in 1988, and \$318.52 million in 1989. The state's agricultural sector produced earnings of over \$101 million in 1987, over \$132 million in 1988, nearly \$122 million in 1989, and \$158.5 million in 1990 (State of Wyoming; Department of Administration and Information, 1991).

The state's per capita income averaged \$13,163 in 1987, \$14,091 in 1988, \$14,921 in 1989 and \$16,283 in 1990. In these same years, Campbell County per capita income averaged \$15,037, \$15,928, \$16,681 and \$18,203, respectively (State of Wyoming; Department of Administration and Information, 1992).

Table 13 shows a summary of total disbursements by Campbell County, the City of Gillette, and the Campbell County school districts for selected years. Campbell County School District No. 1 in Gillette had fifteen elementary (5 rural), five junior high and middle schools (2 rural), and three high schools in 1992 (Campbell County Chamber of Commerce, February, 1993). At that time, the district employed about 598 full-time classroom teachers, and had a full enrollment of 8,033 pupils, which resulted in a pupil/teacher ratio of 22.15:1 for elementary and 17.03:1 for secondary schools. The number of full-time classroom teachers includes special program and extracurricular instructors (i.e. art, music, p.e.). These special instructors are not included in the elementary pupil:teacher ratio, but are included in the secondary school ratio. All other certified employees, including administrative, guidance counselors, training, etc. raise the total full-time district employees to 630 (Hastings, 1993).

Table 13. Local Disbursements for Campbell County and Gillette for Selected Years.

Years	Campbell County 1000 \$	Gillette 1000 \$	School District 1000 \$
1980 ¹	---	15,721.0	35,885.2
1985 ¹	---	30,415.0	62,261.0
1990 ¹	158,639.9	29,717.0	59,715.9
1992	113,999.4 ²	31,178.0 ³	56,716.0 ⁴

¹ Figures for 1980, 1985, and 1990 are actual expenditures as reported by local entities. Figures include debt servicing. Source: BLM, June 1991, Jacobs Ranch Federal Coal Lease Application Environmental Assessment.

² Figure provided by Study 1993.

³ Figure provided by Layden 1993.

⁴ Figure provided by Wright 1993.

The area being considered in this EA, like many other areas of the state, suffered from the decline in energy prices during the 1980s; therefore, it is not expanding as rapidly as had been projected earlier by various planners. However, the preceding information would indicate that Campbell County experienced an upward movement in mining activity and related earnings in the late 1980s, and that Campbell County was above the state average in per capita income. Any increase in the demand for the area's energy-related resources would be expected to further economic growth, with most of this growth likely to accrue in Gillette due to its size and variety of available services.

IV. ENVIRONMENTAL IMPACTS

A. Impacts Of The Proposed Action--Leasing Under Alternatives 1 or 2

The proposed action is to issue the Eagle Butte LBA tract as a maintenance lease for an existing mine; either as applied for (Alternative 1), or with an altered tract boundary (Alternative 2). Alternative 2 would increase the efficiency of coal recovery along the west edge of the tract, adjacent to U. S. Highway 14-16. Alternative 2 is the preferred alternative of the BLM. The actual limits of mining disturbance would not differ very much between these two alternatives.

The environmental impacts of mining the Eagle Butte LBA tract as a maintenance tract for the existing Eagle Butte Mine (Alternative 1 or Alternative 2) are described in this section (Section IV. A). Impacts are quantified for each discipline addressed in Section III of this report. The following section (IV. B.) addresses impacts of Alternative 3, the No Action Alternative, primarily by comparison to the impacts of the proposed action. Subsequent sections describe regulatory compliance and mitigation measures that would reduce or eliminate adverse impacts, residual impacts that might remain in spite of mitigation measures, and cumulative impacts of the proposed action and alternatives.

1. Geology and Topography

Surface coal mining alters the geology of the affected land. The overburden is drilled, blasted, and removed from atop the coal by trucks and shovels or draglines. Trucks and shovels are used at Eagle Butte. The overburden is either stockpiled or replaced directly into a mined-out area. Coal is blasted and removed by trucks and shovels. A coal recovery efficiency of about 90 to 95 percent is typical for Powder River Basin mines, based on information provided in numerous mine permit documents on file with WDEQ/LQD. The small percentage of coal not taken may be left intentionally, as with ashy or otherwise poor-quality coal; it may be left as a safety measure; or it may be lost by spillage from equipment. A small amount of coal may go unmined at the bottom of the seams, especially where the bases of the coal seams are very irregular.

Under the existing mine plan, approximately 4690 acres will be affected by actual coal removal. Mining of the Eagle Butte LBA tract as proposed as a maintenance tract would add about 915 acres to the total area of coal removal (940 if the lease boundary is expanded as under Alternative 2). Thus, the area subject to coal removal would range from about 4690 acres in the current mine area to about 5605 acres under Alternative 1 (5630 acres under Alternative 2). This is an increase of approximately 20 percent in the area of coal removal.

Under the current mine plan, an additional 1016 acres is permitted for surface disturbances such as construction of roads and diversions, mining of scoria for road surfacing material and overburden benching. The total area of disturbance permitted under the current

mine plan is therefore 5706 acres (4690 acres of coal removal plus 1016 acres of additional mining-related surface disturbance). Under Alternative 1 or Alternative 2, the total area of surface disturbance (the area of coal removal plus disturbance by mining-related activities) would be 1210 acres. (Although Alternative 2 allows mining of additional coal resources, the total surface disturbance is the same for both alternatives). About 250 acres of this 1210 acres would be disturbed under the current mine plan to allow recovery of all the coal in the existing Eagle Butte lease, but this disturbance is not yet permitted. Therefore, the increase in disturbance area over that currently permitted would be approximately 1210 acres under Alternative 1 or 2 acres. The total area of surface disturbance would increase from the 5706 acres currently permitted to about 6916 acres under the proposed action (5706 acres plus 1210 acres equals 6916 acres), an increase of approximately 21 percent. Under the existing mine plan, and under the either Alternative 1 or 2, only part of this area would be disturbed at any one time because of contemporaneous reclamation efforts.

In the process of reclamation, the overburden is put back into the mined-out area. The replaced overburden, or spoil, is physically different from the in-place overburden. As described previously, the Wasatch Formation, which comprises the overburden, consists primarily of discontinuous lenticular (lens-shaped) sandstone beds and sand channels surrounded by siltstone and shale. The replaced spoil is a mixture of these materials, with the physical characteristics (bulk density, porosity, hydraulic conductivity, etc) of the spoil being a function of the relative percentages of sand and finer-grained sediments in the pre-mining overburden and the mining methods. Spoil aquifers from dragline spoils are generally more permeable than those from truck and shovel operations.

The topography of the lease area is subject to considerable change during the mining process. Since the coal seams are so thick, the average elevation of the mined-out and reclaimed area is generally lower than the premining elevation. The reduction in elevation is generally less than the thickness of the coal because of overburden swelling. In-place overburden volumes are generally expressed in bank cubic yards (bcy), while spoil volumes are expressed in loose cubic yards (lcy). The ratio between lcy and bcy is termed the swell factor. The swell factor currently used for mine planning at Eagle Butte is 10 percent (AMAX, M. Nicholson, personal communication, 1993).

A typical average overburden thickness for mines in the Powder River Basin is about 150 feet. At the Eagle Butte Mine, overburden in the existing mine area averages 220 feet thick. Coal thickness at Eagle Butte varies, but an average minable thickness is approximately 110 feet. Exploration drilling results indicate that overburden and coal thicknesses on the LBA tract are not substantially different from the existing lease. Thus, for the existing mine and the LBA, removal of the coal and swelling of the overburden by 10 percent results would in a change in average elevation of:

$$220 (0.10) - 110 = -88.0 \text{ feet.}$$

The premining landscape of the LBA area is level to gently rolling, and the postmining landscape should be relatively similar. There are no habitat features such as playas, cliffs, or

rock outcrops present on the area, so none of these features will be lost by mining. There would be some topographic moderation of the tract following reclamation, however, the LBA tract is not topographically diverse in its pre-mine condition. Reduction of topographic diversity on reclaimed land can result in a reduction in habitat diversity. It can also reduce areas available to big game species as winter range.

The historic occurrences of coal bed methane, and indications of structural deformation in the Rawhide Butte Gas Field and Eagle Butte Mine area indicate that shallow accumulations of coal bed methane could be present in the nearby Eagle Butte LBA area. However, as discussed in Section III. B. 1., no folding or faulting like that found at Rawhide Butte Gas Field has been mapped in the LBA area or in the area just west of the LBA. Coal bed methane is being produced from wells located west of the airport. In 15 years of mining at Eagle Butte, no hazardous mining conditions or mining difficulties have been encountered due to methane, and none are expected as a result of mining the Eagle Butte LBA tract.

2. Water Resources

Surface coal mining has several impacts on local hydrology, including both the surface and ground water systems. These impacts are acknowledged by both mine operators and regulatory agencies, and the analysis and mitigation of hydrologic impacts receives considerable attention in the preparation and review of mining permit application documents.

The general impacts to ground water resources as a result of surface coal mining include the following:

- 1) Removal of the coal aquifer and any overburden aquifers within the mine area, and replacement of these aquifers with spoil material.
- 2) A temporary lowering of static water levels in the coal and overburden aquifers around the mine due to dewatering associated with removal of these aquifers within the mine boundaries.
- 3) A temporary lowering of static water levels in the sub-coal Fort Union Formation if the mines pump from this formation to provide water for sanitary and industrial (wash-down, etc.) uses. Most mines in the Powder River Basin, including Eagle Butte Mine, have water-supply wells completed in the sub-coal Fort Union Formation.
- 4) Temporary changes in water quality, usually deterioration, outside the area that is mined and reclaimed as a result of communication between the reclaimed aquifer and the unmined alluvial and coal aquifers.

Other ground water impacts, which may or may not occur, or which may occur only at

specific locations, include changes in recharge-discharge conditions and/or ground-water flow patterns.

General impacts to surface water resources resulting from surface coal mining include the following:

- 1) Disruption of the surface drainage system (channels and tributaries) during mining, requiring replacement of these systems during reclamation.
- 2) Changes in streamflow patterns during mining caused by the regulatory requirement to store runoff and settle out solids; by construction of flood control reservoirs or diversion systems needed to prevent unacceptable levels of runoff from entering the pit; and by discharges to streams of pit inflows or other sources of water in excess of the mines' water requirements.
- 3) Possible changes in runoff rates due to changes in precipitation infiltration rates on reclaimed land.
- 4) Possible changes in surface water quality.

a. Ground Water

As described in above, in Section IV. B. 1., the physical and chemical characteristics of the reclaimed spoil material are dependent upon mining methods and overburden lithology. Research in other coal-mining areas in the northern Great Plains indicates that hydraulic conductivity in the reclaimed spoil would be large enough to consider the material an aquifer (Groenewold, 1979). The final hydraulic conductivity of the reclaimed spoil aquifer would probably approximate the geometric mean values of hydraulic conductivity for the undisturbed Wasatch aquifer (0.2 ft/day) and the Wyodak coal aquifer (0.8 ft/day) (p. 23, Martin, et al.; US Geological Survey, 1988). Given the expected final saturated thickness, the reclaimed spoil aquifer would be able to supply water of adequate quantity for supply of the yields needed for stock and domestic wells. This hydraulic conductivity could also be sufficient for the reclaimed spoil aquifer to support flow patterns that are similar to premining patterns, allowing for the fact that one aquifer (the reclaimed spoil aquifer) would replace two aquifer systems (coal and overburden) in areas that are mined and reclaimed.

The following discussion of recharge, movement, and discharge of water in the spoil aquifer is excerpted from the Powder River Basin Cumulative Hydrologic Impact Assessment (CHIA) (Martin, et al., U.S. Geological Survey, 1988):

The potential for recharge to the backfilled spoil would be greater than in areas not disturbed by mining. The natural bedding will be destroyed, creating a more isotropic condition in the spoil, resulting in generally greater vertical permeability than exists in undisturbed areas. The infiltration capacity of the backfilled and reclaimed spoil will be greater than that of the undisturbed Wasatch

aquifer and Wyodak coal aquifer. However, the infiltration rate for reclaimed soils is less than that for natural soils due to the lack of root structure and other paths for vertical movement of water. After several years, infiltration rates for reclaimed soils will increase to approximately the same rates as for undisturbed soils. As infiltration rates increase to approximate premining conditions, ground-water recharge rates also will increase to approximate premining conditions.

Although the recharge potential of the reclaimed mine areas will increase, the actual recharge rate after reclamation probably will approximate or be somewhat greater than premining recharge. Actual recharge will depend on how well the surface contours are restored. A flatter average slope of the reclaimed land would increase the potential recharge by decreasing the rate of runoff from reclaimed areas. Recharge will increase locally where water is allowed to pond in surface impoundments. Also, some increase in recharge along re-constructed channels probably will occur during the infrequent periods of surface runoff.

Postmining recharge rates and mechanisms will not change in areas where lateral movement of ground water from adjacent clinker is a major source of recharge. This is because, in general, the clinker will not be disturbed by mining operations. After mining and reclamation have been completed, water will move laterally from clinker to the spoil aquifer.

Recharge to the spoil aquifer will be from infiltration of precipitation, lateral flow from the undisturbed clinker and the Wasatch aquifer and Wyodak coal aquifer, and leakage from surface-water impoundments and stream channels. Estimates of the time required for the ground-water system to re-establish equilibrium varies from a few tens of years to hundreds of years. The anticipated potentiometric surface of the spoil aquifer will resemble a composite of the premining potentiometric surfaces in the Wasatch aquifer and Wyodak coal aquifer. After equilibrium is re-established, ground-water flow patterns will approximate premining conditions. Discharge from the spoil aquifer will flow into the undisturbed Wasatch aquifer and Wyodak coal aquifer to the west (regional flow) or to reclaimed stream channels (local flow).

Recovering water levels in reclaimed spoils at the Eagle Butte Mine are currently being monitored in two wells. The most recent water level data from these wells are presented in Appendix 2 of the 1993 Eagle Butte Annual Report (AMAX, 1993) and the Gillette Area Groundwater Monitoring Organization (GAGMO) 1993 Annual Report (Hydro-Engineering, 1993) which reports data for 1992. Water levels in these wells range from about 82 to 115 feet below the reclaimed surface. Saturated thickness, which is the distance between the base of the spoil aquifer and the water table (indicated by the water level), currently ranges from 64 to 104 feet at these wells (AMAX, 1993).

Data from reclaimed area monitoring wells is relatively short term, generally less than 10 years. Total dissolved solids (TDS) in reclaimed monitoring wells at the Eagle Butte Mine has ranged from 2000 to over 6000 mg/L, and no pattern of change in TDS is apparent at this time. Dissolved-solids concentrations in the two currently existing backfill wells at Eagle Butte Mine range are both around 5,300 mg/L (AMAX, 1993, Appendix 3). The pre-mining concentrations in the Eagle Butte area are: 2,000 to 20,000 mg/L for the Little Rawhide Creek Alluvium; 897 to 8,650 mg/L for Wasatch aquifers, and 895 to 3,316 mg/L for the coal aquifer.

A regional study of the cumulative impacts of coal mining found the median concentrations of dissolved solids and sulfates to be larger in water from spoil aquifers than in water from either the Wasatch Formation overburden or the coal aquifer (Martin, et al.; U.S.

Geological Survey, 1988). This is expected because blasting and movement of the overburden materials exposes more surface area to water, increasing dissolution of soluble materials, particularly when the spoil materials are situated above the saturated zone in the premining environment. On the basis of studies done in North Dakota, it was estimated that at least one pore volume of water must leach through the spoil before the dissolved-solids concentration in the water would be similar to the premining dissolved-solids concentration (Houghton, et al.; U.S. Geological Survey, 1987). The time required for one pore volume of water to pass through the entire spoil aquifer would be greater than the time required for the postmining ground water system to re-establish equilibrium. As quoted above, estimates of the time required for the ground-water system to re-establish equilibrium vary from a few tens of years to hundreds of years.

AMAX has conducted ground water modeling to predict the extent of water drawdown in the coal and overburden aquifers as a result of mining at the Eagle Butte Mine. The model considers operations at adjacent mines in order to predict the cumulative impacts of all mining in the area on groundwater levels. The results of the ground water modeling are reported in Appendix 3.5-4 of the Eagle Butte Mine 428-T2 permit document (AMAX, 1990). Drawdowns in the coal aquifer are expected to extend further beyond the mine boundaries than do those in the overburden. Drawdowns extend farther in the coal because the coal is a confined aquifer with a large areal extent, whereas the Wasatch aquifers are generally unconfined and discontinuous. The five-foot drawdown contour for the coal predicted by the model extends about eleven miles west and about five miles south of the current permit boundary. The modeling predicts drawdowns from the Eagle Butte will intersect drawdowns from the Rawhide and Buckskin Mines, resulting in cumulative drawdown effects to the west and northwest. Drawdowns do not extend to the east or the north because the mine is located just west of the coal outcrop line and because current mining activities are located south of a no-coal channel which is believed to be relatively impervious. This modeling predicts that the LBA tract is within an area where the drawdown in the coal will exceed 40 feet as a result of mining the existing lease.

The extent and magnitude of the drawdowns in the coal and the overburden aquifers will likely be shifted southward by about one mile as mining extends approximately one mile south through the LBA tract. Under either Alternative 1 or 2, northward and westward extent of coal removal would not be materially changed by the mining of the LBA tract. Therefore, the maximum northward and westward extent of drawdown caused by mining operations at the Eagle Butte Mine should not change. Likewise, the cumulative effects to the north and the west should not change as a result of issuing the Eagle Butte LBA.

A total of 31 water-supply wells have been identified as potentially being impacted by Eagle Butte Mine (AMAX 1990) based on the results of the ground water modeling. These wells are listed in Table 3.5-13 of the Eagle Butte Mine Permit Application. Table 3.5-13 is included as Appendix B of this EA. Please note that on this list, the applicant name and well name are listed as they appear in the water rights records of the State Engineer' Office. As a result, they may or may not reflect current ownership or use. Eight of the wells are on AMAX

land. Of the remaining 23, 11 are permitted for domestic use, 2 are for stock use, 1 is for industrial use, and 9 are for miscellaneous use. Four of these wells are located on the LBA tract. Impacts to most of these wells will be due to drawdowns. The four water-supply wells on the LBA tract would experience water-level declines as they are approached by the pit, and ultimately would be removed by mining. Water-supply wells completed in the coal and possibly wells in the overburden outside, but in close proximity to, the mine area would also experience reductions in water levels.

To monitor the effects of mining on water levels, AMAX maintains several coal, overburden and alluvial monitoring wells both on and adjacent to the Eagle Butte Mine permit area (see Figure 4). Of these wells, four coal monitor wells are located in the vicinity of the LBA tract: C217, D201C, D59-1 and D26C. Wells C217 and D201C indicate that up to 158 feet of drawdown has occurred since 1981 (Hydro-Engineering, 1993). Although wells D59-1 and D26C were not constructed until 1988, comparison of their current (1991) water levels (AMAX, 1992a) to the estimated premining potentiometric surface in their vicinity (AMAX, 1990) indicates drawdowns of roughly the same magnitude as wells C217 and D201C.

Water level data from overburden monitoring wells in the vicinity of the LBA tract show declines of 2.41 feet for well C217Z and 48.62 feet for well D106YY since 1984 and 1985, respectively (Hydro-Engineering, 1993).

Water-level declines in the sub-coal Fort Union Formation have been documented in the Gillette area. According to Crist (U.S. Geological Survey, 1991), pumpage for municipal use by Gillette and for public supply by the subdivisions around Gillette is the principal cause of water-level declines in the upper Fort Union measured in wells in the immediate vicinity of Gillette. Most of the water-level declines in the sub-coal Fort Union wells occur within one mile of the pumped wells (M.A. Crist, p. 30, Martin, et al.; U.S. Geological Survey, 1988). Since the mine facilities are always separated by distances of a mile or more, there is little interference between mine supply wells.

The Eagle Butte Mine obtains water from two Fort Union Formation wells, both of which are located approximately six miles from Gillette (see Figure 4). The potential cumulative impacts associated with these two wells were studied in 1983 for AMAX by Western Water Consultants (Western Water Consultants, 1983). This study identified 56 wells, in addition to the two Eagle Butte wells, all of which are believed to be completed in the same sandstone units. Of these 56, four are located within two miles of the Eagle Butte wells. It was estimated in this study that impacts would extend less than one mile from the center point between the two AMAX wells and that the two wells would not significantly increase the cumulative impacts of the other 56 wells on water levels in the Fort Union sandstones in which they were completed (Western Water Consultants, 1983).

There would be no direct impact to the Fort Union aquifers near Gillette as a result of mining the proposed LBA tract because there is no hydraulic communication (connection that would allow the movement of water) between these sands and the coal being mined and because,

if mined by an existing operation, no additional facilities or facilities water would be required. Thus, if the LBA tract is mined as proposed under Alternatives 1 or 2, a need for additional water-supply wells in the sub-coal Fort Union is not anticipated. There would be an increase in the duration of use of the two existing wells.

After mining, water levels in the coal and overburden aquifers would begin to recover, and eventually an equilibrium flow pattern would develop. Water from the spoil aquifer would enter the adjacent, unmined coal. This would result in increased dissolved-solids concentrations in the coal aquifer water initially, but since there is a finite quantity of soluble salt in the spoil material this increase would not be permanent. Martin, et al. (U.S. Geological Survey; 1988) point out that, in general, current and future water from the spoil aquifers will meet state standards for livestock, which is the current major use of water from the coal and overlying Wasatch aquifers. This conclusion was based on 336 chemical analyses of samples between 1981 and 1986 from 45 wells completed in spoil aquifers at ten existing mines. Eagle Butte was one of the mines included in that investigation.

As noted previously, dissolved-solids concentrations in the existing backfill wells at Eagle Butte are currently range about 5,300 mg/L (AMAX, 1993). This is higher than the range of premining water quality in the coal aquifer as described in Section III.2.A. (895-3,316 mg/L TDS). It is within the range of premining water quality in the Little Rawhide Creek Alluvium (2,000-20,000 mg/L TDS) and the Wasatch aquifers (897-8650 mg/L TDS).

Martin, et al., 1988, also point out that column leach tests indicate that the elevated levels of dissolved solids caused by coal mining will decrease over time. As soluble salts continue to leach from the spoil material, future postmining water entering the adjacent coal aquifer should decrease in dissolved-solids concentration until a postmining equilibrium condition is attained (p. 92, Martin, et al.; U.S. Geological Survey, 1988).

Clinker would be the major recharge source for the spoil aquifer, just as it is for the coal before mining. Although some clinker is mined for road surfacing material, saturated clinker is not generally mined at Eagle Butte or any of the Powder River Basin Mines since there is sufficient clinker above the water table that does not present the mining problems that are known to result from mining saturated clinker.

b. Surface Water

The incremental impacts to the surface drainage system caused by mining the Eagle Butte LBA tract would be minimal. The Little Rawhide Creek flows along the western edge of the present mining lease. A portion of the Little Rawhide Creek on the Eagle Butte Mine property has already been mined through. The stream is now conveyed around active mining areas in a diversion channel. Plans for the restoration of this stream have been submitted to and approved by WDEQ/LQD, and portions of the stream channel have already been partially restored on reclaimed ground. Restoration plans are designed to provide channel and drainage-basin

erosional stability comparable to premining stability. Natural flows in the reclaimed channel are currently being diverted to accommodate the Rawhide Mine, operated by The Carter Mining Company. The Rawhide Mine is currently mining through Little Rawhide Creek downstream of Eagle Butte. Natural runoff from reclaimed lands drains to the reconstructed channel, and some creek flow has been pumped from Little Rawhide Creek into the reconstructed channel. No hydrologic instabilities have been noted in the reclaimed channel to date as a result of this flow. Mining and reclamation at the Eagle Butte Mine is not expected to change the intermittent nature of the lower reaches of Little Rawhide Creek, with or without the LBA.

Downstream water rights will not be affected by the addition of this lease tract to the existing operation. Flood control impoundments may be used to keep streamflows out of the pit. The impoundments will have to be dewatered following major runoff events to provide storage space for subsequent events. The water thus released will be available to meet the needs of downstream water users. These impacts are addressed in the current mine plan and will not be significantly increased by the proposed increases to the coal reserve.

Some studies indicate that infiltration rates are initially smaller on reclaimed lands than on premining lands. A weighted average reduction of 29 percent has been found, with this reduction declining over time until the postmining infiltration rates recover to premining levels (Martin, et al.; U.S. Geological Survey, 1988).

Since runoff and infiltration rates have an inverse relationship, a reduction in infiltration rates could cause an increase in runoff and, hence, streamflows. Assuming that the runoff from reclaimed areas is 29 percent greater than that from premining areas (based on this change in infiltration rates noted above), USGS determined that major streams in the Powder River Basin would see runoff increases ranging from 0.4 percent for the Cheyenne River to 4.3 percent for Coal Creek. Rawhide Creek at the confluence with the Little Powder River would see a 3.3 percent increase in runoff (Martin, et al.; U.S. Geological Survey, 1988).

Surface water quality should not be significantly affected by mining, based on studies conducted by the USGS (Bloyd, et al.; U.S. Geological Survey, 1986). Sediment yield should not increase in area streams. Although reclaimed soils may be more erosive for the first few years after reclamation, the larger sediment production would probably not be delivered to area streams due to sediment deposition as a result of flatter slopes on reclaimed lands and sediment trapping by mandated sedimentation ponds.

Recently, concern has been expressed over the presence of certain forms of selenium in overburden. The WDEQ and the mine operators are cooperating in a joint effort to study this issue and to determine safe levels of selenium in overburden that is to be placed near the reclaimed surface, near reclaimed streams and impoundments, or in saturated spoils. Selenium levels at the Eagle Butte Mine are further discussed in Section IV. 3. Soils.

c. Alluvial Valley Floors

Impacts to designated alluvial valley floors (AVFs) are generally not permitted if the AVF is determined to be significant to agriculture. If the AVF is determined not to be significant to agriculture, or if the permit to affect the AVF was issued prior to the effective date of SMCRA, the AVF can be mined. The determination of significance to farming is made by the WDEQ/LQD, and it is based on specific calculations which consider the size of the AVF relative to the size of the existing agricultural operations. The WDEQ/LQD has determined that potential AVF lands within and adjacent to the LBA tract are not significant to agriculture and therefore can be disturbed (April 22, 1993 letter from L. Harmon to M. Nicholson, State of Wyoming).

If a determination is made that an AVF is not significant to agriculture, as in the case of the potential AVF within the Eagle Butte LBA area, the AVF can be disturbed during mining. However, it must be restored as part of the reclamation process. In order to restore the AVF, the physical and hydrologic characteristics of the AVF must be determined. The exact extent and characteristics of the AVF in the area of the Eagle Butte LBA are currently the subject of a detailed study. These characteristics will be detailed in the WDEQ/LOD permit application to mine the LBA. The permit application will include restoration plans for any AVF lands that will be impacted by mining.

In general, AVF impacts can include several of the ground and surface-water impacts listed above. Alluvial aquifers can be subject to water-table drawdowns, channels subject to changes in flow patterns, and the interaction between surface water and ground water can be altered.

d. Wetlands

As discussed in Section III. B. 2. d. above, based on the available site-specific data gathered on the LBA tract, there is no indication that any portion of the LBA meets the criteria to be designated a wetland. A full evaluation of the wetlands criteria will be performed prior to applying for a permit to mine the tract. If wetlands are identified during that evaluation, mitigation in accordance with the prevailing USCE regulations will be required and will be addressed as part of future Eagle Butte mining permits.

3. Soils

The topsoil, like the overburden, is removed, stockpiled if necessary, and replaced during the mining and reclamation process. The postmining topsoil is therefore a composite of premining soils. However, there are important differences between premining and postmining soils. Premining soils occur in mappable units, or soil series, which are distinguishable by their physical and chemical characteristics, depths, locations in the landscape, and other factors. Prior

to mining, the operator is required to map the soils, test them for physical and chemical suitability to support plant growth, and provide a plan for their salvage and replacement.

The postmining soils are a more homogenous mixture than the premining soils, and are replaced at a more uniform depth. On average, the postmining soils would be superior in quality to premining soils, because soil material determined to be unsuitable, due to physical or chemical limitations, is not salvaged and replaced. The average topsoil replacement depth at the current Eagle Butte Mine is about 26 inches. Since soils in the LBA tract are similar to those in the current mine area, the average replacement depth for the entire mine area including the LBA tract, under Alternatives 1 or 2, should not change significantly.

Infiltration rates of soils may be altered by the salvage and replacement activities. However, differences between infiltration rates for natural and replaced soils may be masked by the variability of infiltration rates among soils and by inherent inaccuracies in measuring infiltration rates. Average infiltration rates would probably be smaller soon after reclamation is completed, but over time, as the postmining vegetation root system develops and natural weathering action affects the soil structure, infiltration rates should trend toward premining levels (Martin, et al.; U.S. Geological Survey, 1988).

It is estimated that up to 1210 acres of soil resources would be disturbed in the proposed lease area and adjacent disturbance areas. Approximately 250 acres of this 1210 acres would need to be disturbed to recover currently leased coal, with or without the LBA. There would also be surface disturbances associated with relocating the pipelines that currently cross the LBA, and with moving Highway 59 off of the existing lease and the LBA.

Improper disturbance to soils can cause numerous types of impacts associated with alteration of existing soil characteristics and properties. Potential impacts to soil resources as a result of mining can include changes in soil structure, texture, organic matter content, infiltration rate, permeability, water-holding capacity, nutrient level, soil microorganism composition, and soil productivity. Mining can expose lower soils or overburden material which may contain chemical constituents at levels which could be harmful to plants and animals.

Stockpiling soil material can degrade biological, chemical, and physical properties. Stockpiling can decrease organic matter content, disrupt nutrient cycles, increase bulk density, upset the carbon-nitrogen ratio and negatively affect the mycorrhizal response of stored soil material (U.S. Forest Service, 1984).

The exposure, compaction, and stockpiling of salvaged soil material could increase potential for soil loss from wind and water erosion until the soil is revegetated. Increases in surface runoff could cause increased soil erosion and subsequent sedimentation into drainage channels or impoundments. Erosion hazard is greatly reduced through successful establishment of reclamation measures.

Potential impacts to topsoil resources are short-term and not significant as evidenced by

reclamation efforts on reclaimed areas of the adjacent Eagle Butte Mine for similar soils. No significant site-specific or cumulative impacts have been encountered on the currently active Eagle Butte Mine to date, and none are foreseen on the LBA tract. No prime farmland exists within the proposed lease area, and therefore none would be disturbed. Creek channels, pools, and other drainage features have been reconstructed at the existing Eagle Butte Mine during reclamation, and similar reclamation techniques would be used on the LBA tract.

There has recently been some general concern expressed about levels of selenium in replaced topsoil and backfill within the Powder River Basin. Previous analysis of soil series sampled within the current Eagle Butte permit area did not show elevated levels of selenium over 0.1 parts per million. The two new series sampled on the proposed lease area during the 1992 soil assessment contained less than 0.01 parts per million in all intervals. Minor occurrences of selenium have been detected through time in both overburden and backfill at Eagle Butte, but levels have not been significant (N. Hutten, personal communication, May 10; AMAX, 1993).

At this time, the chemistry of selenium in Powder River Basin soils is being studied to see if the current guidelines can reasonably be applied for this area. The Wyoming Mining Association and the WDEQ/LQD have embarked on a comprehensive research program, in which AMAX is involved, to address issues such as:

- appropriate analytical techniques for obtaining reproducible selenium measurements in soils;
- levels of selenium in vegetation on reclaimed areas and undisturbed ground;
- the interrelationship between selenium in soils and vegetation;
- the characteristics of selenium uptake by vegetation; and
- the potential for contribution of selenium to the groundwater or surface water resources from backfill areas.

The intent of this research is the potential promulgation, if appropriate, of rules for handling seleniferous soils to minimize or avoid long-term impacts to the environment. To date, impacts related to selenium have not been detected, and this research will help agencies to assure future selenium problems are not encountered.

4. Vegetation

Native vegetation types on the Eagle Butte LBA tract are basically identical to those same types on the existing permit area; these types are common throughout the region. However, a greater proportion of the LBA is occupied by agricultural vegetation. The primary agricultural types are hayland, tame pastureland, and annual grain cropland.

As of November 1992, 1,835 acres of the existing permit area had been disturbed by mining and mining-related activities, and 302 acres had been permanently reclaimed (AMAX, 1992b). The amount of land available for permanent reclamation is controlled by completion of the postmining surface, which is closely linked to coal extraction activities. All disturbed lands at Eagle Butte are currently bonded. All reclaimed lands have been built to approved postmining topography, therefore, the reclamation performance bond that is held for the reclaimed is bonding for vegetation performance standards and for topsoil carryover.

Evaluation of reclamation at the AMAX mines has illustrated that vegetation can be re-established on reclaimed areas even when precipitation is below normal and precipitation patterns are highly irregular. Revegetation monitoring has been in progress at Eagle Butte since 1983. Results of this monitoring, as well as visual assessment of newly reclaimed areas, indicate that permanently revegetated areas will equal or exceed native prairie in vegetation cover and production. Vegetation diversity on reclaimed areas is good, and includes shrubs such as Wyoming big sagebrush and forbs such as prairie coneflower as well as well-established grasses, which are dominated by a variety of wheatgrasses. Results of reclamation sampling are presented in Eagle Butte Mine's Annual Reports filed with WDEQ/LQD. The vegetation monitoring done on permanently reclaimed ground in the mine's former north pit for 1993 reports a shrub density average of 3.9 shrubs per square meter over ten sample plots. The shrubs identified in this sampling were mostly less than one inch high and consisted of big sagebrush and winterfat (Eagle Butte Mine 1993 Annual Report, Appendix 8).

If similarity between premining and postmining land uses is maintained, revegetation emphasis on the LBA is likely to favor agricultural vegetation types. Revegetation success with these vegetation types on the LBA is anticipated to be similar to the existing lease (D. Steward, personal communication; AMAX, May 1993).

Revegetation practices at Eagle Butte are based on an ongoing evolution of a complex revegetation technology. A typical cultivation and planting sequence includes: disk, cultipack, hydroseed, roll, drill-seed, chain, and roll. Annual grains may be planted to condition the soil prior to permanent revegetation. In some instances, interseeding of key species follows the initial seeding effort. It is anticipated that the proposed lease could be revegetated by the same techniques currently being used at the AMAX Eagle Butte and Belle Ayr mines, based on the similarity of the LBA tract to the existing mine areas. Vegetative impacts from mining the Eagle Butte LBA tract would be temporary. Re-establishment of agricultural vegetation types would be expected to take place within a few years of reclamation. Re-establishment of native rangeland vegetation types, including shrubs at pre-mining densities, could take 20 to 100 years.

5. Land Use

During mining, portions of the Eagle Butte LBA tract and adjacent areas would be unavailable for livestock grazing or farming. At a mining rate of 16 million tons per year, about 150 acres per year would be newly disturbed. Considering time required for topsoil and

overburden removal in advance of mining, and spoil grading and topsoil replacement following coal removal, the total area of disturbance at any given time would probably total 300 acres or more. The total area of land disturbance at any one time is expected to be similar to that under the existing Eagle Butte operation. It is anticipated that the LBA tract will support both agriculture and wildlife use after mining. AMAX Land Company is currently integrating reclaimed lands into its Campbell County ranching operations, and wildlife are utilizing reclaimed lands as well.

The plugged and abandoned oil and gas wells on the LBA tract would be mined through and the plugs replaced. AMAX has had experience with this procedure at Eagle Butte and Belle Ayr mines. There are no producing wells on the area at this time.

6. Wildlife

Mining the LBA lease under either Alternative 1 or 2 will disturb approximately two square miles of winter/yearlong pronghorn habitat in the North Black Hills herd unit. The population within this unit is approximately 6-7 animals per square mile (based on 2080 square miles of occupied habitat, and a WGFD 1992 post-harvest estimate of 14,000). Since no critical or crucial habitat or limiting feature has been identified on the LBA, if the affected area became permanently unsuitable for any pronghorn use, the loss of AUMs for antelope would be fairly proportional to the size of the LBA in relation to the size of the occupied habitat within the herd unit. This would equate to a decline of 12 to 14 animals for this herd unit as a result of permanent habitat loss. Permanent habitat loss is not expected. During mining, pronghorn would be displaced from disturbed land, which may equal 300 acres or more at any one time. However, undisturbed native habitat will exist south of the tract, and reclaimed land will be available in previously mined areas. Pronghorn are already using reclaimed areas at Eagle Butte Mine seasonally; as the shrub component on reclaimed land increases, more winter use of this land by pronghorn is expected. It is estimated that the time necessary for establishment of sagebrush to pre-mining densities in reclaimed areas that are not cultivated for agricultural purposes would range from 20 to 100 years. The impacts of topographic moderation be minimal because the pre-mine topography of the tract is gently rolling. Due to the availability of adjacent habitat, and the demonstrated use of reclamation, the impact to pronghorn as a result of leasing the Eagle Butte LBA tract is not expected to be significantly greater than the impacts of mining the existing lease.

According to the WGFD range maps, the LBA is not considered deer habitat (WGFD classification is "OUT"), however, deer use has been noted regularly in both disturbed and reclaimed areas at Eagle Butte. This current use of the area by deer may result in its classification as yearlong deer habitat. It is possible that the abundant forage, artificial cover features (berms, parked equipment), and lack of hunting pressure have contributed to increased deer populations in the immediate vicinity of the mine. After mining, when artificial cover features are eliminated and the gently rolling topography is restored, the deer population at Eagle Butte (including the LBA tract) would probably return to a more normal situation.

It is unlikely that raptor populations will be deleteriously impacted by development of the proposed lease. Very few raptors currently winter in the Eagle Butte area, and the raptor nesting density is not high. Only one raptor nest site currently exists on the proposed lease area. If the nest site is still in existence as mining approaches, it could likely be relocated away from disturbance. Eagle Butte Mine has successfully relocated one red-tailed hawk nest twice to artificial nesting structures. There is a raptor mitigation plan for all nests on the Eagle Butte permit area which must be updated each time new lands are added to the permit area, when the mine plan is significantly changed, or when the permit is renewed. Mitigation plans would be submitted to the USFWS for review and approval during the WDEQ/LQD permit application process for the LBA.

There are no sage grouse leks on the proposed lease, but overburden removal and other mining-related disturbance on the tract will encroach within 1/4 mile of Schiermiester lek. Based on observations at other leks exposed to mining disturbance, birds will likely continue to use the lek, as long as the ground surface at the lek itself is not disturbed and adjacent native habitat is available (B. Postovit, Powder River Eagle Studies Inc., April 1993 personal communication).

Sagebrush grassland habitat adjacent to Schiermiester lek, south of the proposed lease, will remain undisturbed by mining. Approximately 650 acres of sagebrush grassland habitat will be disturbed by mining the LBA lease. Sagebrush grassland is the most common native habitat in northeast Wyoming and Campbell County; the percentage of sage grouse habitat disturbed by mining the LBA is not significant. Sage grouse use of the LBA tract is not high, and little or no brood-rearing habitat is found on the area. Much of the bottomland on the area is in poor condition due to past grazing practices. The impact of leasing and mining the tract would therefore be minimal to sage grouse populations.

Sharptailed grouse and gray partridge are only rarely observed in the vicinity of the LBA. Optimal habitat for these species does not currently exist in the area. The impact of leasing and mining the tract is not significant for these species. It is possible that reclamation will temporarily increase habitat for these species, which are generally associated more with grasslands and agriculture than with sagebrush grasslands. As the shrub component on reclamation increases through time, the area would become less suitable for these game birds.

Because migratory birds of high federal interest do not regularly use the area, mining would not have a significant impact on these species. No unique source of prey, and no nesting habitat, for bald eagles or peregrine falcons exists on or near the Eagle Butte LBA tract; therefore the impact of mining on these species would be negligible. Because no prairie dog towns exist on or near the LBA tract, there will be no impact on habitat for black footed ferrets.

7. Cultural Resources

No significant cultural resources were located on the LBA tract or on adjacent lands

within the limits of potential mining disturbance. Should the boundaries of the affected area change, additional Class III survey work would be required prior to disturbance.

8. Paleontological Resources

No unique or significant paleontological resources have been identified on the LBA tract. In the event that significant paleontological resources are discovered in the course of mining, those resources will be handled as specified in the special stipulations concerning paleontological resources which is cited in section II. A. of this EA.

9. Visual Resources

No unique visual resources are found on the Eagle Butte LBA tract, and therefore impacts to visual resources would be minimal. The need to remove and stockpile overburden, extract coal and construct facilities requires a major modification of landforms in coal lease areas. These activities are already occurring extensively as a result of several nearby surface mining operations. Two highways, an airport, and industrial development also affect visual classification of the LBA tract. The additional cumulative increment of mining on the LBA, when compared to the current visual classification, is not significant.

The duration of the visual impact from mining will be extended between 9 and 10 years if the LBA lease is added to Eagle Butte Mine. However, stringent reclamation guidelines require that these lands be restored to their premine character to the extent practicable.

10. Noise

The proposed LBA lease is approximately the same distance from public access (Highways 14-16 and 59) as the existing operations. The nearest residence is about 300 feet south of the proposed lease area, and is owned by AMAX Land Company. The next nearest residence is the Campbell County Regional Airport manager's residence, approximately one-half mile to the west. There are also two mobile homes located at the airport. The Rachel Fulkerson residence lies approximately three-quarters of a mile to the southwest of the lease area. A mobile home park is located on Hannum Road, approximately two-thirds of a mile south of the LBA tract. The WDEQ/LQD mine permit regulates blasting noise and vibration from a mine within one-half mile of the mine permit boundary.

Potential onsite noise impacts to workers are regulated by the Mine Safety and Health Administration (MSHA). Since no workers would be housed at the mine site, compliance with the work-related hearing conservation programs of MSHA is sufficient to insure impacts to workers on the proposed lease area would be minimized.

Section III.B.11 of this report states that ambient noise levels are in the 40 to 60 decibel range, while the noise level in the immediate vicinity of mining operations is in the range of 85 to 95 decibels. The psychological property of a sound called *loudness* is intimately connected with the *intensity* of a sound wave. Intensity is generally measured in watts per square meter. The intensity of a sound wave is the power transferred through unit area normal to the direction of propagation. For a pure tone of given frequency, loudness increases with increasing intensity, but in general the relation between the loudness of a sound and its intensity is not simple. Loudness cannot be measured in physical terms, since it depends on the ear and judgement of the individual observer.

Using intensity as an indicator, it is possible to estimate approximately the distance one would have to be from a sound source 100 decibels in the mine area to have the sound reduced to an ambient level of about 40 decibels. This estimate is based on the fact that energy is inversely related to the square of the distance and that the logarithm (base 10) of the ratio of two sound intensities is called the difference in intensity level, or bels. Ten times this logarithm is called the difference in intensity level in decibels (db), and this difference is ordinarily used to compare intensities of two sounds. A sound 10 times as intense as another has an intensity level 10 db higher. Thus a sound of 100 db has an intensity level one million times higher than a sound of 40 db (10^6). A 100-db sound would be reduced to a 40 db level at a distance of about 10,000 feet from the source, assuming no attenuation of the sound. In other words, the sound of a 100 db source would be reduced to near ambient levels within 10,000 feet (less than two miles) from the source.

The non-AMAX dwellings nearest to the LBA are located at the Campbell County Regional Airport. The Fulkerson residence sits approximately 300 feet from U.S. Highway 14-16, and less than one-half mile from the airport. These locations are all currently subject to higher ambient noise levels than most of the LBA tract. There would be an increase in the noise level at these sites as a result of mining the LBA tract, particularly during the time that mining reaches its western limit along U.S. Highway 14-16; the closest point to the residences.

11. Air Quality

As discussed in Section III.B.12 of this report, air quality monitoring indicates that coal production in Wyoming's Powder River Basin increased nearly 2.5 times between 1980 and 1989 without adversely impacting air quality. This is due to the development and use of air quality control measures, which include bag houses, covered transfer points, sprinkling of water and addition of EPA-approved chemicals to haul roads, limiting disturbance areas, and contemporaneous reclamation. These measures enable operators to plan and implement ways to increase coal production without adversely affecting air quality.

The amount of additional air quality resource that is available for future mining cannot be quantified without a rigorous technical evaluation. The amount of air increment utilized by a particular operation is highly dependent upon the type of operation, the types of equipment,

and the mining sequence. Under the proposed action, the LBA tract would be used to extend the life of the operating Eagle Butte Mine. There would not be additional sources of fugitive dust. The relative locations of emission sources, such as topsoil removal areas, haul roads, and active pit areas, would change but the numbers and types of sources would not. The existing lease extends the same distance into the Gillette buffer zone as the LBA, so the proximity of mine operations to Gillette would not be changed.

Before the LBA tract can be mined, even as an extension of an operating mine, an air quality permit application must be submitted to and approved by WDEQ/AQD. The analysis of emissions for the WDEQ/AQD permit modification would be similar to previous analyses since proposed mining methods and rates are the same with or without the LBA. The haul distance from the LBA tract to the coal preparation plant would approximate the currently proposed haul distance from the southeastern portion of the current permit area to the plant. Thus, dust from the coal haul road would not significantly increase from current permitted levels when the LBA tract is mined. No changes in size and numbers of machinery are being proposed at this time.

Mining is currently done at several active coal faces. Mining plans now on file with WDEQ/LQD show that reclamation will proceed at the current rate for the next several years, maintaining current low dust emissions.

Blasting, another source of emissions, will increase due to gradually increasing overburden thickness. This will occur with or without the LBA, because mining at Eagle Butte is currently in an area of very thin overburden. Overburden is thicker on the remainder of the current lease and on the LBA tract. The net short-term effect of blasting on air quality would be determined through monitoring. Blasting is not a major source of emissions at Eagle Butte. Air quality modelling for Eagle Butte's WDEQ/AQD permit has shown that blasting is responsible for less than 2 percent of emissions at the mine.

As with current operations, blasting and mining operations would at times be near U. S. Highway 14-16, Wyoming Highway 59, and the Campbell County Regional Airport, making the dust from operations more visible to the public. The prevailing winds are from the northwest, away from Highway 14-16 and the airport, however, there is a potential for highway traffic to be affected on occasion by blowing dust, as a result of the proximity of the pit to roads. Highway 59 would be relocated in the process of mining the existing lease with or without the LBA. Specific mitigation for the existing operations is addressed in the current mine blasting plan. Specific mitigation for the LBA will be addressed in a revised mine blasting plan.

The Eagle Butte Mine is operating within the requirements of their current air quality permit. As discussed above, the existing lease and the LBA are similar in terms of coal thickness, overburden thickness and proximity to Gillette and local roads. The mine proposes to mine the existing lease and the LBA using similar equipment, at similar rates, and using similar emission control methods. As a result, the air quality impacts of mining the LBA would not be expected to be significantly different from those predicted for mining the existing lease,

but their duration would be extended. Before the LBA tract can be mined, an amendment to the current air quality permit application must be approved by WDEQ/AQD.

12. Transportation Facilities

Mining of the Eagle Butte LBA tract by AMAX would not increase the current level of impact on U.S. Highway 14-16, other than the potential for increased dust, as discussed above under air quality. By extending the mine life, the current levels of use of this highway, as well as Wyoming Highway 59, would be extended in duration.

Wyoming Highway 59 crosses the existing Eagle Butte lease as well as the LBA tract. As a result, it will be necessary to move portions of this highway under the currently approved mine plan. The date and relocation site for moving this highway off the existing lease are not finalized at this time. Adding the LBA tract to the mine plan may alter the date of relocation, but the necessity for moving the highway already exists. Highway 59 was relocated once before, away from the path of mining at Eagle Butte. Consideration will be given to relocating the highway in an area where another future relocation will not be necessary, such as on reclaimed land or within the Gillette buffer zone where mining will not occur. There will be additional surface disturbances associated with road construction when the road is moved, with or without the LBA.

Mining the LBA would bring AMAX's operations closer to the Campbell County Regional Airport. There are two potential areas of concern with regard to air traffic and mining activities at Eagle Butte: 1) blasting, because of potential air turbulence and fly rock (airborne blasting debris), and 2) structures (stockpiles, mobile equipment, etc.) that may intrude into vertical air space for a landing approach. These concerns are minimal now, but would become more important as mining activities approach the airport.

Discussions have been initiated between AMAX and airport management, to identify means to coordinate mining activities and airport operations, and prevent potential conflicts. Currently there is a formal agreement outlining blasting notification procedures. As Eagle Butte's mining activities move closer to the airport, other precautions will involve: location of permanent structures out of the vertical air space for flight paths, and notification of temporary structures in or near flight paths. Dust from mining may potentially impact visibility, but prevailing winds are away from the airport.

Leasing the LBA may have a positive impact on the airport as well. Much of the traffic at the airport is business-related travel associated with the mines. Extending the life of the Eagle Butte Mine would help maintain current use levels at the airport, which helps assure availability of regular airline service to the general public as well as governmental agencies and private companies.

Pipelines crossing the LBA tract would need to be moved as mining approaches. Eagle

Butte Mine has arranged for pipeline relocation in the past. There will be additional surface disturbance associated with pipeline construction when the pipeline is relocated.

13. Socioeconomics

If the LBA tract is leased to AMAX to extend the life of the Eagle Butte Mine, a new mine and reclamation plan would be developed to show a logical mining sequence from the current pit into the LBA tract. Coal production would occur from both the LBA tract and the existing lease simultaneously. Although a new mine plan has not been fully designed, pending the outcome of the lease sale, AMAX has made preliminary plans for mining this tract. These plans show coal production from the mine, including the current lease and the LBA tract, averaging about 16 mmtpy. Since the application is for approximately 150 to 156 million tons of coal, mining of this additional coal would add about 10 years to the life of the mine under either Alternative 1 or Alternative 2, assuming all of that coal is recoverable. Production is weighted toward the current lease in the early years, due to its proximity to the facilities area compared with the southern reaches of the LBA lease area.

Employment at Eagle Butte Mine currently averages about 205 employees. This results in annual wages to mine employees of over \$9 million. Employment is predicted to increase slightly through the life of the mine, as the overburden ratio and haul distance increase. Thus, wages would continue, probably at a higher level, for approximately 10 additional years if the LBA were leased and mined. Without the LBA tract, coal production, and related employment would cease after the year 2021.

Boomtown effects would not be created under Alternative 1 or 2 because annual mine output (as well as labor and wage levels) would not increase significantly from the current state. Mining the LBA tract as a maintenance tract to extend the life of the Eagle Butte Mine would allow current staffing levels to be maintained or slightly increased for approximately 10 additional years.

If the tract is leased as proposed under alternative 1 or 2, payment of royalty and taxes on coal production would continue for approximately 10 additional years. Royalty and taxes that are paid on coal production include ad valorem taxes, severance taxes, sales and use taxes, Federal taxes (e.g., Black Lung and Reclamation), and Federal royalties. A study of the economic impacts of coal on Wyoming's economy prepared by the University of Wyoming estimated that for each train of Wyoming coal produced in the Powder River Basin during 1991, coal mines paid approximately \$21,542 in taxes and federal royalties (University of Wyoming; Borden, et al., 1994). In this report, the direct benefits to Wyoming per train were estimated at approximately \$11,559 per train.

Ad valorem taxes paid in 1993 (on 1992 coal production) amounted to \$70,003,029 (State of Wyoming; Department of Commerce, Economic and Community Development Division, 1993). Ad valorem tax is paid on production and property. The rate is set at 5.9324 percent.

The majority of these taxes are paid directly to the originating county.

Statewide, 1993 severance taxes and capital facilities taxes imposed on 1992 coal production amounted to \$93,070,880 (State of Wyoming; Department of Commerce, Economic and Community Development Division, 1994) . This tax was assessed on a coal production with an average 1992 price of \$8.14 per ton (Geological Survey of Wyoming, February, 1994). In 1992, the severance tax was set at a rate of 8.5 percent of the market value for surface mines and 5.25 percent of the market value for underground mines. In 1993, the severance tax rate dropped to 7 percent for surface mines and 3.75 percent for underground mines. Severance taxes are paid directly to the state of Wyoming. Wyoming's general fund and the permanent mineral trust fund receive the largest shares of the severance taxes (each 23.5 percent), followed by water development and capital facilities revenue (each 17.6 percent), the highway fund (11.8 percent), with the remainder to the worker's compensation division (6 percent).

Through 1992, sales and use tax rates ranged from three to five percent. The state sales tax rate was increased in 1993. The 1993 income to the state as a result of coal sales and use taxes was \$8,781,257 (State of Wyoming; Department of Commerce, Economic and Community Development Division, 1994). Sales and use taxes are distributed between the state and the counties.

Federal black lung and reclamation taxes are based on production levels. They are paid directly to the federal government and do not directly benefit the state.

Federal royalties of 12.5 percent of the market value of the coal are paid to the Federal government for production of coal from Federal lands. The Federal government returns 50 percent of this royalty to the state. Cities and towns receive 7.5 percent of this 50 percent returned to the state. Mineral royalty payments to the state of Wyoming in 1993 were \$194,028,701 (State of Wyoming; Department of Commerce, Economic and Community Development Division, 1994). Bonus bids received for the four previously issued coal tracts have ranged from 15.1 cents/ton to 30 cents/ton (see Table 1). The total bonus amount of the bonus bids for the four previously issued leases is \$195,511,977.69. The bonus bids are payable over five years. The state also received 50 percent of the bonus bids.

The current spot-market price for Gillette area coal is estimated at \$3.75 to \$4.00 per ton (M. Nicholson; AMAX, personal communication, May 1993). Assuming a future price of \$4.50 per ton, the market value of the additional 150 million tons of coal would be about \$675 million (\$702 million for the 156 million tons under Alternative 2), assuming all of the estimated coal reserves are recoverable. This is in addition to expected market value of the coal from the existing Eagle Butte leases. One estimated economic multiplier for determining the total economic impact to the local area from the additional coal 1.796 (Taylor, Campbell County, 1993). Based on this economic multiplier and the above spot coal prices, the total economic impact to the local area from the additional coal in the LBA tract would be \$1.21 billion (\$1.26 billion under Alternative 2), based on spot coal prices. Since long-term contract prices are generally higher than spot coal prices, the economic impacts would be larger if long-term

contracts could be negotiated.

14. Hazardous Waste

Waste is generated during mining operations at the Eagle Butte Mine, as at all mines. Non-hazardous waste, which is similar to domestic or municipal solid waste, is currently disposed of both on-site and off-site. The majority of non-hazardous waste is disposed of at the Campbell County Municipal Landfill. Small volumes of non-hazardous waste are disposed of on-site in a landfill permitted by the WDEQ. Materials at Eagle Butte that may be classified as hazardous or are handled as hazardous include some greases, solvents, paints, and other materials determined to be hazardous by the EPA under the Resource Conservation and Recovery Act. These types of wastes are disposed of at an EPA-permitted hazardous waste facility. Eagle Butte Mine has taken waste minimization steps such as product substitution, technological changes, and recycling to significantly reduce the generation of both hazardous and non-hazardous waste.

B. Impacts of Alternative No. 3: No Action Alternative

Under this alternative, the Eagle Butte LBA tract would not be leased. Disturbance of land on the tract would be limited to disturbance associated with overstripping necessary to recover coal within the current lease boundary. This disturbance would be roughly 250 acres. The rest of the proposed lease area would remain undisturbed by mining. Except for the overstrip area, the basic topography, the geology and the soils underlying the lease area would not be affected. Aquifers in the coal and overburden would remain unaffected, and drawdowns in the coal and overburden aquifers would be those associated with the current mining operation. Changes to the drainage system on the tract would be limited to the area of overstrip.

The air quality would be altered by the fact that mining would cease after the year 2021, according to the current Eagle Butte mine plan. Wildlife, vegetation, transportation, visual and noise impacts as a result of mining the LBA would not occur, and would cease on the existing lease after the year 2021.

The economic benefits attributable to the LBA tract would be foregone under this alternative. This would result in loss of potential income from the sale itself (the bonus bid). It would also mean the elimination of income from future royalty revenues on approximately 150 million tons of coal (156 million tons under Alternative 2) to the federal government, half of which would go to the State of Wyoming. Total royalty revenue on 150 million tons of coal would be \$70 to \$75 million at a price of \$3.75 to \$4.00 per ton, which is within the range of currently projected spot prices for Gillette area coal (M. Nicholson, personal communication; AMAX, May 1993). Employees' wages would also be foregone. Economic losses would also affect the individual communities. Eagle Butte Mine's current mine plan shows coal production ceasing after year 2021. It is anticipated that employment at Eagle Butte, and the associated

economic benefits to the local communities, would also cease after 2021 without the acquisition of additional reserves.

If this coal is not mined with Eagle Butte's current operation, it would become an isolated block of coal which would potentially be bypassed. The tract is bordered on the north and east by the existing Eagle Butte lease, which would be mined and reclaimed. The city of Gillette, and its buffer zone lie south of the tract, limiting any further development in that direction. Highway 14-16 and the airport are located immediately west of the tract. It might be possible to move the highway at some point in the future, although there is not a logical alternate location at this time. It is not likely that moving the airport to allow coal mining would be economically feasible, so expansion of the tract to the west is also limited. Therefore, the tract size could not be redelineated to include much more than estimated the 150 million tons currently proposed for leasing. Reserves of this size probably eliminate the likelihood of a new company from identifying this tract under regional sales procedures.

C. Regulatory Compliance

A number of issues related to surface coal mining are described below. These issues are resolved routinely during the mine permitting process, so that additional mitigation measures are not required.

Impacts to topography caused by mining can be partially mitigated by proper design of the postmining surface. The design of the postmining topography would be reviewed by WDEQ/LQD during the permit application process. Specific recommendations pertinent to the Eagle Butte LBA tract include providing stable channels that have natural-appearing meanders and pools, and rockpiles and shrub mosaics designed and located so as to give a natural appearance and provide wildlife habitat and cover.

Impacts to ground water quality can be partially mitigated by special handling of chemically undesirable overburden materials to assure that these materials are placed so as to minimize adverse effects on water quality. All mine permit applications submitted to WDEQ/LQD must include baseline data on overburden geochemistry and special handling plans for unsuitable materials. Provision of channel pools and ponds on the reclaimed surface, similar to what AMAX is doing at the Eagle Butte Mine, helps conserve surface water resources and provides a recharge source for the spoils aquifer.

Impacts to ground water supplies will be mitigated in accordance with state law. SMCRA and state regulations require that valid water rights which are interrupted by mining be mitigated by replacement with water from an alternate source of equivalent quality and quantity. Typically, wells which go out of production due to mine-related drawdowns are replaced with deeper wells completed in the sub-coal formation.

Special care must be taken to provide stable channels on the reclaimed surface. The

design of stable drainage basins is critical to the success of the overall reclamation plan, and this issue receives considerable attention during the permit process. Eagle Butte Mine has already constructed a drainage channel on reclaimed land to replace a mined-through portion of Little Rawhide Creek. Meanders, pools, and terraces are incorporated to create a stable, natural-appearing creek channel.

Impacts to soils can be mitigated by proper identification and handling of topsoils, protection of stockpiled and replaced soils from erosion hazards, and revegetating replaced soils as rapidly as possible. Nutrients lost during handling or stockpiling can be replaced. The erosion control, reclamation and revegetation program outlined by AMAX and implemented on the adjacent Eagle Butte Mine has provided an effective program that ensures successful erosion control and restoration of all land disturbance.

Continued emphasis on increasing vegetal species diversity on reclaimed lands, and particularly on establishing shrublands, would help increase use of reclaimed land by shrub-dependent wildlife species. Continued sampling and monitoring studies, such as those conducted by AMAX's reclamation group, would provide valuable data for continuing improvements in revegetation practices.

Wildlife impacts can be mitigated in part by continuing to consider wildlife habitat in the reclamation planning. Mitigation elements include topographic features such as rockpiles and playas; riparian features such as channel pools, islands, and impoundments; and revegetation features designed for wildlife, such as shrublands and trees where conditions permit. Although not all these elements are part of the premining landscape on the Eagle Butte LBA, they would help to restore and/or enhance wildlife habitat on the area. Continued monitoring will provide important feedback concerning the effectiveness of these measures and, hence, important data for future designs. Mitigation efforts should continue to include relocation of affected raptor nests and consideration of raptor nest sites in reclamation planning.

There are currently no operating oil or gas wells within the potentially affected area. All oil and gas rights within the LBA tract are privately owned. Should any oil and gas leases become active before mining enters the area, a mine plan study would have to be developed to address any impacts on the mining operation. Alternatives to manage any conflicts with such wells could include an economic evaluation to determine if they could be purchased or temporarily plugged and restored when mining has been completed. Under FLPMA, multiple use and concomitant development of natural resources are governed by the Department of the Interior (USDI). USDI guidelines have been developed to address this type of situation. Moreover, the leased lands are managed according to the RMP land use plans. The coal lessee would need to coordinate the development of an agreement with the oil and gas lessees to facilitate maximum utilization of the mineral resources.

No cultural resource sites eligible for the NRHP were identified within the potentially affected area. Should any previously unknown sites be discovered during mining, these would have to be evaluated for eligibility. Impacts to cultural resources are addressed through the

Section 106 process of the National Historic Preservation Act of 1966, as amended, and through other appropriate legislation and regulations. This specifies that the federal land managing agency, in consultation with the Wyoming SHPO, will make final eligibility and effect determinations for all sites located within the proposed lease area. If any sites are found to be eligible for the NRHP and cannot be avoided, then an appropriate treatment plan would have to be developed and implemented prior to mining, in accordance with 36 CFR 800 and other relevant regulations.

No significant paleontological resources were identified within the potentially affected area.

Effects on transportation can be mitigated by: timely relocation of highways to avoid inconvenience to commuters and other travellers; appropriate coordination measures between mine and airport activities; controlling dust to avoid visibility problems; and relocation of gas pipelines to avoid service interruptions.

All hazardous materials generated on the proposed lease area would be handled in accordance with current or future regulations.

D. Mitigation Measures

Mitigation of impacts as a result of surface mining are routinely resolved during the mine permitting process, as described above. Additional mitigation measures are not generally necessary due to the strict reclamation requirements of SMCRA.

E. Residual Impacts

Despite proper reclamation planning and implementation of mitigating measures, there are impacts of mining that remain after reclamation is completed. The coal aquifer and any overburden aquifers are replaced with spoil material. While indications are that this material will function as an aquifer and, in fact, is resaturating more quickly than generally predicted (p. 156, Martin et al.; U.S. Geological Survey, 1988), it would be some time before the spoils are fully saturated and a steady-state flow pattern is reestablished. In the meantime there will be no shallow ground-water source in portions of the reclaimed areas. Just as during mining, alternative sources of water will be required for these areas until the spoils aquifer can sustain water uses.

Once the spoils aquifer resaturates and a steady-state flow pattern is established from the spoils aquifer to the undisturbed coal and overburden aquifers, water quality in those aquifers may be temporarily degraded.

Although coal-aquifer drawdowns toward the west (down-gradient) of the mines become

less important as the depth to coal increases (hence fewer wells are completed in the coal), these drawdowns could persist for several years.

There would be some topographic moderation of the tract following reclamation, which is a permanent impact that could affect wildlife because reduction of topographic diversity on reclaimed land can result in a reduction in habitat diversity. The LBA tract is not topographically diverse in its pre-mine condition.

Re-establishment of native rangeland vegetation types, including shrubs at pre-mining densities, could take 20 to 100 years.

F. Cumulative Impacts

There are eighteen operating mines in the Powder River Basin of Wyoming (Figure 10). The BLM has received eight lease applications since the Powder River Coal Region was decertified. Four leases, representing five of these applications, have been issued in the past two years (Table 1, and Figure 10). Three of the issued leases were maintenance-type tracts adjacent to operating mines. One of the recently-issued leases, Rocky Butte, is adjacent to an undeveloped lease issued after the 1982 regional sale. The BLM currently has three more maintenance-type LBAs under consideration for leasing in Wyoming and one in Montana (Table 1). In addition to the proposed Eagle Butte LBA tract, the North Rochelle and Antelope Mines have submitted applications for coal tracts adjacent to their current operations. No scheduling has yet taken place for processing the North Rochelle or Antelope LBAs.

NEPA requires that cumulative as well as site-specific impacts of proposed federal actions be considered as part of the decision making process. According to the Council of Environmental Quality, *cumulative impact* is 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 actions can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7). In this case, concerns center about cumulative impacts of coal leasing when considered with coal mining and other known activities that cause impacts in the Powder River Basin of Wyoming. This section should not, and does not address impacts specific to the Eagle Butte LBA, as those are addressed elsewhere in this EA.

Prior to the decertification of the Powder River Coal Region, there were approximately 7.797 billion tons of Federal coal underlying 102,426 acres under lease in the Wyoming portion of the Powder River Basin. These areas are located in Campbell and Converse Counties, and 102,426 acres represents 1.8 percent of Campbell and Converse counties combined. There are currently 8.796 billion tons of Federal coal underlying 111,154 acres under lease in the Wyoming portion of the Powder River Basin as a result of the issuance of the four new leases. This represents 1.9 percent of Campbell and Converse counties. Most of the existing coal leases

Existing and Proposed
Leased Federal Coal
Campbell and Converse
Counties, Wyoming

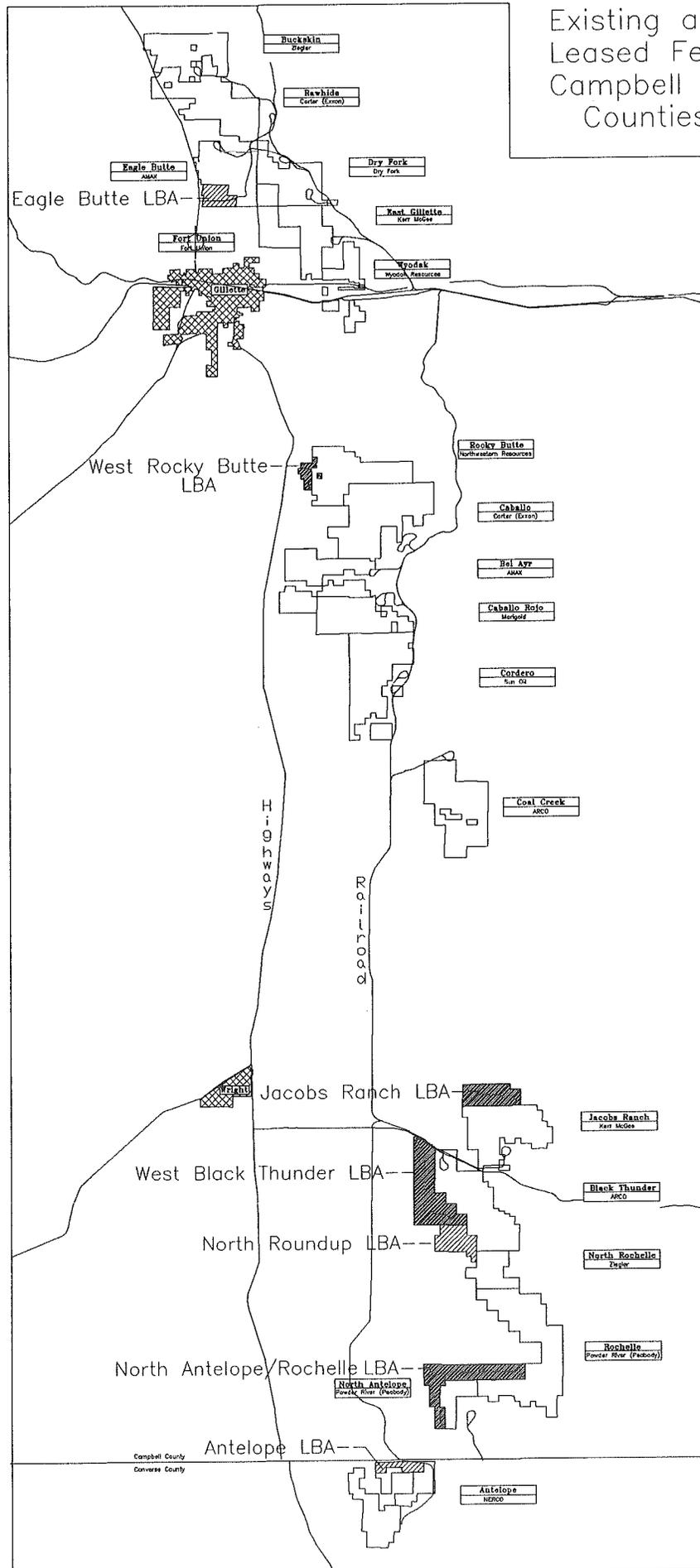


Figure 10

and all of the previously-issued LBAs are located in Campbell County. Approximately 3.5 percent of Campbell County is currently included in Federal coal leases. There are three pending LBAs containing approximately 360 million additional tons of coal underlying 2,816 acres. Two of the pending leases are located in Campbell County (Eagle Butte and North Rochelle), the third (Antelope) is located in Converse County (Antelope). There are approximately 1.359 billion tons of coal underlying approximately 11,500 acres in the recently issued and pending LBAs. This represents an increase of approximately 17.4 percent leased Federal coal and an increase in Federal leased coal acreage of 11.3 percent. The recently issued leases and pending LBA tracts represent approximately 0.2 percent of Campbell and Converse counties combined. The 1.359 billion tons of coal underlying these recently issued and pending LBAs represents approximately 7.4 years of production for the basin at the 1992 production rate of 188.9 million tons for Campbell and Converse Counties)(Geological Survey of Wyoming; Dan Vogler, May, 1994).

The following discussion of cumulative impacts includes a comparison of the actual coal activity occurring in the Wyoming portion of the Powder River Basin in 1990 with the activity predicted for 1990 in four previously prepared environmental impact statements on coal mining in the basin. The actual data for 1990 is used for this comparison rather than the most recent available data because that is a year for which predictions were made in the regional EISs. The 1990 figures are fairly probably representative of the 1992 situation, however, since production in 1992 was only 5.5 million tons greater than production in 1990.

1. Actual and Predicted Coal Activity in the Wyoming Powder River Coal Region

This cumulative impact analysis updates the cumulative analyses that are contained in each of four regional EISs prepared during the 1970's and early 1980's. The four analyses are:

- Final Environmental Impact Statement, Eastern Powder River Coal Basin of Wyoming, BLM, October 1974
- Final Environmental Statement, Eastern Powder River Coal, BLM, March 1979
- Final Environmental Impact Statement, Powder River Coal Region, BLM, December 1981
- Draft Environmental Impact Statement, Round II Coal Lease Sale, Powder River Region, BLM, January 1984

This update provides an assessment and analysis of cumulative environmental impacts based on current coal production and presently anticipated levels of regional development activity. The analysis reviews cumulative impacts identified in the above referenced EISs as compared to the actual development activity which has occurred. This cumulative analysis also incorporates data, monitoring results, and research done since the EISs were done, or in response to impacts identified in these EISs, which will provide further assessment of cumulative impacts resulting from the leased and pending lease-by-applications.

The coal region in which the Eagle Butte lease-by-application is located can be defined as the Eastern Powder River Coal Region, and is generally considered to include Campbell and Converse Counties in Wyoming. In the 1970's and early 1980's there was a great deal of interest and activity in mining existing leases and acquiring new federal coal leases in this area. As a result, the four regional EISs listed above were prepared. Each of these regional EISs identified and discussed the regional, cumulative impacts resulting from coal development, coal related development, and other regional activities, based on reasonably foreseeable development scenarios at that time. All of the mines currently operating, including those which have recently requested or been issued LBAs, in the Eastern Powder River region were specifically addressed in one or more of the referenced EISs, as shown in Table 14.

Each regional EIS predicted coal mining activity into the future and included estimates of future numbers of mines, production levels, and acreage disturbance. Coal-related developments, such as power plants, coal gasification, and other coal conversion industries were predicted. Other regional activities such as oil and gas, uranium, and any other known major development activities were also predicted. Then an analysis was developed to identify and evaluate impacts of all of these activities taken together.

Table 15 compares the coal-mining and mining-related activities that had actually taken place in the region as of 1990 with the coal-mining and mining-related activities that were predicted for 1990 in the four regional EISs. Table 15 also shows the cumulative total of 1990 activity with the addition of activity predicted based on the five issued LBAs plus the Eagle Butte LBA. The cumulative impact analysis that was prepared for each of the regional EISs is based on the predicted levels of activity at that time, shown in Table 15.

As shown in Table 15, the actual 1990 levels of development in the Powder River Basin of Wyoming are within the range of the predictions that were made in the referenced EISs (Table 15). In retrospect, the 1979 EIS made the closest prediction of actual 1990 level of production. This is explained by the fact that the 1981 and 1984 EIS assumed higher levels of new leasing and more development of new leases and pending preference right lease applications than has actually occurred. In reality, market conditions have not favored the development of new mines that was anticipated in the 1981 and 1984 regional EISs.

Many of the impacts of mining development activities are related to the amount of surface disturbance and new employment from the predicted coal-mining activity. Table 16 compares 1990 predictions for each regional EIS as to acres disturbed, employment, and population with

Table 14. Mine Sites Addressed in Previous Regional EIS Analyses

Mine	Operator	Status	1974 EIS	1979 EIS	1981 EIS	1984 EIS
Antelope	Antelope Coal Co.	(2)	XXX		XXX	XXX
Belle Ayr	AMAX Coal West, Inc.		XXX	XXX	XXX	XXX
Black Thunder	Thunder Basin Coal Co.	(1)	XXX	XXX	XXX	XXX
Buckskin	Zeigler Coal Co.			XXX	XXX	XXX
Caballo	The Carter Mining Co.			XXX	XXX	XXX
Caballo Rojo	Caballo Rojo, Inc.			XXX	XXX	XXX
Clovis Point/ East Gillette	Kerr-McGee	(3)		XXX	XXX	XXX
Coal Creek	Thunder Basin Coal Co.			XXX	XXX	XXX
Cordero	Cordero Mining		XXX	XXX	XXX	XXX
Dave Johnston	Pacificorp		XXX	XXX	XXX	XXX
Dry Fork	Dry Fork Coal				XXX	XXX
Eagle Butte	AMAX Coal West, Inc.	(2)	XXX	XXX	XXX	XXX
Fort Union	Fort Union Ltd.				XXX	XXX
Jacobs Ranch	Kerr-McGee	(1)	XXX	XXX	XXX	XXX
Keeline		(5)			XXX	XXX
North Antelope	Powder River Coal Co.	(1)	XXX	XXX	XXX	XXX
North Rochelle	Zeigler Coal Co.	(2)			XXX	XXX
Rawhide	The Carter Mining Co.		XXX	XXX	XXX	XXX
Rochelle	Powder River Coal Co.	(1)	XXX	XXX	XXX	XXX
Wyodak	Wyodak Resources Development Corporation		XXX	XXX	XXX	XXX
Rocky Butte	Northwestern Resources Co.	(1),(4)			XXX	XXX
TOTALS: 21 (19 Mines, 1 Undeveloped & 1 Terminated Lease)			11	15	20	20
(1) LBA application approved/lease issued (2) LBA application on file (3) Currently inactive mine (4) Proposed new mine (5) Lease Terminated in 1992 due to failure to meet diligence requirements						

Table 15. Cumulative Regional Activity, Eastern Powder River Coal Region
Campbell and Converse Counties, Wyoming

	1990 Actual Activity	1990 Actual Activity + LBAs ¹	1974 Predictions of 1990 Activity	1979 Predictions of 1990 Activity	1981 Predictions of 1990 Activity	1984 Predictions of 1990 Activity
No. of Producing Mines	18	19	14	15	40 ²	37 ^{2,3}
No. of Power Plants	3	3	6	2	3	3
No. of Gasification Plants	0	0	2	1	0	0
Leased Federal Coal (millions of tons)	7796.5	8831.5	not available	not available	not available	not available
Acres of Leased Federal Coal	102,426	110,854	93,075	not available	not available	not available
Coal Production (millions of tons)	162.6	178.6	150	174.3	332.9 ²	292.1 ^{2,3}

¹ Represents actual 1990 activity plus the activity which would have been expected if the LBAs had been approved in 1990.
² Calculated from Wyoming and Montana totals in EIS. This EIS covered the entire Powder River Basin.
³ Baseline "No Action" alternative used from EIS. The 1984 EIS was not finalized; thus actions proposed were never taken.

actual 1990 surface disturbance, employment and population. As discussed previously, actual data from 1990 are used because predictions were made for that year in the regional EISs. That provides a basis for determining the applicability of the previous impact analyses to the present situation. Cumulative surface disturbance as a result of all mining in the Wyoming portion of the basin to 1990 is about 32,000 acres. Predictions of surface disturbance in 1990 ranged from 13,877 acres to 43,500 acres in the referenced EISs. Actual employment levels and population levels for 1990 are less than predicted in any of the EISs.

Table 16. Cumulative Surface Disturbance, Employment, and Population: Actual and Predictions Without the Lease-By-Applications, Eastern Powder River Coal Region (Campbell and Converse Counties)

	Actual 1990 Levels	1974 Predictions of 1990 Levels	1979 Predictions of 1990 Levels	1981 Predictions of 1990 Levels	1984 Predictions of 1990 Levels
Acres Disturbed	31,744	13,877	22,794	43,550 ¹	40,900 ^{1,2}
Acres Reclaimed	9,199	4,132	12,666	24,200 ¹	22,800 ^{1,2}
Coal Employment	2,862	5,200	3,899	11,900	11,500 ²
Total Population	40,498	65,600	59,400	69,000	62,300 ²

¹ Wyoming portion calculated from Montana plus Wyoming total in EIS. This EIS covered entire Powder River Basin.
² Baseline "No Action" alternative used from EIS. The 1984 EIS was not finalized; thus the proposed actions were not taken.

Sources of 1990 data: 1990 Annual Mine Reports for Eastern Powder River Basin Mines, BLM Casper District Records, 1990 Census Results for Wyoming Counties/Municipalities, "Annual Report of Mines of Wyoming" through 12-31-90.

2. Cumulative Impacts Related to Existing Surface Coal Mining in the Powder River Basin

There are currently seven mines located in the area north and east of Gillette, including Eagle Butte (Figure 10). Six of these mines are operating at this time (Wyodak, Dry Fork, Fort Union, Rawhide, Buckskin, and Eagle Butte), one mine is inactive (Clovis Point/East Gillette). The Eagle Butte tract is the only LBA tract that has been applied for in this group of mines north of Gillette to date. It is more than 40 miles north of three of the previously issued LBAs and the two remaining pending LBA tracts. It is approximately 15 miles north of the proposed Rocky Butte Mine.

Cumulative disturbance to date represents less than one percent of Campbell and Converse Counties. The acreage disturbed was specifically analyzed in the referenced EISs and no unique soils, vegetation, or habitat types were identified as being impacted. No unique soils, vegetation or habitat types are included in the previously-issued LBAs, or in the Eagle Butte EA, according to their site-specific EAs and EISs. The disturbed acreage is being reclaimed; about one-third of the already disturbed areas have been contoured, topsoiled and reseeded.

The success of revegetation (reclamation) depends on the ability of the plant communities to perpetuate themselves under the indigenous environmental conditions of an area, such as moisture distribution during the growing season, wind, temperature extremes, and drought. It also depends on the ability of the reclaimed land to meet postmining land use objectives. Establishment of vegetative cover, according to the requirements of OSM as administered by WDEQ, has been demonstrated at the Dave Johnston, Black Thunder, Belle Ayr, Eagle Butte, Big Horn, and Jacobs Ranch, among others. As a rule, the success of reclamation of land disturbed by coal mining depends on a combination of intensive reclamation practices and adequate, timely precipitation.

There is currently some controversy in the state of Wyoming concerning the appropriate density of shrubs, particularly sagebrush, on reclaimed areas in the Powder River Basin. Reestablishment of shrubs is a difficult and expensive process, particularly in the case of sagebrush. The shrubs, particularly sagebrush, are an important component of habitat for sage grouse and antelope, and their absence will limit the use of reclaimed land by these animals. The WGFD has determined that a standard of 1 shrub/m² on 20 percent of the reclaimed area is their minimum acceptable standard, along with a requirement that premining shrub species dominance be maintained. The Wyoming legislature has passed several laws in the past few years containing standards at levels below this, with no requirement as to the shrub species. DEQ and WGFD, along with environmental and industry representatives are attempting to reach a mutually acceptable standard for shrub density on reclaimed land, which then must be reviewed by OSM for compliance with SMCRA. Sagebrush will naturally recolonize the reclaimed areas in time. Estimates on the amount of time that would be required for this to occur vary from 20 years to 100 years.

Cumulative transportation impacts are related to coal production levels and are within the level of impacts identified in the referenced EISs. The previously issued maintenance-type LBAs

are not expected to measurably increase the impacts already occurring, but they will extend the period of time those impacts occur. The specific and cumulative impacts of the proposed Rocky Butte Mine are addressed in the EIS prepared prior to issuance of that lease. The Eagle Butte LBA will not increase the impacts already occurring, but will extend their duration because it is also a maintenance-type tract.

Cultural impacts are addressed specifically for each site identified and related to specific decisions to excavate, avoid, or research these sites. Cultural sites are a non-renewable resource subject to destruction through disturbance. As a result of mineral development and other surface disturbing activities, an inventory, cataloguing and excavation of cultural resources occurs as additional areas are disturbed. Paleontological resources are also non-renewable resources subject to destruction through disturbance. NEPA requires that these resources be evaluated before they are impacted. Lease stipulations require coal lessees to report significant cultural and paleontological resources uncovered during mining (see Section II. A.) No significant cultural or paleontological resources have been found the LBA area to date.

Cumulative visual impacts are related to surface disturbance and activity. In the short term, mining activity dominates the landscape where mining is occurring. Most of the LBAs are adjacent to existing mining operations, where the visual landscape has already been affected by mining activities. In several cases, including Eagle Butte, the LBAs include coal underlying acreage near public roads where mining operations will be more visible to the public. This is not a change from the existing situation because these same mines have other leased coal properties near public roads. The maintenance-type LBAs, including Eagle Butte, will not increase visual impacts in the basin but they will increase the time that the mines operate. After mining and reclamation are completed, the landscape character is variably changed. The change is greatest in areas where rough, steep-sided breaks, gullies or scoria knobs are replaced by gently rounded slopes. These types of topographic features are not present on the Eagle Butte tract, so these features will not be lost by mining that tract.

During mining, the cumulative impacts on wildlife are caused primarily by new impediments to daily and seasonal movements such as road right-of-way fences and railroad spurs. There are also impacts from road kills, poaching, and habitat loss.

With all the issued LBAs added to acreage already permitted to mine, about 1% of the wildlife habitat in Campbell and Converse Counties would be disturbed. Because disturbances only occur on part of the leased area at any one time and reclamation is continually taking place, habitat loss caused by the projects included in the cumulative analysis would be less than one percent of the habitat within this unit at any one time.

Following mining and reclamation, wildlife, particularly sage grouse and antelope, may be impacted by permanent changes in topography and by long-term reductions in shrub density (particularly sagebrush) on reclaimed lands until the shrubs are reestablished by natural processes. Shrubs, particularly sagebrush, are currently established on reclaimed lands at density levels that are generally lower than the premine levels. Estimates for the time required

for sagebrush density to attain pre-mining levels range from 20 to 100 years.

Cumulative impacts to pronghorn from leasing and mining the Eagle Butte LBA are examined most appropriately in the context of currently projected mining disturbance within the North Black Hills herd unit. There are currently no other LBAs proposed in this area. Active mines within this herd unit include Eagle Butte (in part), Rawhide (in part), Wyodak (in part), Dry Fork, and Fort Union. In addition, the currently idled Clovis Point and the proposed East Gillette mines are within this herd unit. According to figures provided in a 1987 WGFD report, the existing leases at these mines will disturb approximately 18 square miles. This is less than 1 percent of the total occupied habitat in the North Black Hills herd unit, and less than 4 percent of winter/yearlong habitat (Tessmann; State of Wyoming, 1987 unpublished report). The population within this unit is approximately 6-7 animals per square mile, (based on 2080 square miles of occupied habitat and a WGFD 1992 post-harvest estimate of 14,000). If you assume that the loss of AUMs for Antelope would be proportional to the size of the occupied habitat within the herd unit, a permanent loss of approximately 18 square miles of pronghorn habitat would result in a decline of 108 to 126 animals. There may not be a directly proportional relationship of antelope loss to antelope habitat loss as a result of mining, because loss of limiting habitat features within the areas permitted for mining may affect more than an average number of animals per square mile, but this comparison gives an indication of the size of the area being mined relative to the size of the area of occupied habitat for the North Black Hill herd unit.

The potential affected area for the Eagle Butte LBA comprises one-tenth of one percent of the occupied habitat of the North Black Hills antelope herd unit, and less than half of one percent of the winter/yearlong habitat. No critical or crucial habitat or limiting habitat feature has been identified on the LBA tract. Adding the Eagle Butte LBA to the projected disturbance from the existing mines in this herd unit brings disturbance to just under 1 percent of occupied habitat, and slightly over 4 percent of winter/yearlong habitat. Using the proportional relationship discussed above, the number of pronghorn that could be lost in the North Black Hills unit as a result of surface coal mining could be 120 to 140 animals if the LBA is mined in addition to the seven existing mines and if the mined areas, including the LBA, were to become permanently unsuitable for antelope. The increase (from a range of 108-126 to a range of 120-140) is related to issuance of the Eagle Butte LBA.

The six other LBAs sold or applied for to date lie within the Hilight herd unit, southeast of Gillette. These six LBA leases encompass over 16 square miles within the Hilight unit. Cumulative surface disturbance resulting from mining these LBAs could total 20 square miles. Numerous existing coal leases also lie within the Hilight herd unit. Projections provided by Tessmann (State of Wyoming; 1987) show mining (before the LBA leases) potentially affecting 112 square miles within this herd unit which is approximately 12 percent of the occupied habitat within the unit. This figure included 12 operating mines (Caballo, Belle Ayr, Caballo Rojo, Cordero, Coal Creek, Jacobs Ranch, Black Thunder, North Rochelle, North Antelope, Rochelle, Antelope, and part of Wyodak) as well as 4 proposed mines (Rocky Butte, Wymo Fuels, Keeline, and part of East Gillette). The East Gillette Mine is currently inactive, the Rocky Butte

Mine is in the process of being permitted, and the Wymo and Keeline leases are no longer in existence.

The 1992 population within the Hilight herd unit was estimated at 12,000 (1,000 animals over the objective of 11,000). This equates to approximately 13 pronghorn per square mile of occupied habitat. If the areas affected by the six LBAs (approx. 20 square miles) and the areas affected by the existing leases (approx. 112 square miles) become permanently unsuitable for pronghorn use following mining and reclamation, cumulative impact to the Hilight herd unit could be a decrease of 1716 animals (1456 in the existing mine areas plus 260 additional animals in the LBAs). These losses are not related to the issuance of the Eagle Butte LBA, they are related to leasing (260) and existing mining (1456) south of Gillette. These estimates do not take into account potential loss of limiting habitat features within the areas permitted for mining which may impact more than an average number of animals per square mile.

The losses described above are not expected because they are based on the assumption that all reclaimed acreage would be permanently unsuitable for any use by pronghorns. Reclaimed acreage may experience decreased use by pronghorn as a result of topographic moderation (which is permanent) and reductions in shrub density (which are not permanent), but pronghorn habitat is not completely eliminated on reclaimed land. This is demonstrated by current use of reclaimed acreage by antelope.

Through 1985, mining had disturbed approximately 18 percent of the total area projected to be affected within the herd unit (Tessmann; State of Wyoming, 1987). By the present time (1993) this figure has probably increased to over 20 percent. During this period, the herd unit has generally equalled or exceeded WGF D population objectives. Herd objectives are not set at carrying capacities, and the recent high population numbers probably reflect, at least partially, a series of mild winters, however, at this point, herd population levels have not been adversely affected by more than ten years of mining.

Cumulative impact to the deer population of the Powder River herd unit due to the mining the Eagle Butte LBA is anticipated to be minimal. Eight mines (the above operations, plus Buckskin Mine) are located within this deer herd unit. Combined, these mines will affect less than 1 percent of the occupied habitat within the Powder River unit (Tessmann; State of Wyoming, 1987 unpublished report). The LBA tract is currently classified as "unoccupied" deer habitat. Even if it is reclassified as yearlong, the affected area will comprise less than 0.05 percent of the occupied habitat of the Powder River deer herd unit. This will not significantly increase the percentage to be affected by currently permitted (or projected) mining operations.

Sage grouse use of the LBA tract is not high, and little or no brood-rearing habitat is found on the tract. The percentage of sage grouse habitat that would be disturbed by mining the LBA is small relative to both the amount of that habitat present in the basin, and the amount of that habitat included in existing coal leases in the basin.

A new mine has been proposed for the recently issued West Rocky Butte lease combined

with the Rocky Butte lease issued in 1982. An EIS was prepared prior to issuance of this lease. Even with a new mine added to the current situation, total activity is within the reasonably foreseeable cumulative activity scenarios analyzed in the referenced EISs. As this potential new mine would result in an additional impact to the water resources, a new source of suspended particulate matter in the air and also new employment, an additional discussion of cumulative water, air quality, and socioeconomic impacts is presented. The additional impacts of a new mine start to other resources, such as vegetation, soils, and transportation are included in the discussion of these topics in the paragraphs above.

3. Water Resources

Surface coal mining does impact local hydrology, including both the surface and ground water systems. These impacts have been monitored over the years of mining activity. The potential and actual extent of these impacts have also been the subject of several regional studies. These new data are identified and assessed in this cumulative analysis.

a. Ground Water

The cumulative impact of surface coal mining on ground water is an issue which was raised during scoping conducted for previous LBAs, and also during the scoping for the Eagle Butte LBA.

The WDEQ/LQD is required by SMCRA and WDEQ/LQD Rules and Regulations (State of Wyoming, 1986) to assess the potential for cumulative hydrologic impacts of current and anticipated mining on the ground and surface water systems each time a mine permit application or a mine permit revision is made. In 1987, the U.S. Geological Survey, in cooperation with the WDEQ/LQD and the OSM conducted a study of the hydrology of the eastern Powder River basin, the purpose of which was to provide the hydrologic information needed to perform these assessments. The resulting description of the cumulative effects of all current and anticipated mining (as of 1987) on the hydrologic system of the eastern Powder River basin is presented in a document called "Cumulative Potential Hydrologic Impacts of Surface Coal Mining in the Eastern Powder River Structural Basin, Northeastern Wyoming", otherwise known as the "CHIA" (Martin, et al.; U.S. Geological Survey, 1988). The CHIA is the most comprehensive basin-wide assessment of the potential hydrologic impacts of surface coal mining in the eastern Powder River Basin.

During scoping for the Eagle Butte LBA, concern was expressed over reliance on the existing Cumulative Hydrologic Impact Analysis for the eastern Powder River Basin in assessing the impacts to groundwater in this and previously prepared EAs, in light of the findings in OSM's 1992 Annual Evaluation Report on Wyoming's regulatory program (Office of Surface Mining Reclamation and Enforcement, 1992). The scoping comments specifically identified groundwater impact analysis concerns related to two specific evaluation report findings: 1) that

"assessments of the hydrologic impacts of minesites in the Powder River Basin are based on technical data that may not be site specific", and 2) that some CHIA documents in Wyoming are deficient in that not all hydrologic impact projections were based on the most recent technical/baseline information.

With respect to the first issue, the lack of site specific data is a surface water data concern in the evaluation report, not a groundwater data concern. The evaluation report noted that Wyoming agreed that the "USGS CHIA was site specific to the Belle Fourche River Basin and should not be extrapolated and used area wide."(for surface water impacts).

With respect to the second finding, the evaluation report did not find that the existing CHIA's were inadequate or inaccurate, but cited areas where they could be improved. The evaluation report noted that Wyoming DEQ agreed that CHIA analyses must consider the most current information available for each mine in assessing cumulative impacts, and had suggested a procedure that would "include all the latest baseline information from the probable hydrologic consequences of all mines in the cumulative impact area."

The issues raised in the evaluation report do not change the assessment of impacts to groundwater described in the EA. This environmental assessment describes anticipated impact using the available information. In the case of groundwater impacts, this EA and the previous EAs and EIS rely on a comparison of the predictions in the CHIA with the monitoring information gathered since publication of the CHIA. As a result, the most current groundwater information is considered in this EA, and has been considered in the previous groundwater impact analyses.

Finally, in order for mining of the Eagle Butte LBA tract to proceed, it must be permitted by Wyoming DEQ. In this process, the applicant must assess the probable hydrologic consequences of mining the LBA and Wyoming DEQ must find that the cumulative hydrologic impacts of all anticipated mining will not cause material damage to the hydrologic balance outside the permit area.

Each time a mine permit application or a revision is made, the WDEQ/LQD assesses cumulative hydrologic impacts on a more local scale than the CHIA, based on the site-specific information and targeted to determining the cumulative impact of the applicant's mine or changes in the applicant's mining plan in combination with other mines or activities in the area. The cumulative hydrologic impacts associated with mining the Eagle Butte Mine, including the Eagle Butte LBA, will be re-evaluated by the WDEQ/LQD based on site-specific, current data before the tract is mined.

Concern over the effects of large-scale surface coal mining on groundwater around the mines has resulted in the establishment of monitoring programs which are required by WDEQ/LQD and administered by the mining companies. Each mine is required to monitor groundwater levels in the coal itself as well as in shallower aquifers in the area surrounding their operations. There are also requirements for drilling monitoring wells in the backfill areas of the

mines in order to record the water level recovery in these areas.

The Gillette Area Groundwater Monitoring Organization (GAGMO) is a voluntary group which was formed in 1980. The purpose of GAGMO is to assemble and report the hydrologic monitoring data being collected by the coal mining companies operating in the eastern Powder River Basin of Wyoming, from the Buckskin mine north of Gillette to the Antelope Mine in northern Converse County. Members of GAGMO include most of the companies with operating or proposed mines in that area, the WDEQ, the Wyoming State Engineer's Office, the BLM, the USGS, and the OSM, which joined in 1991. Each year, GAGMO contracts with an independent firm to publish the results of the monitoring for that year.

In 1991, GAGMO published two reports, an annual report for 1990 and a ten-year report. The ten-year report, which was prepared by Hydro-Engineering of Casper, summarized the data accumulated during the last ten years of monitoring in the Powder River Basin. According to the GAGMO ten-year report (Hydro-Engineering, 1991b), 646 monitoring wells were operated at 21 coal mines in 1990. The 21 sites include active and inactive mines and unmined leases. The Dave Johnston Mine, located near Glenrock, is not a member of GAGMO. The Cordero Mine resigned from GAGMO in December, 1992. Data for the Cordero Mine are not included in the GAGMO 1993 annual report, but were included in the ten-year report, and in annual reports prior to 1993.

The following discussion of cumulative hydrologic impacts compares the CHIA predictions to more recent actual monitoring collected by AMAX Coal West, as well as that collected by other mines and reported and by GAGMO. The major groundwater issues discussed are:

- 1) The effect of the removal of the coal aquifer and any overburden aquifers within the mine area, and replacement of these aquifers with spoil material.
- 2) 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.
- 3) The effect of the use of water from the sub-coal Fort Union Formation by the mines. Most mines in the Powder River Basin have water-supply wells completed in the sub-coal Fort Union Formation.
- 4) Changes in water quality as a result of mining.

The impacts of large-scale surface coal mining on a cumulative basis for each of these issues are discussed in the following paragraphs.

1) The effects of replacing the coal aquifer and overburden with a spoil aquifer is the first major ground water concern. The following discussion of recharge, movement, and

discharge of water in the spoil aquifer is excerpted from the Powder River Basin CHIA (Martin, et al.; U.S. Geological Survey, 1988):

The potential for recharge to the backfilled spoil would be greater than in areas not disturbed by mining. The natural bedding will be destroyed, creating a more isotropic condition in the spoil, resulting in generally greater vertical permeability than exists in undisturbed areas. The infiltration capacity of the backfilled and reclaimed spoil will be greater than that of the undisturbed Wasatch aquifer and Wyodak coal aquifer. However, the infiltration rate for reclaimed soils is less than that for natural soils due to the lack of root structure and other paths for vertical movement of water. After several years, infiltration rates for reclaimed soils will increase to approximately the same rates as for undisturbed soils. As infiltration rates increase to approximate premining conditions, ground-water recharge rates also will increase to approximate premining conditions.

Although the recharge potential of the reclaimed mine areas will increase, the actual recharge rate after reclamation probably will approximate or be somewhat greater than premining recharge. Actual recharge will depend on how well the surface contours are restored. A flatter average slope of the reclaimed land would increase the potential recharge by decreasing the rate of runoff from reclaimed areas. Recharge will increase locally where water is allowed to pond in surface impoundments. Also, some increase in recharge along re-constructed channels probably will occur during the infrequent periods of surface runoff.

Postmining recharge rates and mechanisms will not change in areas where lateral movement of ground water from adjacent clinker is a major source of recharge. This is because, in general, the clinker will not be disturbed by mining operations. After mining and reclamation have been completed, water will move laterally from clinker to the spoil aquifer.

Recharge to the spoil aquifer will be from infiltration of precipitation, lateral flow from the undisturbed clinker and the Wasatch aquifer and Wyodak coal aquifer, and leakage from surface-water impoundments and stream channels. Estimates of the time required for the ground-water system to re-establish equilibrium varies from a few tens of years to hundreds of years. The anticipated potentiometric surface of the spoil aquifer will resemble a composite of the premining potentiometric surfaces in the Wasatch aquifer and Wyodak coal aquifer. After equilibrium is re-established, ground-water flow patterns will approximate premining conditions. Discharge from the spoil aquifer will flow into the undisturbed Wasatch aquifer and Wyodak coal aquifer to the west (regional flow) or to reclaimed stream channels (local flow).

According to the 1991 GAGMO ten year report, 56 backfill monitor wells had been drilled as of 1990. The report listed the current water levels in these wells, and compared them to the 1980 water-level elevations, which were estimated from the 1980 coal water-level contours. Of these 56 backfill wells, six (10.7 percent) were dry (the water level in that location was below the total depth of the well), 29 (51.8 percent) reported water at levels less than the water levels estimated for 1980, and 21 (37.5 percent) reported water at levels equal to or greater than those estimated for 1980. The 1993 GAGMO report listed data from 51 1992 backfill wells (the five wells listed for the Cordero Mine in previous reports were not included in the 1993 report). Of the 51 backfill wells reported in 1992, four (8 percent) were dry, 25 (49 percent) reported water at levels less than those estimated for 1980, and 22 (43 percent) reported water levels equal to or greater than those estimated for 1980. The presence of water in 92 percent of the reported backfill wells in 1992 indicates that recharge is occurring in the backfill.

The cumulative size of the backfill area in the Powder River Basin will be increased by mining of the recently issued leases and the currently proposed lease tracts. However, additional significant impacts are not anticipated as a result of these leasing actions because reclamation is done concurrently with mining, and the monitoring data indicate that recharge of the backfill is occurring. In particular, the cumulative effect due to the 915-acre Eagle Butte LBA would not be notable.

Clinker, the baked and fused rock formed by prehistoric burning of the Wyodak-Anderson coal seam, is believed to be the major recharge source for the coal aquifer and the spoil aquifer. Although some clinker is mined for road surfacing material, saturated clinker is not generally mined since sufficient clinker exists above the water table, and it does not present the mining problems that would result from mining saturated clinker. Therefore, the major recharge source for the spoil aquifer is not being disturbed by mining. The Eagle Butte LBA tract contains no clinker, and will not have a cumulative effect on recharge.

2) The second major ground water issue is the extent of water level drawdown in the coal and shallower aquifers in the area surrounding the mines. Most of the monitoring wells included in the GAGMO ten-year report (578 wells out of 646 total) are completed in the coal beds, in the overlying sediments, or in sand channels or interburden between the coal beds. These holes range from 9 feet to 420 feet in depth. The changes in water levels in the coal seams after ten years of surface coal mining are shown in Figure 11, which was taken from the 1991 GAGMO report. This map shows the area where actual drawdown in the coal seam has been greater than five feet in ten years, in comparison with the predicted worst-case five-foot drawdowns derived from ground water modeling done by the mines. WDEQ/LQD policy is to have the mining companies determine the extent of the five-foot drawdown contour.

In general, drawdowns do not extend east of the mines because the mines are located on or near the coal outcrop line. The actual ten-year five-foot drawdown contours have not exceeded the predicted worst-case drawdowns in any of the mines, and, in most cases, the drawdown contours are well within the mines' predicted worst case drawdowns.

Drawdowns extend farther in the coal than in the shallower aquifers because the coal is a confined aquifer that is aerially extensive. The area in which the shallower aquifers (Wasatch Formation, alluvium, and clinker) experience a five-foot drawdown would be smaller than the area of drawdown in the coal because the shallower aquifers are generally discontinuous and of limited areal extent.

The actual five-foot drawdown levels are also well within the cumulative drawdown predicted by the USGS in the Powder River Basin CHIA (Martin, et al.; U.S. Geological Survey, 1988). This study predicts the approximate area of five-foot or more water-level decline in the Wyodak coal aquifer which will result from "all anticipated coal mining". "All anticipated coal mining" as referred to in the CHIA includes 16 surface coal mines operating at the time the report was prepared and six additional mines proposed at that time. The proposed mines include two mines which are now producing, one mine which did produce for a short time

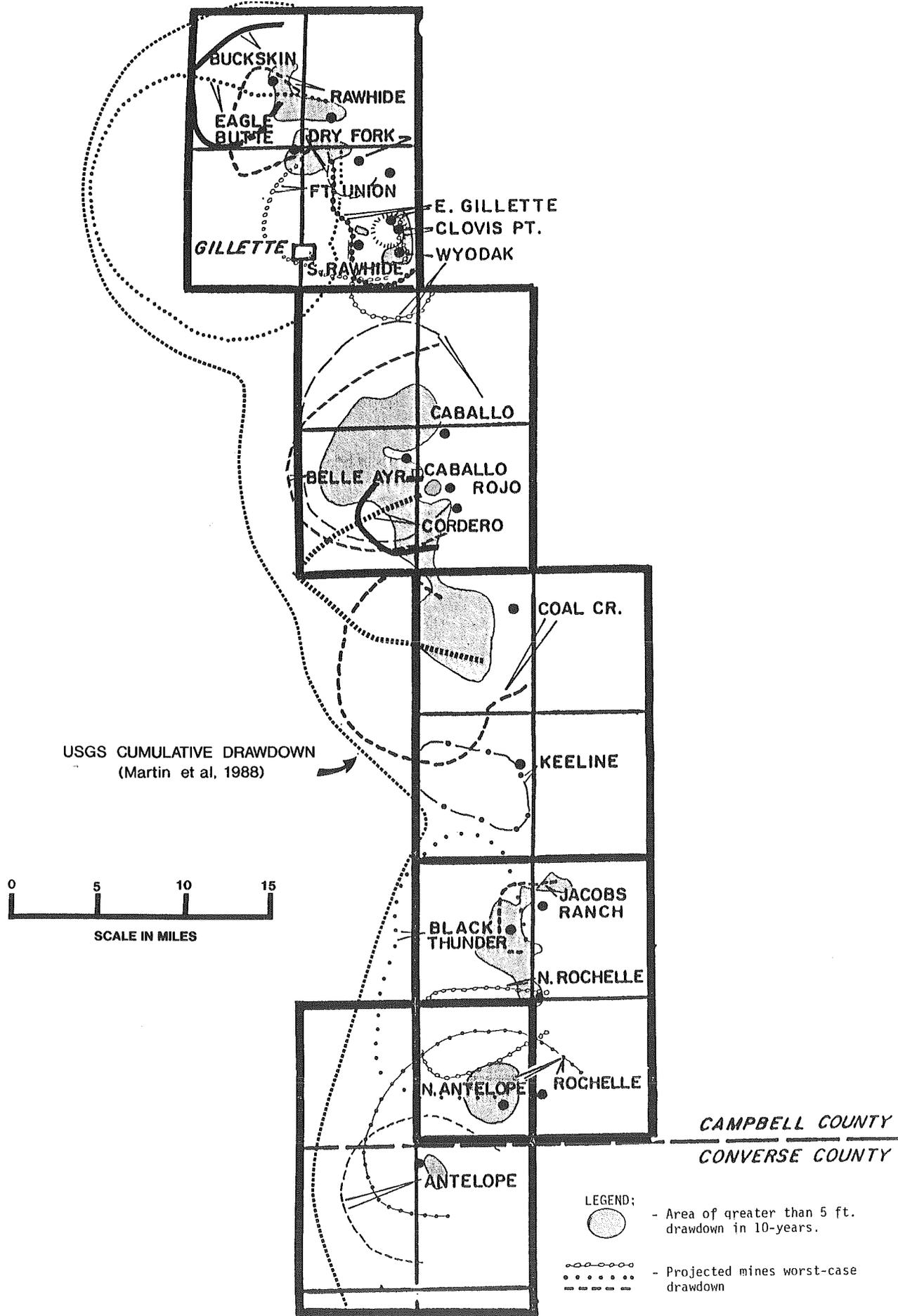


FIGURE 11. COMPARISON BETWEEN THE 1990 CUMULATIVE DRAWDOWNS AND THE MINES WORST-CASE AND THE USGS PREDICTED DRAWDOWNS. (Modified from Hydro-Engineering, 1991)

but is currently inactive, and the proposed Rocky Butte mine. The study assumes that water-supply wells completed in the coal may be affected as far away as eight miles from mine pits, although at this distance the effects were assumed to be minimal. Wells in the Wasatch Formation are considered to be impacted by drawdowns only if they were within 2,000 feet of a mine pit (p. 29, Martin, et al.; U.S. Geological Survey, 1988).

Based on the above assumptions, the CHIA indicates that there are about 3,000 wells in the area subject to impact by current and anticipated mining in Wyoming's Powder River Basin. Of these, about 1,200 wells are outside the actual mine areas (i.e., will not be removed by mining). About 1,000 of these supply water for domestic or livestock uses, and about 200 supply water for other uses. The 1,800 wells that are within mine areas are used by coal-mining companies: about 1,700 wells are monitor wells only, and the other 100 are used for water supply and/or dewatering at mine sites.

Of the 1,200 water-supply wells subject to impact that are outside actual mine areas, about 580 are completed in the Wasatch aquifer, about 100 in the Wyodak coal aquifer, and about 280 in strata below the coal. There is no completion data available for the remainder of these wells (about 240). They could be completed in any of the above aquifers.

Since the actual ten-year drawdowns lie within the cumulative drawdown predicted by Martin, et al. (U.S. Geological Survey, 1988), the cumulative impacts to water wells have not reached the levels described in that report.

The additional ground water impacts that would be expected as a result of extending mining into the maintenance-type LBAs issued or proposed to date would be to extend the drawdown areas in the area surrounding the proposed new leases. The actual drawdown contours for the mines with issued or proposed LBAs that would maintain their current operations are well within the cumulative drawdown anticipated in the report by Martin, et al., 1988, and some recharge was already occurring in 1990 in 14 of the 15 backfill wells drilled by those mines. Therefore additional significant impacts in water level drawdown as a result of issuing the maintenance leases, including the Eagle Butte LBA, is not anticipated. The anticipated ground water impacts for the proposed new start Rocky Butte mine are considered in the CHIA (Martin, et al.; U.S. Geological Survey, 1988). The addition of the West Rocky Butte tract could extend the drawdown area incrementally. An EIS which includes ground water modeling has been prepared to evaluate the impacts of leasing the West Rocky Butte tract (BLM, 1992c).

3) Potential water-level decline in the sub-coal Fort Union is the third major ground water issue. According to the Wyoming State Engineer's records, fourteen mines hold permits for 42 wells which are between 400 feet and 10,000 feet deep. That number does not represent the actual number of wells potentially completed in the Tullock, because the zone of completion of these wells is not specified, and not all of the wells are currently producing (for example, three of the permits are held by an inactive mine, and one of the wells the Black Thunder Mine has permitted has not been used since 1984). The State Engineer's Office is currently tracking

sub-coal Fort Union water use through various studies (personal communication, State Engineer's Office, 5/7/93). These studies are still in progress. One study, specific to the Gillette vicinity, includes both mine and residential use Fort Union wells, in a study area that encompasses the Eagle Butte LBA.

Water-level declines in the Tullock have been documented in the Gillette area. According to Crist (U.S. Geological Survey, 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 sub-coal Fort Union wells occur within one mile of the pumped wells (M.A. Crist, p. 30, Martin, et al.; U.S. Geological Survey, 1988). The mine facilities in the Powder River Basin are separated by distances of a 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 sub-coal Fort Union Formation. The OSM commissioned a cumulative impact study of the sub-coal Fort Union Formation to study the effects of mine facility wells on this aquifer unit (McIntosh, et al.; Office of Surface Mining, 1984). Conclusions from all these studies are similar and may be summarized as follows:

- a) 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.
- b) In the Gillette area, water levels in this aquifer are probably declining because the city of Gillette and several subdivisions are utilizing water from this formation (Crist; U.S. Geological Survey, 1991). (Note: Gillette is using this water as a back-up source at this time.)
- c) Because large saturated thicknesses are available in this aquifer unit, generally 500 feet or more, drawdowns of 100 to 200 feet in the vicinity of a pumped well would not dewater the aquifer.

The mines adjacent to the maintenance-type LBAs, including Eagle Butte all have permits from the State Engineer for deeper wells. Extending the life of these mines would result in additional water being withdrawn from the Tullock. The additional water withdrawals would not be expected to extend the area of water level drawdowns over a significantly larger area due to the discontinuous nature of the sands in the Tullock aquifer. Eagle Butte has two wells completed in aquifers below the coal. The result of a study done for the Eagle Butte on the cumulative impacts of these wells is discussed in Section IV.A.2.a.

The potential impact to Gillette's water supply as a result of the current and proposed

LBAs adjacent to existing mines would be an indirect one related to the fact that leases would extend the duration of mining operations at the parent mines. Many of the mine employees in the eastern Powder River Basin live in or near Gillette and are city or county water users. Contact with the city (Fritzler, City of Gillette-Utilities, 1991) and Campbell County (McDill, Campbell County Engineer, 1992) indicate that the position of the city and county is that there is an adequate water supply for the city and county even with mine life extension due to the LBAs, including that proposed by Eagle Butte.

There would not be significant impact to the water supply of the city of Wright as a result of the four leased and one proposed LBAs. According to the State Engineer's Office, the only permitted wells drilled below 1,000 feet in a 100 square mile area surrounding Wright are four wells permitted to the city of Wright (Stockdale, State Engineer's Office, 1992). As discussed above, Crist (Martin, et al.; U.S. Geological Survey, 1988) indicated most of the water level declines in the sub-coal Fort Union wells occur within one mile of the pumped wells. Since the Eagle Butte LBA is more than 40 miles north of Wright, it would not contribute to any possible cumulative impact on water levels for that town.

The impacts of the new start mine at Rocky Butte on the Tullock aquifer were considered in the EIS prepared for the West Rocky Butte tract (BLM, 1992c).

The Tullock member of the Fort Union Formation is the lowermost unit in the formation, and it crops out at the surface east of the area being mined. Therefore recharge to the Tullock member from the outcrop area is not affected by mining.

4) The fourth issue of concern with ground water is the effect of mining on the 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 spoil 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 larger in water from spoil aquifers than in water from either the Wasatch overburden or the coal aquifer (Martin, et al., U.S. Geological Survey, 1988). This is expected because blasting and movement of the overburden materials expose more surface area to water, increasing dissolution of soluble materials, particularly when the spoil materials are situated above the saturated zone in the premining environment. On the basis of studies done in North Dakota, it was estimated that at least one pore volume of water must leach the spoil before the dissolved-solids concentration in the water would be similar to the premining dissolved-solids concentration (Houghton, et al.; U.S. Geological Survey, 1987). One pore volume of water is the volume of water which would be required to fill the pore space or open space in the spoils following reclamation. The time required for one pore volume of water to pass through the spoil aquifer is greater than the time required for the postmining ground water system to re-establish equilibrium.

Chemical analyses of 336 samples collected between 1981 and 1986 from 45 wells completed in spoil aquifers at 10 mines indicated that the quality of water in the spoil will, in

general, meet state standards for use for livestock when recharge occurs (Martin, et al.; U.S. Geological Survey, 1988). The major current use of water from the aquifers being replaced by the spoils (the Wasatch and Wyodak-Anderson coal aquifers) is for livestock because these aquifers are typically high in dissolved solids in their premining state (see Table 4, Martin, et al., U.S. Geological Survey, 1988). According to the monitoring data published by GAGMO (Hydro-Engineering, 1991a, 1991b, 1992 and 1993), average TDS values in spoil ground waters have ranged from 400 to 25,000 mg/L. Of the backfill wells reported in the 1993 Annual GAGMO report (Hydro-Engineering, 1993), TDS in 71 percent were less than 5000 mg/L, TDS in 25 percent were between 5000 and 10,000 mg/L, and TDS in 4 percent were above 10,000 mg/L. Based on this data, the water from the spoils will generally be acceptable for its current use, which is for livestock, before and after equilibrium is re-established. The incremental effect on ground water quality due to the Eagle Butte LBA would be to increase the total volume of spoil, and, thus, the time for equilibrium to re-establish.

b. Surface Water.

There are two main issues relating to cumulative surface water impacts:

- 1) Possible changes in runoff rates due to changes in precipitation infiltration rates.
- 2) Possible changes in surface-water quality.

Some studies indicate that infiltration rates are initially smaller on reclaimed lands than on premining lands. A weighted average reduction of 29 percent has been found, with this reduction declining over time until the postmining infiltration rates recover to premining levels (P. 106, Martin, et al.; U.S. Geological Survey, 1988). Since runoff and infiltration rates have an inverse relationship, a reduction in infiltration rates could cause an increase in runoff and, hence, streamflows. Assuming that the runoff from reclaimed areas is 29 percent greater than that from premining areas (based on this change in infiltration rates noted above), USGS determined that major streams in the Powder River Basin would see runoff increases ranging from 0.4 percent for the Cheyenne River to 4.3 percent for Coal Creek. Rawhide Creek would see an estimated 3.3 percent increase in runoff (p. 109, Martin, et al.; U.S. Geological Survey, 1988). Lands affected by mining the Eagle Butte LBA would add a very minor amount to this increase.

Surface water quality should not be significantly affected by mining, based on studies conducted by the USGS for the Belle Fourche River Basin (pp. 33-41, Bloyd, et al.; U.S. Geological Survey, 1986). Sediment yield should not increase in area streams, even with the added area disturbed due to the Eagle Butte LBA. Although reclaimed soils may be more erosive for the first few years after reclamation, the larger sediment production would probably not be delivered to area streams due to sediment deposition as a result of generally flatter slopes on reclaimed lands and sediment trapping by mandated sedimentation ponds.

Impacts to alluvial valley floors (AVF) can include several of the ground and surface-water impacts listed above. Alluvial aquifers can be subject to water-table drawdowns, channels subject to changes in flow patterns, and the interaction between surface water and ground water can be altered. Impacts to designated AVFs are generally not permitted unless the AVF is determined to be not significant to farming or unless the permit to affect the AVF was issued prior to the effective date of SMCRA. The WDEQ/LQD has determined that the potential AVF within and adjacent to the Eagle Butte LBA is not significant to agriculture (See discussion in Section IV. A. 2. c.).

Recently, concern has been expressed over the presence of certain forms of selenium in overburden. The WDEQ and the mine operators are cooperating in a joint effort to study this issue and to determine safe levels of selenium in overburden placed near the reclaimed surface, near reclaimed streams and impoundments, or in saturated spoils.

3. Air Quality

Coal mining activities produce particles which can be released in the air. Most of these particles are created as the result of physical forces such as blasting, crushing, and friction between vehicles and road surfaces. The larger (heavier) the particle, the closer to the source it tends to settle to the ground. Until recently, these particles were not considered to be as much of a health hazard as the generally much smaller particles produced by chemical activities such as condensation, absorption and adsorption. However, recent studies indicate that airborne particulates may cause adverse health effects at particulate levels lower than current standards (Chestnut, et al., 1991; Schwartz, 1991/92).

The initial Federal particulate standard was based on all particle sizes which could be trapped using a high volume air pump and a particular type of filter. This was the total suspended particulates (TSP) standard. Recently, the federal standard was amended to account for the greater health risk attributed to particles less than 10 micrometers in diameter (the PM10 standard). The particulate standard change from TSP to PM10 is more lenient toward mining activities since mining produces mostly larger particles. Monitoring has indicated that at similar distances from the active pit, PM10 levels are about one-third those of TSP. The Wyoming State Ambient Air Quality Standard remains at 150 ug/m³ for a 24-hour average and only changed from 60 to 50 ug/m³ for the annual average. The WDEQ has kept the 24-hour TSP standard in addition to the PM10 standard. The EPA is currently reviewing the appropriateness of the current standard in light of the studies concerning potential adverse health effects referenced above.

Tables 17 and 18 use the TSP standard in order to assess how well the previous regional impact assessments fit the current actual impacts. While it was not possible to predict with exact certainty which specific mines would be developed and what their size would be, the overall number and productivity of the mines in the Eastern Powder River Basin was projected with remarkable accuracy from 1979 to 1990.

Table 17. Particulate Concentration by Mine in the Eastern Powder River Basin as projected for 1990 and as Measured^a for 1990 for the Annual Ambient Air Quality Standard

Mine Name	Projected 1990 Annual Avg TSP Concentration ^b ug/m ³	Measured 1990 Annual Avg TSP Concentration ^c ug/m ³
Antelope	20-40	29
Belle Ayr	20-40	40
Black Thunder	20-40	46
Buckskin	20-40	33
Caballo	20-40	33
Caballo Rojo	20-40	29
Clovis Point	20-40	Idle
Coal Creek	20-40	22
Cordero	20-40	43
Dave Johnston	20-40	28
Dry Fork	20-40	28
Eagle Butte	20-40	32
Fort Union	20-40	29
Jacobs Ranch	20-40	40
North Antelope/Rochelle	20-40	31
Rawhide	20-40	30
Wyodak	20-40	29
Average		33

^a WDEQ
^b The technical report for the 1979 EIS with values for individual mines was not available at the writing of this draft, but the technical report for the 1984 EIS projected that mines south of Gillette would be between 30 and 40 ug/m³ and those north of Gillette would span a greater range of between 20 and 40 ug/m³.
^c Average of all sites making measurements in 1990 with 40 or more observations.

Particulate emissions are controlled by the amount of regulation imposed as well as by coal production. It would be expected that the actual emission rates would be less than the projected emission rates since regulations have become stricter during this time period. In particular, treatment of haul roads and stock piles, covering of conveyors, and more rapid revegetation of disturbed areas have become the norm rather than just used in special cases.

Table 18. Particulate Emissions by Mine in the Eastern Powder River Basin as Projected for 1990, and as Estimated from Actual Mining Activities in 1990

Mine Name	Projected 1990 Particulate Emission Rates (tons/year) ¹	Actual 1990 Particulate Emission Rates (tons/year) ²
Antelope		228
Belle Ayr	4520	2127
Black Thunder	3744	1912
Buckskin	1276	531
Caballo	3651	1126
Caballo Rojo		2701
Clovis Point	1492	Idle
Coal Creek	3432	1383
Cordero	9241	2477
Dave Johnston	961	
Dry Fork		750
Eagle Butte	3096	1101
Fort Union		278
Jacobs Ranch	3149	1869
North Antelope/Rochelle	2318	471
Rawhide	2218	1388
Wyodak	682	338
Total	39780	18680

¹ PEDCo, 1983.
² Tentative figures from various regional EISs, to be checked with the WDEQ.

As can be seen from the tables, the ambient concentrations across the region are generally less than past and current particulate standards. With the major current standard being for finer particles which settle out more slowly, the area of potential cumulative impacts (the area where monitoring would pick up concentrations of 1 ug/m³ as a result of all contributing sources) may be greater. In the event that the current standards are revised, compliance with any new standards will be required.

Cumulative air quality impacts tend to occur when mine operations are within about 10 miles of each other, because most large particles from mining processes drop out of the air quickly. The trend over the past 10 years, and with the current and proposed maintenance tracts, is for the mines to spread apart, increasing the distance between them. Cumulative impacts of mining in the area north of Gillette are not expected to increase as a result of issuing the Eagle Butte LBA tract because the LBA is farther from adjacent mining operations than the current Eagle Butte lease is. An increase in intensity of air quality impacts in Gillette is not expected, because mining will not be any closer to the city than it will be when the southern portion of the current lease is mined, and, as indicated above, cumulative impacts as a result of mining activity at adjacent mines are not expected to increase. The duration of air quality impacts to Gillette will increase because there will be mining activities within the Gillette Buffer Zone for a longer period of time.

In the case of a mine being developed as a new mine start (i.e. Rocky Butte), the trend of increasing distance between mines would be reversed. Air quality impacts presented in the EIS for the West Rocky Butte LBA include those expected for the life of the Rocky Butte Mine. Conclusions of that document were that air quality in the immediate vicinity of the proposed mine would decrease, but still continue to meet State and Federal standards (BLM, 1992c).

5. Socioeconomics

Three of the four recently-issued leases, like the Eagle Butte LBA, are maintenance-type lease applications. As a result, it is not anticipated that issuance of these leases will result in additional socioeconomic impacts in the area. They will extend the period of employment for workers at these mines, and will therefore maintain income and employment over time in the area. They will not result in an increase in numbers of people employed in the area. The Rocky Butte LBA is expected to result in a new mine start, adding approximately 250 to 300 new jobs to the area. There are two other proposed projects which may be under construction at the same time as the Rocky Butte Mine. These projects are: a proposed Black Hills Power and Light Company power plant and the second phase of construction scheduled at the Dry Fork Mine. The cumulative effects of these projects were addressed in the West Rocky Butte EIS (BLM, 1992c). The following discussion describes the current situation in the area of Gillette.

Gillette is located in the center of the Powder River Basin and Campbell County. With a 1960 population of 3,580, a 1980 population of 14,545, and a 1990 population of 17,635 people, it is the largest town in northern Wyoming. In the early decades of this century, the primary industry in this area was ranching, but this has changed and today relatively few people work in agriculture. Today the major industries are related to coal mining and oil and gas production. This has helped Campbell County lead Wyoming in coal and oil production and make it 7th in gas production with assessed mineral valuations of over \$1.2 billion or about 1/3 of total state mineral valuation (Hoffman, Department of Commerce; State of Wyoming, 1994).

Based on the most current information on housing availability in Gillette, there are about 355 unoccupied housing units available, mostly single family and rental properties (Table 10).

In addition, Gillette can provide 1,058 rooms for workers, visitors, tourists etc. through 12 motels and hotels located within the city. Typically, these rooms range from \$27 to \$50 per night. It also has 42 restaurants, cafes and other eating establishments throughout the city for the worker and visitor (Campbell County, Chamber of Commerce, Short, 1993).

According to Campbell County School District 1992/93 6th week attendance data, this school system is being used at about 69 percent of capacity based on fall attendance of 7,434 pupils (less kindergarten) and an enrollment capacity of 10,764. With kindergarten included, this enrollment figure climbs to 8,033, or nearly 75 percent of capacity. Based on this information, the school system could handle another 2,731 to 3,330 students (Campbell County, School District, Buxton, 1993).

In regard to utilities, Gillette appears to have the ability to provide additional services to many hundreds of new customers. For example, the average water usage in Gillette amounts to about 3.5 million gallons a day, with peaks of 7-9 million gallons during the summer months. This amounts to 1,278 million gallons (3,922 acre-feet) per year. However, at this time deliverable water capacity stands at 11 million gallons of water per day (4015 million gallons or 12,322 acre-feet per year). The city serves 18,300 customers that each consume an average of 189.5 gallons of water per day (Gillette City Utilities, Fritzler, 1993).

Gillette's wastewater treatment facility was upgraded in 1989. This constituted the final phase of their improvement program. The average daily throughput is 2.3 million gallons per day, against a plant capacity of 3.85 million gallons a day (Gillette City Utilities, Schultz, 1993).

The historical electrical peak capacity in Gillette amounted to 38.76 megawatts of power. This is not locally-produced energy, but bought power from two or more sources. For example, 60 percent of their power is purchased from Black Hills Power & Light Company located in Rapid City, SD. Another source of energy is from the Western Area Power Administration. Service is provided for 8,147 customers in the area, including business establishments. If the need arises, they could buy up to 55 megawatts of power without major modifications to their system. Usage stands at about 160 million kilowatt hours of use for 1992, with a peak of 35.6 megawatts of capacity; below the historic 1990 peak. If 400 new homes were to be built within the area, about 2.3 megawatts of additional power would be needed (Gillette City Utilities, Lindgren, 1993).

Crime rates, marriage and divorce rates, and birth and death rates are indicators of well being in communities. These topics are discussed in the following paragraphs.

Between 1980 and 1991, the crime rate in Campbell County decreased 13 percent. Large decreases were witnessed in robbery, burglary, and motor vehicle theft. A large increase was seen in aggravated assault incidents, with a smaller increase in larceny incidents. There was an

increase in city law enforcement personnel, but a decrease in county law enforcement personnel over this timeframe (Table 19).

Table 19. Crime in Campbell County, 1980 and 1991.

Type of Crime	1980	1991*	Difference
Murder	1	1	0
Rape	9	5	-4
Robbery	13	4	-9
Aggravated Assault	49	183	+134
Burglary	267	141	-126
Larceny	979	1,089	+110
Motor Vehicle Theft	91	36	-55
Total	1409	1459	+50
Crime Rate/10,000 Inhabitants	578.3	503.1	-75.2
Law Enforcement Personnel		1992	
Campbell County	43	40	-3
City of Gillette	44	54	+10
Total	87	94	+7

* Source: Uniform Crime Reporting, Crime in Wyoming Jan. through Dec. 1980, and 1991, Office of the Attorney General.

In 1980 the marriage rate in Campbell County was 13.7 per 1,000 population; in 1990 it had declined to 7.7 per 1,000 population. Note comparisons with the U.S. and Wyoming rates in Table 20 below.

In 1980, the divorce rate in Campbell County was 9.2 per 1,000 population; in 1990 it had declined to 5.5 per 1,000 population. Again, note in Table 20 the comparisons with the U.S. and Wyoming averages.

In 1980, Campbell County had a birth rate of 29.3 live births per 1,000 population; in 1990 this had decreased to 18.1. Note comparisons with Wyoming figures in Table 21.

Table 20: Marriage and Divorce Rates in Campbell County, 1980 and 1990.

Category	Subject	1980	1990
Marriages	U.S. Average	10.6	9.8
	Wyoming	14.6	10.7
	Campbell County	13.7	7.7
Divorces	U.S. Average	5.2	4.7
	Wyoming	8.5	6.9
	Campbell	9.2	5.5

Source: Wyoming Vital Statistics, 1981 and 1990, Wyoming Divisions of Health and Medical Statistics (1983)/Wyoming Dept of Health, June 1992.

In 1980, Campbell County had a death rate of 3.6 persons per 1,000 population; in 1990 it had increased slightly to 4.0 (Table 21).

Table 21: Birth and Death Rates in Campbell County, 1980 and 1990.

Category	Place	1980 ¹	1990 ¹
Births	U.S. Average	15.8	16.7
	Wyoming	22.5	15.4
	Campbell County	29.3	18.1
Deaths	U.S. Average	8.9	8.5
	Wyoming	6.8	7.0
	Campbell County	3.6	4.0

¹ Numbers are reported in number per 1000 population. Source: Wyoming Vital Statistics, 1983 and 1992.

There appear to be adequate medical facilities located in Gillette. The Campbell County Memorial Hospital is located in Gillette. It has a 119-bed capacity and is staffed by 30 local physicians and 17 visiting physicians in 11 specialty areas. For 1991/92, it had 3,156 admissions, a 39 percent occupancy rate (Campbell County Memorial Hospital, Clark, 1993).

The Pioneer Manor Nursing Home provides care for the elderly and handicapped with 160 bed units and 81 apartment units (Campbell County, Chamber of Commerce, Short, 1993).

This information indicates that the city of Gillette can handle a substantial influx of new people without experiencing the "problems" of growth. With the Eagle Butte LBA proposed as a maintenance-type tract, there should be little, if any, resultant cumulative socioeconomic impact on the Gillette area.

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Vegetation Resources

Soil Resources

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Campbell County

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Sheridan, WY 82801

Wyoming Wildlife Federation
Attn: Ms. June Rain
P.O. Box 106
Cheyenne, WY 82003

Wyoming Outdoor Council
Attn: Mr. Dan Heilig
201 Main Street
Lander, WY 82520

Sierra Club, Northern Great
Plains Regional Office
Attn: Mr. Kirk Koepsel
23 North Scott, No. 25
Sheridan, WY 82801

Big Horn Audubon Society
Attn: Mr. Scott Posner
P. O. Box 535
Sheridan, WY 82801

Murie Audubon Society
Attn: Mr. Bart Rea
P.O. Box 2112
Casper, WY 82602

Cheyenne High Plains Audubon Society
Attn: Mr. Mark Gorges
3417 Yucca Road
Cheyenne, WY 82001

Izaak Walton League of America
P.O. Box 4867
Casper, WY 82604

Friends of the Bow
P.O. Box 6032
Laramie, WY 82070

The Nature Conservancy
Box 3165
University Station
Laramie, WY 82070

Wyoming Association of Professional
Archaeologists
Box 3431
Laramie, WY 82071

Wyoming Mining Association
Attn: Mr. Marion Loomis
P.O. Box 866
Cheyenne, WY 82003-0866

Wyoming Stock Growers
Attn: Mr. Bob Budd
Box 206
Cheyenne, WY 82002-0206

Wyoming Heritage Society
Attn: Mr. Bill Schilling
139 West Second Street, Suite
Casper, WY 82601

Medicine Wheel Alliance
Attn: Ms. Nicol Price
Box 37
Huntley, MT 59037

Wyoming Geological Association
Attn: President
P.O. Box 545
Casper, WY 82602

Petroleum Association of Wyoming
Attn: Mr. Tom Clayson
951 Werner Court, Suite 100
Casper, WY 82601

Wyoming Public Lands Council
P.O. Box 115
Casper, WY 82602

Wyoming Multiple Use Coalition
117 Glen Road
Casper, WY 82601

Wyoming Bankers Association
111 West 2nd Street, Suite 310
Casper, WY 82601-2464

Mining Association of Wyoming
Attn: Mr. Bob Holcomb
P.O. Box 1060
Mills, WY 82644

National Coal Association
Attn: Mr. Hal Quinn
1130 17th Street NW
Washington, DC 20036

Wyoming Wool Growers Association
Ms. Carolyn Paseneaux
P.O. Box 115
Casper, WY 82602

Wind River Multiple Use Advocates
Box 1126
Riverton, WY 82501

United Mine Workers Association
Mr. Bob Guilfoyle
P.O. Box 3775
Gillette, WY 82717

Tri-County Electric Association
P.O. Box 930
Sundance, WY 82729-0930

Mr. Cecil Cundy
P.O. Box 519
Sundance, WY 82729

Western Water Consultants
Attn: Mr. Doyl M. Fritz
1949 Sugarland Drive, Suite 134
Sheridan, WY 82801

Powder River Eagle Studies Inc.
P.O. Box 2411
Gillette, WY 827176

Mr. Cat Urbigkit
Natural Resources Consultant
P.O. Box 1416
Lander, WY 82520

Environmental Strategies, Inc.
Attn: Mr. Stanley Dempsey
1660 Wynkoop Street, Ste. 1000
Denver, CO 80202

BXG, Inc.
Attn: Ms. Jackie Oldham
1113 Spruce Street
Boulder, CO 80302

Mariah Associates, Inc.
Attn: Mr. Scott Benson
3810 Grand Avenue
Laramie, WY 82070

Pacificorp Electric Operation/Fuel
Resource Dept.
Mr. Scott Child - Property
Administrator
One Utah Center - Suite 2100
201 South Main
Salt Lake City, UT 84140-0021

Mr. Bill Saulcy
P.O. Box 127
Encampment, WY 82325

Mr. Don Duerr
205 South 30th St., Ste. A-35
Laramie, WY 82070

Mr. Arnold Cunningham
Arnjac
P.O. Box 1596
Laramie, WY 82070

Mr. Ladd Frary
580 Kirby Lane
Grand Junction, CO 81504

Mr. Jim Nyenhuis
1427 Wildwood Road
Ft. Collins, CO 82521

Rachel Fulkerson
P.O. Box 788
Gillette, WY 82717

Hoy's Mobile Home Park
P.O. Box 1656
Gillette, WY 82717

V1 Propane
P.O. Box 2050
Gillette, WY 82717

Casper Star Tribune
Northern Star Tribune Bureau
Attn: Mr. Mike Riley
1306 Marion
Sheridan, WY 82801

Gillette News-Record
Attn: Deb Holbert
P.O. Box 3006
Gillette, WY 82716

Cheyenne-Wyoming Eagle
Attn: Managing Editor
702 West Lincolnway
Cheyenne, WY 82001

Associated Press
Attn: Managing Editor
P.O. Box 1323
Cheyenne, WY 82001

Casper Star-Tribune
Attn: Managing Editor
P.O. Box 80
Casper, WY 82602

Mr. Oliver Schaub, Land Mgr.
C.H. Snyder Co.
Box 1022
Kittanning, PA 16201

Poudre Environmental Cons., Inc.
Attn: Mr. Russell T. Moore
966 Wagonwheel Drive
Fort Collins, CO 80526-5842

Eldon D. Strid, P.E.
Mine Engineers, Inc.
P.O. Box 3026
Cheyenne, WY 82003-3026

**APPENDIX A:
COMMENT LETTERS ON THE DRAFT
EA AND RESPONSES**



United States Forest Service Rocky Mountain Region Medicine Bow National Forest 2468 Jackson Street Laramie, WY 82070-6535

1

93 DEC -8 AM 10:35

Reply to: 2820/1950 WY124783

Date: December 2, 1993

3420(LB4)
WY124783
Eagle Butte

Bureau of Land Management
Casper District Office
1701 East E Street
Casper, Wyoming 82601-2167

District Manager:

We appreciate having the opportunity to review the draft environmental assessment for the Eagle Butte coal lease application.

None of the federal mineral estate being proposed involves surface lands managed by the Medicine Bow National Forest.

No forest comments have surfaced which may be of use to you as part of this scoping process.

Sincerely,

Michael B. Murphy

MICHAEL B. MURPHY
Staff Officer for Program Support

cc:
J. Reddick, Douglas Dist.



Caring for the Land and Serving People

FS-4200-28 (7-82)



United States Department of the Interior
FISH AND WILDLIFE SERVICE

Fish and Wildlife Enhancement
2617 East Lincolnway, Suite A
Cheyenne, Wyoming 82001

IN REPLY REFER TO:

FWE-61411

December 10, 1993

MEMORANDUM

To: District Manager, Casper District Office, BLM, Casper, WY
Attn: Nancy Doelger

From: State Supervisor, FWE, Cheyenne, WY (FWE-61411)

Subject: Draft Environmental Assessment - Eagle Butte Coal Lease
Application (WY124783), Powder River Coal Region

This responds to your agency's request for comments on the Draft Environmental Assessment regarding the proposed leasing of the Eagle Butte Coal Tract in the Powder River Coal Region north of Gillette.

We have reviewed your agency's unsuitability criteria application for criterions Numbers 9 and 11 through 14 for the subject lease and concur with your findings that none of the lands located on the tract are unsuitable for leasing. You should note on page vi that the existing mine's Raptor Mitigation Plan needs to be amended to include the subject tract, if leased. The current mine's Raptor Plan only addresses in detail the raptor nesting pairs that will be affected during this five year term of permit.

We appreciate the opportunity to comment on this proposal. If we can assist further, please contact Art Anderson of my staff at the letterhead address or phone 772-2374.

Charles Davis

Charles Davis

cc: Director, WGF, Cheyenne, WY

3420(LB4)
WY124783
Eagle Butte

COMMENT LETTERS

A-2

3



NO. REVISED BY:
N36:5 (DETC)

December 27, 1993

Nancy Doelger, Geologist
Casper District Office
Bureau of Land Management
1701 East E Street
Casper, Wyoming 82601

Dear Nancy:

Thank you for sending us a copy of the Draft Eagle Buttes Environmental Assessment for review and comment. We received the plan on November 7th. It is a well written and comprehensive draft. We are pleased to have the opportunity to participate in this planning document. It is important for all land stewards to take part in ecosystem management, particularly for us at Devils Tower since the monument is such a small park unit surrounded by private interests and multiple use public lands.

It appears that virtually all of the environmental effects that will result from the implementation of this preferred alternative are local and would not impact Devils Tower. The one potential exception is the affect on air quality, particularly visibility.

The large quantities of particulates released from mining and mining-related activities will continue to enter the region's airshed upwind of Devils Tower. This will negatively influence the long distance visibility from the Tower top which currently enjoys 150 mile vistas under ideal meteorological conditions. While Devils Tower National Monument is designated a Class II area under the 1977 amendments to the Clean Air Act, the Department of the Interior identified that the monument possesses air quality-related values including visibility, flora, fauna, and cultural resources. The Department also recommended that the monument be redesignated to Class I. Furthermore, the BLM's Newcastle Resource Area's draft environmental impact statement proposes to designate Devils Tower and the area around it as a Class I area for visual resources.

The important point is that maintaining the nearly-pristine visibility in this part of Wyoming is a very high priority to the National Park Service and American public. I would ask that the BLM do what it can to minimize all air quality-related impacts at the Eagle Butte Mine. In the future, I trust that the BLM will take into consideration the cumulative impacts on air quality from all sources in the region, current and planned.

United States Department of the Interior

NATIONAL PARK SERVICE
Devils Tower National Monument
P.O. Box 8
Devils Tower, Wyoming 82711-0008

TAKE PRIDE IN AMERICA

DEC 29 1993

10:19 AM

U.S. DEPARTMENT OF THE INTERIOR

Thank you for providing us with the opportunity to comment on this plan. Good luck with the mine.

Sincerely,

George L. San Miguel
George L. San Miguel
Chief of Resources Management

For:
James Schlinkmann
Acting Superintendent

A-3

COMMENT LETTERS

RESPONSES TO FEDERAL AGENCIES

Response to Letter 1, from the Forest Service

Thank you for reviewing the draft Eagle Butte EA, although it does not include lands managed by the Forest Service. We will continue to provide Forest Service the opportunity to review and comment on all coal leasing actions, and to work with the Forest Service as a cooperating agency when Forest Service surface lands are involved.

Response to Letter 2, from the U.S. Fish and Wildlife Service

Thank you for your cooperation in reviewing the unsuitability criteria application for the Eagle Butte lease application and commenting on the proposal. We will continue to consult with the Fish and Wildlife Service on proposed future leasing actions.

The statement about the Raptor Mitigation Plan on page vi has been corrected.

Response to Letter 3, from Devil's Tower National Monument

The air quality impacts of mining the Eagle Butte LBA should not result in an incremental adverse effect on visibility at Devils Tower since no increase in production rates is proposed.

(Note: The BLM requested and received information from the Wyoming Department of Environmental Quality, Air Quality Division (WDEQ/AQD) on all comments that were received relating to the potential air quality impacts of the Eagle Butte LBA. Regarding the recommendation that Devils Tower National Monument and surrounding area be designated a Class 1 area, the WDEQ/AQD stated that the State of Wyoming has received no request for redesignation, and that WDEQ/AQD PSD regulations are the sole source of regulations governing such actions.)

4



STATE OF WYOMING
OFFICE OF THE GOVERNOR
CHEYENNE 82002

MIKE SULLIVAN
GOVERNOR

RECEIVED

94 JAN -4 AM 10:15

MEMORANDUM

TO: Nancy Doelger
Casper BLM District Office

FROM: Rod S. Miller, Federal Lands Planning Coordinator *RS*

DATE: January 3, 1994

SUBJECT: Eagle Butte Coal Lease Application Draft EA

Nancy, here are comments from state agencies on the Draft EA for the Eagle Butte Coal Lease Application. I hope this information is helpful and thanks for this opportunity to take an advance look at the document. Please feel free to give me or the appropriate agency a call if you need to follow up on any of these comments.

rms

Enclosures

A-5

COMMENT LETTERS

WYOMING
GAME AND FISH DEPARTMENT



December 15, 1993

EIS 319
U.S. Department of the Interior
Bureau of Land Management
Casper District Office
Draft Environmental Assessment
Eagle Butte Coal Lease
Application as Applied for by
AMAX Land Company
SIN: 93-081
Campbell County

ROD MILLER
STATE PLANNING COORDINATOR'S OFFICE
HERSCHLER BUILDING, 4TH FLOOR EAST
CHEYENNE, WY 82002

Dear Mr. Miller:

The staff of the Wyoming Game and Fish Department has reviewed the draft environmental assessment for the Eagle Butte Coal lease application as applied by AMAX Land Company. We offer the following comments for your consideration.

- 1) RE: Pages 35 and 60, finding "d" -- wetlands. The author states, "Based on vegetation and soils, it is unlikely that any portion of the proposed lease area can be considered a wetland." This conclusion is partially based upon composition of a "drainage bottom" vegetation type delineated along East Prong Little Rawhide Creek, Revlon Draw, and upland swales. Vegetation mapping units are not defined with the objective of delineating wetlands. The composition of the bottomland type is an average of sampling units, which would merely intersect wetlands and uplands in proportion to their occurrence. The overall composition is not a reliable indicator of wetlands. Soil mapping units likewise may not be sufficiently refined to predict the potential occurrence of wetlands. Based upon vegetation, topography, and hydrology, it is reasonable to anticipate wetlands are absent or very limited in extent. However it is inappropriate to rely upon the average composition of a vegetation mapping unit to make inferences about the potential existence of very localized departures from the average condition (ie, the possible existence of wetlands). Site reconnaissance is necessary to develop any sort of statement that merits inclusion in a decision document. In other words, wetlands are a resource that should be inventoried and disclosed prior to the leasing decision, not speculated

Mr. Rod Miller
December 15, 1993
Page 2 - EIS 319

based upon the composition of more encompassing plant community classifications.

- 2) RE: Pages 72 and 92 -- method for predicting big game impacts. The approach used to predict big game impacts is analytically incorrect and leads to inappropriate conclusions. The author calculates the "average" density of antelope per square mile of occupied habitat in the herd unit as a basis for projecting the "worst case" potential mine impact. Conjecture is, the "worst case" potential reduction in the herd is a product of the average number of antelope per square mile of occupied habitat and the area of affected habitat.

This procedure has no biological value and is a digression from the kind of analysis needed to address the real impact. Using this procedure, the incremental effect of habitat loss or alteration, in most cases, is zero, and the number of animals critically dependent upon the lease area is probably zero. On the other hand, the number of animals critically dependent on a limiting habitat feature could be many times the average number per square mile of occupied habitat, assuming the herd is at carrying capacity. The point is, average density is an arbitrary assignment of the importance of any piece of habitat. The ongoing loss of average pieces of habitat will have no effect initially, because mobile species simply displace to other suitable habitats. However, as incremental losses accumulate, the elasticity of the habitat base diminishes. Also, important habitats become more scarce.

Animals which previously moved freely to access suitable habitats during severe weather events encounter more barriers and voids, and must migrate longer distances to find suitable habitats. This causes a net metabolic drain and concentrates animals on smaller areas where competition intensifies. As incremental development continues, the potential of severe weather to impart disproportionately high losses escalates. Eventually, incremental modifications of "average" pieces of habitat may lead to losses that far exceed the average number of animals per occupied unit. The idea of identifying "fail-safe" levels for development or habitat alteration is untenable. The actual increments that might be traced as having a causal effect on survival can vary depending on sequence of events and the herd's distribution and condition prior to each event. The important habitat elements (topography, shrubs, water sources, etc) of each increment must be maintained or restored to protect elasticity of the habitat base (the ability to accommodate population needs under a variety of climatological scenarios).

The kind of analysis ELM attempts to perform minimizes the importance of each spatial increment based upon it's "insignificance" relative to the amount of occupied habitat. ELM needs to view the cumulative effect of its leasing decisions in conjunction with all cultural land modifications preceding the decision and reasonably likely to follow the decision, in order to comment about the ongoing state of habitat

Mr. Rod Miller
December 15, 1993
Page 3 - EIS 319

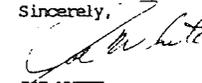
elasticity. This is much more a statistical endeavor than an absolute one. If elevated mortalities become more probable because animals have fewer options, then over time, the carrying capacity of the herd unit will decline. Using BLM's approach, the next logical extension (by industry) is that mitigation is unnecessary because the impact is "insignificant." BLM needs to be cognizant of the implications of its historic approach to impact analysis.

- 3) RE: Page 73 -- shrub component and big game winter use. Authors make the statement, "Pronghorn are already using reclaimed areas at the Eagle Butte Mine seasonally; as the shrub component on reclaimed land increases, more winter use of this land by pronghorn is expected." Please comment on the relative amounts of sagebrush that currently exist on reclaimed surfaces at Eagle Butte mine, and provide documentation of a time frame for recolonization by adequate densities of sagebrush in locations that will be accessible during winter storm events.
- 4) RE: Page 82 -- Shrubland reclamation. Authors state, "Continued emphasis on increasing vegetal species diversity on reclaimed lands, and particularly on establishing shrublands, would help increase use of reclaimed land by shrub-dependent wildlife species." This interjects speculation into the analysis. Please comment on the more probable scenario based upon existing conditions -- straight grassland, little surface relief, reversion to moderate to heavy grazing practices after mining. What kind of wildlife community will occupy a closely cropped grassland, no shrubs, and a few isolated rock piles? (Alternative shrubs substituted for sagebrush are eliminated by livestock or decline in this climate).
- 5) RE: Page 92 -- percentages of herd unit affected. We question the value of this approach for impact analysis, particularly when viewed in a cumulative context (see comments 2 and 6). Also, what effect will habitat alteration within the mined area have on biological diversity (see comment 4)?
- 6) RE: Pages 92 -- cumulative effect on big game. Authors state, "... at this point, herd population levels have not been adversely affected by more than ten years of mining." Again, this is not the impact of immediate concern. The herd objective is not set at carrying capacity. It is an intermediate figure, based largely on social and political desires of the public as well as the biology of the species. Development activities within the herd unit can affect carrying capacity without affecting the current population (see comment 2 discussion). It is highly improbable that any specific increment of development will affect the existing herd number or objective, because these figures are held beneath the carrying capacity. However, incremental developments can lower the carrying capacity by reducing elasticity of the habitat base. As the gap between carrying capacity and the actual population narrows (for whatever reason), the effects of climate and density dependent regulation increase. The annual recruitment potential of the

Mr. Rod Miller
December 15, 1993
Page 4 - EIS 319

herd diminishes. Furthermore, such impacts compromise future management options (ie, setting a higher population objective) as well as the margin of error for existing management objectives. The point is, incremental methods of impact analysis portray a misleading image of what is actually happening, leading to a false sense of security. More damaging than that, they create a tempting argument against the need for effective mitigation. The discussion of cumulative impacts needs to address the interactive effects of all previous, existing, and future cultural modifications of the land (agricultural conversions, grazing, fences, roads and highways, urban developments, subdivisions, oil and gas, feral animals, etc) and the addition of mining related impacts. This discussion should consider the impacts of these features upon the ability of animals to access required habitat elements during the most restricting climatological periods, as well as the impact upon the animal's metabolic balance prior to entering periods of restricting conditions. That is where the true cumulative effect lies.

Thank you for the opportunity to comment.

Sincerely,

JOE WHITE
DEPUTY DIRECTOR

JW:TC:as
cc: Wildlife, Fish, HATS Divisions
USFWS

A-7

COMMENT LETTERS

6



THE GEOLOGICAL SURVEY OF WYOMING
BOX 3008 UNIVERSITY STATION • LARAMIE WYOMING 82071
(307) 766-2286 • FAX 307-766-2605

GEOLOGICAL SURVEY BOARD
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Stanford D. Reed

STATE GEOLOGIST - Gary B. Glass

MINOR ECONOMIC GEOLOGIST (Metals) W. Don Houser	STAFF GEOLOGISTS - Coal Timothy A. Moore	Geologic Records James C. Cole	Geologic Mapping Alan J. Van Pelt	Industrial Minerals/Tronsum Roy E. Hays	Oil and Gas Richard W. De Bruin	PUBLICATIONS Editor Richard W. Jones
---	--	-----------------------------------	--------------------------------------	--	------------------------------------	--

December 2, 1993

-- Memorandum --

TO: Rod Miller, Wyoming State Clearing House
FROM: Gary B. Glass, State Geologist *GBG*
SUBJECT: Eagle Butte Coal Lease Application Draft Environmental Assessment
(State Identifier 93-081)

We submit the following comment on the Draft Environmental Assessment (DES) for the Eagle Butte Coal Lease Application:

Pages 26, 28, and 31

The "Roland" and "Smith" coal bed terminology used for the Wyodak-Anderson coal in the lease area is technically incorrect. We think it is important to note that these coal beds are now more appropriately called the "Anderson;" and "Canyon" beds, respectively. This nomenclatural change became the acceptable one sometime after Amax's original Eagle Butte mine plan had been submitted and after considerable coal drilling information had been made available to State and Federal coal researchers. As long as this is made clear, there is no reason to require formal changes in mining permits.

Page 28, third paragraph, fourth sentence

The word "subbituminous" is not spelled with a hyphen.

Page 38, Section 5, Ownership and Use of Land

Has anyone sampled the areas adjacent to the proposed lease tract for signs of naturally venting methane such as occurred at the Rawhide Village and Horizons subdivisions in the 1980s? Soil-gas tests could establish the existence or nonexistence of this kind of hazard prior to mining. Early detection of a naturally occurring hazard could avoid expensive litigation in the future, after the area is affected by mining.

Are coal bed methane wells in this general area reducing or eliminating the surface venting of methane in the Rawhide Village and Horizon subdivision areas? This may be a possible hazard mitigation procedure to consider if another Rawhide Village situation is discovered.

Serving Wyoming Since 1933

Rod Miller
December 2, 1993
Page 2

There is no indication how close this extension is to inhabited buildings or water wells that are not owned by Amax. We note that the 7 1/2-minute topographic map for this area shows there may be inhabited dwellings within one-half mile of the mine area to the south. Also, is there still a public golf course immediately west of the lease tract? There is also a trailer park within 1.5 miles. Because this map is not very recent, there may be other dwellings as well. Several water(?) wells are shown on the topographic map (attached).

Page 56, Table 10

We have included an updated table of coal production forecasts for use by those preparing the DES. We did this because our most recent forecast is considerably higher than the one we published in May 1993.

Questions on coal bed nomenclature and forecast coal production should be directed to Gary Glass or Tim Moore. Questions on the potential for venting coal bed methane should be directed to Gary Glass.

GBG/sb

Enclosure

A-8

COMMENT LETTERS

7
DIVISION OF PARKS
& CULTURAL RESOURCES

State Historic Preservation Office
2192 East St. Bureau Bldg.
Cheyenne, Wyoming 82002-0219
(307) 777-7697
FAX (307) 777-6142

November 17, 1993

Casper District Manager
Bureau of Land Management
1701 E Street
Casper, Wyoming 82601
ATTN: Nancy Doelger

RE: Eagle Butte Coal Lease Application Draft Environmental Assessment (State ID #93-081),
SHPO #0492JAK005

Dear Ms. Doelger:

Sandra Shelley of our staff has received information concerning the aforementioned project. Thank you for giving us the opportunity to comment.

Our office received a report on a Class III inventory of the project area done by Frontier Archaeology in 1992. We have already commented on the report and find that there will be "no effect" to cultural resources, (see attached letter dated April 14, 1992).

Please refer to SHPO project control number #0492JAK005 on any future correspondence dealing with this project. If you have any questions contact Ms. Shelley at 777-5497 or Judy Wolf, Deputy SHPO at 777-6311.

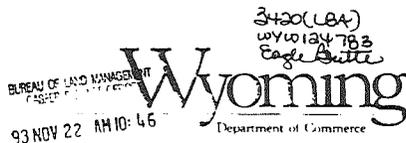
Sincerely,

John T. Keck
John T. Keck
State Historic Preservation Officer

JTK:SAS:kfm
Attachment

Mike Sullivan
Governor

R.D. "Max" Masfield
Director
Department of Commerce



8
DIVISION OF PARKS
& CULTURAL RESOURCES

State Historic Preservation Office
1825 Carey Avenue
Cheyenne, Wyoming 82002-0240
(307) 777-7697
FAX (307) 632-2748

April 14, 1992

Mr. David Pomerinke
Buffalo Resource Area Manager
Bureau of Land Management
189 North Cedar
Buffalo, Wyoming 82834
ATTN: B. J. Earle

RE: Amax Eagle Butte LBA Tract, SHPO #0492JAK005

Dear Mr. Pomerinke:

Josie Kantner and Ted Dunn of our staff have received information concerning the aforementioned project. Thank you for giving us the opportunity to comment.

We have reviewed the project report and find that the documentation meets the Secretary of the Interior's Standards for Archaeology and Historic Preservation (48FR44716-42). Sites 48CA2734 and 48CA2735 do not meet the criteria of eligibility for the National Register of Historic Places and no further work or protective measures are necessary. We recommend that the Bureau of Land Management (BLM) allow the project to proceed in accordance with state and federal laws subject to the following stipulation: if any cultural materials are discovered during construction, work in the area should halt immediately and BLM staff and SHPO staff must be contacted. Work in the area may not resume until the materials have been evaluated and adequate measures for their protection have been taken.

This letter should be retained in your files as documentation of our determination of "no effect" for this project.

Please refer to SHPO project control number #0492JAK005 on any future correspondence dealing with this project. If you have any questions, contact Ms. Kantner at 777-6292 or Mr. Dunn at 777-6694.

Sincerely,

Gary Stephenson

Gary Stephenson
Director
Administrative Services

FOR:
Dave Kathka, Ph.D.
State Historic Preservation Officer

Mike Sullivan
Governor

R.D. "Max" Masfield
Director
Department of Commerce



A-9

COMMENT LETTERS

9



THE STATE OF WYOMING

550 07 1337

MIKE SULLIVAN
GOVERNOR

Public Service Commission

100 W 21ST STREET (307) 777 1427 CHEYENNE, WYOMING 82002
FAX (307) 777 5100
TTY (307) 777 1427

BIL TUCKER
CHAIRMAN
JOHN R. "DICK" SMYTH
DEPUTY CHAIRMAN
STEVE ELLENBECKER
COMMISSIONER

ALEX J. ELIOPULOS
CHIEF COUNSEL AND
COMMISSION SECRETARY
STEPHEN G. OSLEY
ADMINISTRATOR

MEMORANDUM

TO: MR. ROD S. MILLER
FEDERAL LANDS COORDINATOR
STATE PLANNING COORDINATOR'S OFFICE

FROM: JON F. JACQUOT
CHIEF ENGINEER
PUBLIC SERVICE COMMISSION *Jon F. Jacquot*

DATE: DECEMBER 6, 1993

RE: EAGLE BUTTE COAL MINE LEASE APPLICATION TO THE BUREAU OF
LAND MANAGEMENT

Thank you for the opportunity to comment on the referenced matter. The Commission requests that no unreasonable restrictions be placed on the provision of utility service or on the construction of utility and pipeline facilities as a result of the referenced lease.

The Commission requests that, when coal leasing is being done, the costs of relocating any utility and pipeline facilities to accommodate coal production be borne by the lessee. If these costs are not borne by the lessee, they would fall unfairly on the ratepayers of the affected utility or pipeline.

If you should have any questions regarding this matter, please let me know.

A-10

10



STATE OF WYOMING
OFFICE OF THE GOVERNOR
CHEYENNE 82002

April 18, 1994

CASPER BLM	
APR 18 1994	
DR	MIKE SULLIVAN
ADM	GOVERNOR
PR	SL
AD	GRA
OPR	NRA
LRR	PRA
SGR	

Don Heinrichsen, District Manager
Casper District
Bureau of Land Management
1701 E Street
Casper, WY 82601

Dear Mr. Heinrichsen:

Agencies of the State of Wyoming have reviewed the Review Draft of the Environmental Assessment for the Eagle Butte Coal Lease Application. Enclosed for your consideration and use are comments resulting from that review. You will note that the Wyoming Game and Fish Department has some specific comments regarding methodologies used in the EA. The Wyoming Geological Survey has offered some valid advice regarding the possible problems caused by soil gas in the area.

These comments, however, do not indicate fatal flaws in the EA and I support the issuance of the subject lease.

With best regards, I am

Very truly yours,

Mike Sullivan
Mike Sullivan

MS/rms

cc: State Review Agencies
Wyoming Congressional Delegation

COMMENT LETTERS

11

THE STATE OF WYOMING



MIKE SULLIVAN
GOVERNOR

Public Service Commission

100 W. 21ST STREET CHEYENNE WYOMING 82002
307) 777 7437
FAX (307) 777 5700
TTY (307) 777 7421

DIL TUCKER
CHAIRMAN
JOHN R. "DICK" SMYTH
DEPUTY CHAIRMAN
STEVE ELLENBECKER
COMMISSIONER

MEMORANDUM

ALEX J. ELIOPoulos
CHIEF COUNSEL AND
COMMISSION SECRETARY
STEPHEN G. OXLEY
ADMINISTRATOR

TO: MR. ROD S. MILLER
FEDERAL LANDS COORDINATOR
STATE PLANNING COORDINATOR'S OFFICE

FROM: JON F. JACQUOT
ENGINEERING SUPERVISOR
PUBLIC SERVICE COMMISSION

DATE: APRIL 14, 1994

RE: APPLICATION BY AMAX LAND CO. TO THE BUREAU OF LAND
MANAGEMENT FOR THE EAGLE BUTTE COAL LEASE, STATE
IDENTIFIER NO. 93-081

Thank you for the opportunity to comment on the referenced matter. The Commission requests that no unreasonable restrictions be placed on the provision of utility service or on the construction of utility and pipeline facilities as a result of the referenced lease.

The Commission requests that, when coal leasing is being done, the costs of relocating any utility and pipeline facilities to accommodate coal production be borne by the lessee. If these costs are not borne by the lessee, those costs would fall unfairly on the ratepayers of the affected utility or pipeline.

If you should have any questions regarding this matter, please let me know.

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THE GEOLOGICAL SURVEY OF WYOMING
BOX 3008 UNIVERSITY STATION • (ARAPAHOE WYOMING 82071)
(307) 766-2286 • FAX 307-766-2805

STATE GEOLOGIST - Gary B. Glass

SENIOR ECONOMIC GEOLOGIST (Retired) Don House
STAFF GEOLOGIST'S COOP P. Daniel Jigger
GEOLOGICAL HISTORY James C. Cole
GENERAL MAPPING Brian J. Van Pelt
HYDROLOGICAL ENGINEERING AND WATER RESOURCES CONSULTANTS
E. J. Beckwith, Jr. Manager
James L. Galloway
Richard D. Rice
APPLICATOR
E. J. Beckwith, Jr.
Richard A. Jones

April 7, 1994

MEMORANDUM

TO: Rod Miller, Wyoming State Clearing House

FROM: Gary B. Glass, State Geologist

SUBJECT: EA for the Eagle Butte Coal Lease Application
(State Identifier 93-081)

I only have one comment on this Environmental Assessment and that goes back to earlier comments I have made in regard to this lease and other coal mines and leases in and around Gillette. There is no indication that any soil-gas surveys were conducted in the areas west and south of this lease application. The report also notes that certain geological and hydrological conditions can cause the surface venting of coalbed methane such as occurred at Rawhide Village.

While the mine may not cause or aggravate the venting of coalbed methane, it seems prudent to determine whether or not there is any surface venting of methane or any methane plumes in the soil gases west and south of the lease before mining begins? A portion of the Campbell County Regional Airport is less than a mile west of the lease. Gillette is to the south. This could save many hours of time and even more dollars in potential property damage and litigation should the mine eventually be accused of something that may or may not already exist.

In hindsight, I believe the Rawhide Village problem might have been identified and mitigated if a surface and/or a soil-gas survey had been conducted there prior to mining. A baseline soil-gas survey in the direction of populated or occupied lands is warranted based on the grief and costs associated with Rawhide Village.

If nothing else is done, perhaps the property owners in those areas and the county should be advised that a soil-gas survey would provide them some peace of mind in regard to preventing a future Rawhide Village -type problem. Perhaps it should be an element of land-use planning in this area of the State, which I realize goes beyond the scope of this EA.

GBG:ph

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COMMENT LETTERS

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WYOMING
GAME AND FISH DEPARTMENT



April 15, 1994

EIS 0319
U.S. Department of the
Interior
Bureau of Land Management
Review Draft
Eagle Butte Coal Lease
Application
SIN: 93-081
Campbell County

ROD MILLER
STATE PLANNING COORDINATOR'S OFFICE
HERSCHLER BUILDING, 4TH FLOOR EAST
CHEYENNE, WY 82002

Dear Mr. Miller:

On November 15, 1993, we received a request to review a draft environmental assessment prepared for the AMAX Eagle Butte Coal Lease. The proposed lease adjoins the southern boundary of the existing Eagle Butte Permit Area, approximately 3 mi north of Gillette. On December 15, 1993, we forwarded comments to the State Planning Coordinator. On March 25, 1994, we received a request to review another "draft" environmental assessment for the Eagle Butte LBA. In reviewing the current draft EA, we find that our December 15 comments were not addressed and there was no apparent effort to incorporate them. Our December 15 comments (attached) still apply to this EA.

Thank you for the opportunity to comment.

Sincerely,

JOE WHITE
DEPUTY DIRECTOR

TC:as
Attachments
cc: Wildlife, Fish, HATS Divisions
USFWS

A-12

COMMENT LETTERS

RESPONSES TO STATE AGENCIES

Response to Letter 4, from the Office of the Governor, January 3, 1994

The BLM appreciates the responsiveness of the agencies of the State of Wyoming in reviewing and commenting on the proposed Eagle Butte leasing action. Comments from state agencies have helped improve the environmental assessments prepared by the BLM for all the leasing actions.

Response to Letter 5, from the Wyoming Game and Fish Department, December 15, 1993

Numbers in this response correspond to numbers in the comment letter.

1) RE: Pages 35 and 60, draft EA, finding "d" -- wetlands. The conclusion that it is unlikely that any portion of the proposed area can be considered a wetland is not based on an average of sampling units which intersect wetland and uplands in proportion to their occurrence. Although an Army Core of Engineers wetlands assessment has not yet been completed on the LBA, full vegetation and soil baseline studies were conducted. Site-specific field studies were conducted, and no clear indicators of wetlands were identified.

2) RE: Pages 72 and 92, draft EA -- method for predicting big game impacts. As you indicate in comment 6 of your comment letter, the herd objective is not set at carrying capacity, it is an intermediate number. Presumably then, the area of the North Black Hills herd unit would support more than the 14,000 pronghorn estimated to be in residence in 1992.

No critical or crucial habitat or limiting habitat feature exists on the LBA, and none are defined within the North Black Hills unit. Given this situation, if this tract became completely unsuitable for pronghorn following mining, the loss of AUMs would be fairly proportional to the size of the LBA in relation to the size of the occupied habitat within the herd unit.

The assumption that the area would be completely unsuitable following reclamation is an exaggeration, because some use of reclaimed habitat by pronghorn has been observed in reclaimed areas in the basin.

Therefore, the estimation of a loss of 12-14 pronghorn within the North Black Hills herd as a result of mining of the Eagle Butte LBA is considered to be a reasonable worst-case estimate of the impacts of issuing this lease on pronghorn in the North Black Hills herd. If the Wyoming Game and Fish Department (WGFD) has data supporting a different estimate, we will consider it in our analyses.

3) RE: Page 73, draft EA -- shrub component and big game winter use. Vegetation sampling in 1993 at the Eagle Butte north pit reclamation area found a sagebrush density of 3.9

sagebrush/square meter. The draft EA states on page 91 that the time required for sagebrush densities to return to pre-mining levels would probably range from 20 to 100 years. These numbers are based on estimates by BLM wildlife biologists and previous comments from WGFD. These statements have been incorporated into the Final EA in the discussion of Environmental Impacts to Wildlife (Section IV. B. 6).

4) RE: Page 82, draft EA -- Topography on reclaimed areas will be gentler than the pre-mining surface and the shrubs will not be as dense or numerous following reclamation. This is stated in the EA. The depiction of the reclaimed areas as straight grassland, little surface relief, reversion to moderate to heavy grazing practices after mining is also speculation. At this time, it is not supported by data from the existing reclaimed areas at Eagle Butte, or from other mines in the basin. The use of reclaimed areas by big game, waterfowl, predators and other faunal groups is indicated by regular observation of these groups in reclaimed areas at Eagle Butte and at other mines.

5) RE: Page 92, draft EA -- percentages of herd unit affected. Please see responses to 2, 4, and 6.

6) RE: Page 92, draft EA -- cumulative effect on big game. As you have indicated in your discussion, pronghorn herd levels are managed, and management decisions are based on social and political desires of the public as well as biology. This is not a natural system in which the pronghorn population is allowed to reach a natural equilibrium based on climatic variations, predator supply, and food supply. As a result, the impacts of ten years development on the herd may not be reflected in the herd population levels. However, given the numbers of antelope in these herds, and the amount of habitat in the Powder River Basin which is not affected by development activities, it is extremely unlikely that either the antelope population or the sagebrush habitat in the Powder River Basin are currently threatened (or will be threatened) with any significant decrease in genetic diversity as a result of the coal mining activity, even when considered with all the other activities in the basin. The BLM is a multiple use land management agency, and as such needs to balance land use, the sustainability of the native ecosystems and the sustainability of economic development.

According to the Council of Environmental Quality, cumulative impact is 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 or person undertakes such other actions. The action being evaluated in this environmental assessment is leasing of approximately 150 million tons of coal under approximately 915 acres. The discussion of cumulative impacts should determine if the incremental impacts of mining of 915 additional acres of coal become more significant when evaluated with other activities (mining and non-mining) in this same area. In the specific case of the Eagle Butte Mine, will mining coal underlying 4,740 surface acres have significantly greater impacts than mining coal underlying 3,825 surface acres when added to other activities in the area. [Or, perhaps more appropriately in Eagle Butte's case, would mining coal underlying 23,332 acres (federally leased coal at the mines north of Gillette including Eagle Butte LBA) have significantly greater impacts than mining coal underlying 22,417 acres (federally leased coal at the mines north of Gillette excluding Eagle Butte LBA), when added to other activities.] In the case of the cumulative

impacts of all the LBAs, would mining coal underlying 113,900 acres (acres of federally leased coal, including all the LBAs) have significantly more impact than mining 102,400 acres (acres of federally leased in 1990, prior to recent leasing) when added to other activities in the Powder River Basin.

The BLM recognizes that there are cumulative impacts associated with leasing at adjacent mines. As a result, each EA considers the cumulative impacts of all the current coal leasing in the Wyoming portion of the Powder River Basin. An analysis of the impacts of all previous, existing and future cultural modifications of the land and the all mining related impacts is beyond the scope of this document. These impacts have been analyzed in past regional environmental analyses which are referenced in the EA. These past regional analyses analyzed levels of mining activity and other activities that are greater than those which have actually occurred. The actual impacts of the mining activity and other activities in the area have not exceeded the impacts that were predicted in these previously prepared regional analyses.

Response to Letter 6, from the Geological Survey of Wyoming, December 2, 1993

Page references refer correspond to comment page references

Pages 26, 28, and 31 (draft EA)

The coal bed nomenclature changes are now discussed in the EA.

Page 28 (draft EA)

This has been corrected.

Page 38 (draft EA), Section 5, Ownership and Use of Land

Paragraph 1: See response to Letter 12, Geological Survey of Wyoming.

Paragraph 2: Eagle Butte maintains three coal monitoring wells at Rawhide Village; one well began monitoring in 1989 (DEQ2001), and two additional wells were added in 1990 (GT2001 and RHV2002). Water levels and gas pressures are monitored in these three wells, and this data is reported in Eagle Butte's annual reports to WDEQ/LQD. During the time period that the wells have been monitored, water levels have dropped almost 20 feet in DEQ2001, while gas pressures have declined by about 30 percent. Water levels have dropped about 10 feet in well GT2001, and gas pressures, which are very small, have stayed relatively constant. Water levels in the third well (RHV2002) have remained relatively constant, while gas pressures have decreased about 30 percent. In a closed system where the gas remained in place, gas pressures would be expected to increase with decreasing water levels, because more gas would be released from the coal as the water level dropped. The absence of an increase in gas pressure in the two wells where water level has dropped is probably due to production of coal bed methane from production wells in this area, or to the venting of the gas at the surface, or both. The monitoring data for these wells is included as an Attachment to these responses.

Paragraph 3: The description of occupied dwellings in the area has been expanded in the

Ownership and Used of Land Section, and a table of water wells that will potentially be impacted by the Eagle Butte Mine has been included in this final EA as Appendix B. The public golf course is no longer in operation.

Page 56 (draft EA), Table 10
This table has been updated.

Response to Letters 7 and 8, from the State Historic Preservation Office, November 17, 1993 and April 14, 1992

Thank you for your continuing cooperation with the BLM in reviewing cultural inventories and commenting on the EAs.

Response to Letter 9, from the Public Service Commission, December 6, 1993

Utility and pipeline facilities will be relocated by the coal lessee except in areas where pre-existing easements and rights-of-way or other legal obligations state otherwise.

Response to Letter 10, from the Office of the Governor, April 18, 1994

Thank you for your review of the preliminary changes made for the final EA for the Eagle Butte coal lease application. We have responded to the comments of the various agencies on the draft EA (see previous comment letters and responses), and made some changes in the final EA as well.

Response to Letter 11, from the Public Service Commission, April 14, 1994

Please see response to Letter 9, above.

Response to Letter 12, from the Geological Survey of Wyoming, April 7, 1994

Surface venting of coalbed methane west of the LBA is not known at this time, and there is no indication on the surface that there are structures in the coal in that area like those at Rawhide Village. There is potential for coal bed methane to be trapped in the coal anywhere in this area, including the area west of the LBA tract, if there are structures in the coal and a good seal on top. There are three wells completed as coal bed methane producers west of the airport in

section 31, T.51 N., R.72 W., and one northwest of the airport in the northwest corner of section 32. Prior to completion of these four wells, the operator drilled 15 test wells in section 31 to identify potential structural highs and gas shows in the coal. This production is part of Rawhide Butte Field.

As indicated in the EA (Section III. B. 1.), the studies that were done in the Rawhide Village area concluded that the mining operations did not cause or aggravate the gas seepage in the Rawhide Village area. Based on those studies, the EA concludes that mining operations on the LBA would not cause or aggravate coal bed methane problems elsewhere.

Soil gas testing would be a useful tool for identifying potential future surface methane gas problems in the area west of the LBA, and in other populated areas around Gillette. There will be a review of Eagle Butte's permit revision application by DEQ, which would provide a forum for further discussion of this topic with the city, the airport, or nearby residents.

Response to Letter 13, from the Wyoming Game and Fish Department April 7, 1994

Please see response to Letter 5, above.

Attachment to Response to Letter 6 from the Geological Survey of Wyoming
Water Levels and Gas Pressures for Coal Monitoring Wells at Rawhide Village

Date	Water Levels			Gas Pressures		
	DEQ2001	GT2001	RHV2002	DEQ2001	GT2001	RHV2002
10/89	4148.13			129.66		
06/90	4134.32					
10/90	4134.02			122.21		5.47
11/90	4133.93	4213.02	4207.33	121.45	0	5.99
12/90	4135.44	4210.84	4203.55	108.17	0	4.7
01/91	4133.64	4211.99	4201.95	86.58	-1.21	5.56
02/91	4133.94	4212.1	4202.36	88.33	-1.11	5.69
03/91	4127.02	4212.12	4202.17	113.99	-1.11	3.17
04/91	4126.71	4212.75	4202.51	114.27	-1.21	4.02
05/91	4125.88	4212.47	4201.87	114.61	-1.11	3.68
06/91	4127.42	4211.24	4203.49	110.36	-0.35	4.99
07/91	4126.83	4211.55	4202.53	112.62	-1.11	4.52
08/91	4128.47	4208.59	4204.12	103.87	-1.02	2.89
09/91	4127.81	4209.05	4202.92	107.66	-1.11	3.35
10/91	4128.82	4209.66	4203.74	104.22	-1.21	4.12
11/91	4128.28	4209.6	4203.32	106.36	-1.21	5.68
12/91	4126.77	4210.45	4205.53	108.12	-1.21	4.81
01/92	4125.48	4207.06	4204.31	98.64	0.36	1.04
02/92	4123.74	4202.02	4206.11	102.29	0.18	2.67
03/92	4124.48	4202.86	4205.56	101.98	-1.11	2.83
04/92	4125.96	4204.61	4204.75	100.62	-1.11	2.39
05/92	4125.16	4204.2	4205.08	101.33	-1.11	2.89
06/92	4125.76	4203.96	4205.48	101.62	-1.11	3.07
07/92	4126.46	4204.77	4206.34	100.92	-1.11	2.79
08/92	4128.73	4201.79	4207.53	92.33	0.05	2.18
09/92	4129.19	4203.15	4208.27	92.51	0.08	2.41
10/92	4130.96	4203.71	4209.82	94.61	0.1	3.02
11/92	4131.52	4204.16	4210.01	93.66	0.09	2.91
12/92	4132.18	4204.35	4210.23	93.07	0.13	3.02
01/93	4131.96	4204.03	4210.88	86.19	0.08	4.07
05/93	4131.51	4203.66	4210.17	87.18	0.12	3.99
09/93	4129.92	4203.45	4208.29	88.52	0.13	3.88
11/93	4129.74	4203.21	4208.21	86.88	0.1	3.91

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POWDER RIVER-BASIN RESOURCE COUNCIL

21 North Scott • Sheridan, WY 82801 • (907) 672-5809

POWDER RIVER BASIN RESOURCE COUNCIL

January 12, 1994

Nancy Doelger
Bureau of Land Management
Casper District Office
1701 East E Street
Casper, WY 82601

RE Comments on Draft EA for Eagle Butte coal lease application

Dear Ms. Doelger

We appreciate the extension of time granted by the BLM until January 14th for submission of our comments on the Draft EA for the Eagle Butte coal lease application. As you know, the Powder River Basin Resource Council is a grassroots organization of Wyoming citizens dedicated to the good stewardship and responsible development of our natural resources. Following are the comments and concerns we have regarding the draft EA

Conformance With Land Use Plan P. 5

The EA states that the buffer zone around the City of Gillette was established in 1979 in which coal leasing is not allowed. In 1987, one exception was made for a coal lease modification for coal that was within the Gillette Buffer Zone. As a result the Buffalo Resource Management Plan was amended to allow limited coal leasing which consisted of emergency leases, exchanges and lease modifications with the buffer zone. In regard to this action we have the following questions: Why isn't an amendment to the Buffalo RMP necessary to process a lease by application like the Eagle Butte LBA? Under what procedure was the RMP change adding LBAs to the types of leasing actions that can be considered in the Gillette Buffer Zone issued by the BLM? How large was the 1987 lease modification as compared with the Eagle Butte lease by application?

Proposed Action and Alternatives P. 14

Why didn't the BLM consider an alternative tract configuration that would enhance competitive bidding between the Eagle Butte Mine and other adjacent mines such as Dry Fork, Rawhide, Fort Union, or Buckskin? Doesn't NEPA require consideration of all possible alternatives? Isn't the BLM mandated to enhance competitive bidding for coal leasing according to the Federal Coal Leasing Amendments Act?

3420 (LBA)
WY 124783
Eagle Butte

Alternative #5 on page 20. Postpone the Lease Sale - The EA states that spot prices for coal are at an all time low and that a rise in spot prices is predicted by some. Given these facts why would the BLM lease coal when prices are at an all time low? The EA also talks about the fact that a delay in leasing would limit a companies ability to negotiate higher priced contracts and rely on spot sales. However, isn't it true that almost none to very few high priced contracts are being signed and most coal is being acquired on spot sales? We would like to see more analysis of Alternative #5 and the advantages of leasing at a later date to obtain a higher bonus bid. How long can the sale be postponed and the tract still mined in a logical sequence? What about the possibility of other tract configurations?

Environmental Impacts & Cumulative Impacts
Water Resources

On page 65, the Draft EA states that a total of 31 water supply wells have been identified as potentially being impacted by the Eagle Butte Mine based on the result of the groundwater modeling. The EA states that eight of the wells are on AMAX land, 11 are permitted for domestic use, 2 are for stock use, 1 is for industrial use and 9 are for miscellaneous. Who specifically uses these wells and will be impacted? Please list them in the Final EA rather than referring to a table in another document in another location.

On page 66, the EA states that water from the spoil aquifer will enter the adjacent unmined aquifer. Since this will degrade water quality in the adjacent aquifer, how many wells will be impacted both locally and cumulatively by the spoil aquifer? Who specifically will be impacted?

On page 102 the EA states that, "... the water from the spoils will generally be acceptable for its current use, which is for livestock, before and after equilibrium is re-established." However, the majority of wells that are projected to be impacted by the Eagle Butte Lease are for domestic use. The EA also states that, the incremental effect on ground water quality due to the Eagle Butte LBA would be to increase the total volume of spoil, and thus the time for equilibrium to re-establish." On p. 64, the EA states, "estimates of the time required for the groundwater system to re-establish equilibrium vary from a few tens of years to hundreds of years." This being the case, even a few months without water makes it impossible to operate. Based on recent data from spoil aquifers it is also true that many of these wells may not be usable for livestock and certainly not for domestic use due to high TDS levels. What mitigation measures is the BLM proposing to minimize and reduce the impacts to those people who depend on these wells?

As you know, NEPA notes that in cases where an environmental assessment is appropriate, certain mitigation measures may be implemented even though the agency deems the impacts to be not significant. The appropriate mitigation measure can be imposed as enforceable permit conditions, or adopted as part of the agency final decision in the same manner mitigation measures are adopted in the formal Record of Decision that is required in EIS cases." Given the very real likelihood of grave impacts to water

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COMMENT LETTERS

resources, and the provisions available under NEPA, PRBRC suggests that BLM adopt a lease stipulation requiring the replacement of domestic and livestock water supplies that are predicted to be impacted. This measure is necessary to ensure the protection and replacement of the water people depend upon. If the BLM chooses not to adopt specific mitigation measures for the impacts to water resources please state why?

Air Quality P 103

The analysis on air quality impacts is completely inadequate especially given the closer proximity of mining to Gillette and the potential impacts to people's health, particularly the young and old. The EA states that, "coal mining activities produce particles which can be released in the air. Most of these particles are created as a result of physical forces such as blasting, crushing and friction between vehicles and road surfaces. **These particles are not considered to be as much of a health hazard as the generally much smaller particles produced by chemical activities such as condensation, absorption and adsorption.**" According to recent studies this may not be true. Is the BLM aware of new studies which indicate that airborne particulate can cause severe health effects which are far worse than previously assumed. Why doesn't the BLM take this information into account?

The EA goes on to state that, "the amount of additional air quality resource that is available for future mining cannot be quantified without rigorous technical evaluation." And, "the amount of air increment utilized by a particular operation is highly dependent upon the type of operation, the types of equipment, and the mining sequence." Given this lack of information how does the BLM know that the air quality impacts of the Eagle Butte Mine would not be significantly different from the past? The EA also states that increased blasting will be probably be required because of thicker overburden in the lease area. If locations of emission sources change or increase the impacts to people would also change. What are these impacts? With the closer proximity to Gillette aren't these critical questions to answer?

The EA states, "The proposed action would not directly affect air quality except to extend the life of the mine incrementally." Doesn't extending the life of the mine, even incrementally, closer to Gillette have a definite impact on air quality and a greater impact on people's health? What studies are you using to back up your statement that although the air quality would decrease it would still meet state and federal standards? What overall impacts on health would this decrease in air quality have? What if state and/or federal standards are changed? Is the BLM aware that discussions are currently taking place regarding the implementation of stricter air particulate standards based on new studies concerning health hazards? Please include some discussion about this possibility and about the studies that show adverse health effects from airborne particulate. Additional new analysis seems to also be in order based on these recent studies.

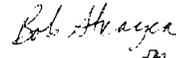
Conclusion

It is still our position that a comprehensive environmental impact study is required

for all the proposed coal leasing and development in this area. The overlapping impacts from adjacent mines combined with additional leasing and proposed mine expansions are not being completely analyzed while they do have significant cumulative impacts. We may be beating a dead horse reiterating this issue, but addressing these leases separately in a scatter-gun approach only impedes a rational analysis of the implications of the action and breeds mistrust of the process.

Thank you for your consideration of these comments

Sincerely,



Bob Strayer
Energy Development Committee

A-21

*nm doelger 1/31/94
M. Loh 1/31/94*

1420(LBA)
WY124783
Eagle Butte

JAN 31 1994

Powder River Basin Resource Council
Attn: Mr. Bob Straver
23 North Scott
Sheridan, WY 82801

Re: Comments on Draft Environmental Assessment (EA) for
Eagle Butte Coal Lease Application

Dear Mr. Straver:

Thank you for your comments on the draft Eagle Butte coal lease application. At this time, we are reviewing comments and revising the draft EA. We need some additional information from you in order to address your comments concerning air quality. In your comment letter on the draft EA dated January 17, 1994, you refer to new studies which indicate that airborne particulates can cause severe health effects. Please send us the references for these studies, so that we may ensure that we review that information before completing the final EA.

Thank you very much for your consideration of this request for additional information. Please send the reference information to: BLM Casper District Office, Attn: Nancy Doelger, 1701 East "E" Street, Casper, Wyoming 82601, or phone (307) 261-7600.

Sincerely,
S/DON L. HINKICHSLE

District Manager

cc: Gene Jonart WSO (925)

NDoelger:smo:1/30/94 PRBRCLET.NED.ND



POWDER RIVER BASIN RESOURCE COUNCIL

23 North Scott • Sheridan, WY 82801 • (307) 672-5800
P.O. Box 1178 • Douglas, WY 82633 • (307) 358-5002

94 FEB -9 AM 10:36

February 8, 1994

Nancy Doelger
BLM Casper District Office
1701 East "E" Street
Casper, WY 82601

RE: Comments on Draft Environmental Assessment (EA) for Eagle Butte Coal Lease Application

Dear Nancy,

Per a request from the District Manager, enclosed please find copies of studies concerning the health effects of airborne particulates. I have also enclosed another document which cites several other studies. I did not make extra copies of these studies so please xerox them for your files and return them to us. In the future, we hope the BLM makes a concerted effort to locate this type of important information in advance so that it can be considered and included in the Draft EA.

Call me if you have questions.

Sincerely,

Jill Morrison
Jill Morrison
PRBRC Staff

*Material returned as requested, 2/9/94
Thank you for your response to our request*

Nancy Doelger



COMMENT LETTERS

Response to Letter 14, from the Powder River Basin Resource Council

Headings in this response correspond to section headings in the comment letter.

Conformance with Land Use Plan

It is not necessary to amend the Buffalo RMP to add leasing by application to the types of leasing actions that can be considered within the Gillette Buffer Zone because the 1987 amendment allows leasing within the Gillette Buffer Zone under the leasing by application regulations. The objectives, and the application, evaluation and sale processes are the same for emergency coal leasing and leasing by application because the regulations are the same (Leasing on Application, 43 CFR 3425). The procedure used to add leasing by application to the types of leasing actions that can be considered within the Gillette Buffer is called plan maintenance, which can be used to further refine or document a previously approved decision incorporated in a plan (43 CFR 1610.5-4).

Lease modifications are limited to a maximum of 160 acres per lease. In 1987, Wyodak added a total of 360 acres to three leases within the Gillette Buffer Zone with three lease modifications. Prior to being modified in 1987, the three Wyodak leases contained 2,580.00 acres; after the 1987 lease modifications, these three leases contained 2,940.00 acres. This is an increase of 14 percent in the size of Wyodak's three modified federal leases.

In comparison, Eagle Butte has two existing federal coal leases, containing a total of approximately 3825 acres. The LBA contains approximately 914 acres (1059 acres under Alternative 2). This represents an increase of 24 percent (28 percent under Alternative 2) in the size of Eagle Buttes federal coal lease holdings.

Proposed Action and Alternatives

Paragraph 1:

As discussed in the EA (Alternative 1, page 17 and Alternative 4, page 20), the Eagle Butte tract is bounded on the north and east by the existing Eagle Butte lease, on the west by Highway 59 and the airport, and on the south by the Gillette Buffer zone. Because these barriers exist on all sides of the tract, BLM was not able to identify a reasonable alternative lease configuration for this particular tract that would make it accessible to any of the other mines adjacent to the Eagle Butte Mine. NEPA requires that all reasonable alternatives be considered.

The BLM is mandated to maximize economic recovery and avoid bypassing minable coal, as well as enhance competitive bidding. The Eagle Butte LBA is a potential coal bypass situation if it is not mined in conjunction with the existing mining operation at Eagle Butte. Furthermore, the environmental impacts of mining this particular tract of coal are reduced if it is mined in a logical sequence by an existing adjacent mining operation since recovery by any other operator in this area would entail more construction, a longer coal hauling distance, or both.

Paragraph 2:

As stated in the discussion under Alternative 5 in the EA (EA, page 21), the primary source of federal and state income from federal coal leases is the royalty which is paid on the coal when it is sold. When prices go up or down, it is reflected in the royalty revenue at that time. In fact, prices have recently gone up for spot coal in the basin as a result of unexpected shortages, according to a report in the Casper Star Tribune ("Coal Sees Upturn", by Michael Riley, March 14, 1994). Although spot sales represent an increasing proportion of the coal sales in the basin, having coal under lease does allow the companies to negotiate more favorable contracts when situations change unexpectedly, as they have in the early months of 1994.

Given the uncertainties in coal prices and demand, and the complexities of the leasing and permitting process, it is difficult to be specific as to an absolute date that the coal would have to be leased by. The sale could presumably be postponed for several years and still be mined in logical sequence by Eagle Butte. Please see response under paragraph 1, above regarding tract configuration.

Environmental Impacts & Cumulative Impacts

Water Resources

Paragraph 1:

A copy of the table listing potentially impacted water supply wells from the Eagle Butte mining permit is included in the final EA as Appendix B. Please note that the well names are listed as they are recorded at the State Engineer's Office, and that these names do not necessarily reflect current well ownership.

Paragraph 2:

The 31 wells potentially impacted by mining activities could also potentially be impacted by water from the spoil aquifer following reclamation. In reality, all 31 of these wells will probably not be affected by significant changes in water quality as a result of interactions between the spoil aquifer and the unmined aquifer.

Paragraph 3:

The 31 wells discussed in the EA and listed in Appendix x were identified by the Wyoming Department of Environmental Quality (WDEQ) as potentially impacted based on groundwater impact analyses, which take into account the potential cumulative effects as a result of contiguous mines. As stated in the EA (Section IV. C. Mitigation Measures), the Surface Mining Control and Reclamation Act (SMCRA) and Wyoming law require that these wells be mitigated by replacement with water from an alternate source of equivalent quality and quantity if they are interrupted by mining.

The groundwater impact analyses are conducted by Eagle Butte as part of the permitting process.

WDEQ uses information from monitoring wells to determine the extent of groundwater impacts on a yearly basis and to evaluate the accuracy of the impact analyses.

Paragraph 4:

As indicated above, the replacement of wells impacted by mining is specifically addressed in SMCRA, which is administered by the Office of Surface Mining Reclamation and Enforcement, and, in Wyoming, by WDEQ; and by Wyoming law, administered by the State Engineer's Office in the case of water rights. Therefore, the appropriate mitigation measures are already in place.

Air Quality

(Note: The BLM requested and received information from the Wyoming Department of Environmental Quality, Air Quality Division on all comments that were received relating to the potential air quality impacts of the Eagle Butte LBA.)

Paragraph 1:

The information on the referenced recent studies has been reviewed, and the statement in the EA has been modified accordingly.

Paragraph 2:

The statement that the air quality impacts would not be significantly different from the present is based on historical ambient air quality data collected at the mine and in the Powder River Basin, and a comparison of the LBA tract with the existing Eagle Butte lease. The type of operation and types of equipment will be similar to the current operation on the existing mine. The overburden is thicker on the remainder of the current lease as well as on the LBA tract, so that an increase in blasting will occur with or without the LBA. The existing lease extends as far into the Gillette Buffer Zone as the LBA does so mining the LBA will not bring mining any closer to Gillette than mining the existing Eagle Butte lease. Based on these similarities between the existing lease and the LBA tract, the EA concludes that the air quality impacts of mining the LBA will not be significantly different from the air quality impacts of mining the existing lease. Mining the LBA tract will, as stated in the EA, extend the duration of the air quality impacts.

Paragraph 3:

As stated above, the mining activities at the Eagle Butte Mine will be as close to Gillette with the existing leases as they will be with the LBA. The statement that air quality will still meet state and federal standards is based on regulatory requirements. Compliance with health-based standards in all areas exterior to mine properties is a requirement of the mine's air quality permit. An amendment to the current air quality permit will be required before operations can be expanded into the proposed lease area. An in-depth analysis and compliance with existing federal and state air quality standards at that time will be required. If the standards change, then

compliance with those standards will be required. Areas where increased impacts to nearby residents may be possible will require verification of compliance with ambient standards through additional monitoring required as part of the mine permitting process.

15

LASER

Legal and Safety Employer Research
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3420(LBA)
wyw 124783
Eagle Butte

RECEIVED
JAN 12 1994

11:20

Ms. Kate Dupont
Casper, WY
1/11/94

Dear Ms. Dupont:

I am the director of LASER, which reviews large industrial projects in the West. Thank you very much for sending a copy of the EA on the Eagle Buttes mine lease to my consultant John Williams, and for extending the comment period.

Here is a hard copy of the comments on the Eagle Buttes EA, that I faxed to you on January 8. Please continue to send future correspondence to:

John Williams
12770 SW Foothill Dr.
Portland, OR. 97225
503-626-5736 (fax) 503-641-2093

Yours,

Jim Wilson

A-26

PAGE 1

COMMENTS ON THE AMAX EAGLE BUTTE COAL MINE EXPANSION

This project involves the leasing of 215 acres of BLM land to AMAX Eagle Butte, for the mining and processing of 150 million tons of coal. The lease would trigger the disturbance of an additional 1210 acres by mining related activities. (EA, p. 17)

SUMMARY OF CONCERNS

The proposed lease would allow the operation of the Eagle Butte mine at its existing or an expanded level of operation. Since the current operation of this facility already has a significant adverse impact, the proposal would allow the continuation of a significant adverse impact. The project would also create additional adverse impacts due to its closeness to populated areas. A environmental impact statement (EIS) should be prepared.

AIR POLLUTION IMPACTS

The mining operations which is done by truck/shovel methods. (p 24) will produce air pollution from many sources. These include blasting, drilling, truck loading, unloading and hauling. Many of these polluting activities will be moved closer to Gillette as a result of this lease. Larger populations of people and sensitive receptors such as schools and hospitals may be exposed to this increased air pollution.

EA FAILED TO IDENTIFY POSSIBLE SENSITIVE AIR POLLUTION RECEPTORS

These receptors and population which may experience increased pollution, and those groups, such as the very young and elderly that are particularly sensitive, were not identified and quantified. Predicted air pollution impacts and isopleths of pollution concentrations were not diagrammed and possible effects were not described in the EA. (p 53)

Prevailing winds may frequently carry the mine's air pollution towards populated areas, presenting a possible problem. (p. 77) Nearby Class I areas are also not identified in the EA.

PARTICULATE INFORMATION NOT COMPLETE

The EA at Table 8 provides average Total Suspended Particulate (TSP) concentrations for the local area. These numbers are averages of concentrations taken from thousands of samples. But this table does not provide an indication of the highest concentrations sampled, and where samplings of high concentrations of TSP were obtained.

Lacking these results, and the sites of the highest readings, it is possible that while the overall average concentrations of particulates remained fairly constant over the last several years, "hot spots," or limited areas for intermittent periods may have suffered higher concentrations than the averages presented in Table 8.

COMMENT LETTERS

TSP AND GASEOUS EMISSIONS FROM HAUL ROAD BUILDING AND MINING

The haul road construction and mining operation will also cause discharges to the air from dust and equipment engines. Pollutants will include total suspended particulate (TSP), PM10 (particulate matter smaller than 10 micrometers), oxides of nitrogen (NOx), carbon monoxide (CO), hydrocarbons (HC), sulfur dioxide (SOx), and several air toxics from windblown erosion and vehicle generated road dust, blasting, vehicle and equipment engines and generators, drilling equipment, and gravel crushing for road building.

The construction and improvement of roads may require operation of heavy equipment and power tools, including bulldozers, backhoes, graders, chainsaws, and cranes. This equipment will generate additional air pollutants. Surfacing the new and improved roads may necessitate rock crushing operations, which will generate TSP from the crushing, and other air pollution from the equipment engines.

But the EA does not discuss in detail or list the types and quantities of the engines and compressors that power the roadbuilding and mining equipment, the total hours of operation for these engines, and the resulting pollution tonnage and concentrations of TSP, PM10, HC, NOx, CO, SOx, and toxics from those diesel and gasoline fumes.

The EA could have calculated these emissions from these sources with criteria developed by the Federal Environmental Protection Agency's "AP-42" methods. This omission from the EA means that this significant adverse air quality impact, and potential mitigation measures, was not discussed adequately.

MINING TSP EMISSIONS

The operation of the mine production facilities and related ore retrieval operations will emit TSP and PM10 from the non-point sources of traffic on unpaved roads, erosion from disturbed areas, and dust from drilling and explosives. These dust sources could generate potentially thousands of Tons Per Year (TPY) of particulate and PM10 from the Eagle Butte mine.¹

Point sources of TSP and PM10 include silos, crushers, screening, truck loading and unloading, generators during construction and operation, and any conveyors and elevators.

PM AND GASEOUS EMISSIONS FROM INCREASED BLASTING

The EA says that the mine may have to increase its blasting over its current levels, because overburden will be thicker in the newly leased areas. This will be a significant adverse impact. As previously mentioned, this blasting will be taking place closer than before, to large populations and sensitive receptors.

In addition, blasting can produce large amounts of air emissions, depending on the size and frequency of blasts and the type of explosives used. This type of information was not supplied in the EA.

For instance, twice-daily blasts at one mine in the Western United States for 313 days per year, was estimated to produce annual emissions of over 64 tons per year of PM 10, 117 TPY of carbon monoxide, and 30 TPY of NOx.²

This demonstrates that increased blasting in the lease area, which is moved closer to the City of Gillette than current blasting from this mine, could create a significant air quality impact.

MINE VEHICLE EMISSIONS

There will be mining activity such as truck loading and hauling in the lease area. These actions also create large amounts of air pollution. One mining operation with one 700 hp bulldozer, a 13-yard loader, and 11 85-ton trucks was estimated to produce the following daily air emissions from vehicle exhausts: 600 lb of CO, 80 lb of HC, 1400 lb. of NOx, 150 lb of SOx, and 90 lb of PM10.³ These totals do not include commercial and worker commuter traffic to the mine.

HAUL ROAD DUST

The EA did not describe the length of haul roads. This is a significant omission because dust from mine truck haul roads can produce significant amounts of particulate emissions.

At one mine with a 5000' haul road, it was estimated that about 3400 lb/day of TSP emissions were produced by the truck traffic, even with 80% effective dust controls. Loading and unloading of the haul trucks produced another 170 lb/day of TSP emissions.⁴

If air pollution in these amounts are emitted from the new lease area, there could be significant adverse air impacts on the Gillette area.

LARGE PERCENTAGES OF VERY FINE PARTICULATE PRODUCED FROM DRILLING

One important factor in determining the health effect of PM is the size of the dust; whether it is highly respirable. PM that is less than 10 microns in diameter is considered particularly dangerous. A recent study found that dust produced by rock drilling produced dust samples with a mean diameter of less than 1 micron in diameter. This means that mine dust produced by drilling will be highly respirable and present an increased health risk for those exposed to it. Amounts of drilling dusts produced should be estimated.⁵

CRYSTALLINE SILICA AIR CONTAMINANT HAZARD (QUARTZ DUST)

Silica (quartz) dust is a possible pollutant from coal mining dust. This substance has been detected at levels of concern at other coal mines. The lease area may contain quartz. This substance is recently classified as a probable carcinogen by United Nations health study groups.

The amounts of respirable silica to be emitted should be closely studied. Amounts of silica in the ore to be processed, and in addition the amount and percentages of surface-available quartz should be determined.⁶

If the dust at the proposed Eagle Butte coal mine site will contain high percentages of silica dust, then there will be an increased incidence of lung injury among the mine workers. This will cause an adverse, unmitigated impact on worker health, on the human environment, and on local health services. But this health risk was not evaluated in the EA.

Second, if the large amounts of particulate to be emitted from the Eagle Butte gold mine will contain a high percentage of silica dust, this will create measurable concentrations of silica in the air offsite from the mine. But the EA did not model either the cumulative particulate concentrations, or the crystalline silica concentrations, that will drift offsite.

The problem of silica concentrations in mine particulate emissions is a well known significant adverse impact that should have been discussed in the EA. The lack of this discussion renders the EA inadequate. An EIS should be prepared.⁷

The mine's various air emissions are a significant impact. The project's air contaminants adversely affect the public health, are highly controversial, and in the case of air toxics, are highly uncertain and involve unique and unknown risks.

MOBILITY OF TOXIC METALS FROM MINING SITE

Airborne dust from the proposed lease site may contain toxic and hazardous materials, including metals, arsenic, selenium, and silica. Recent studies of the trace metal/substance toxic content of Powder River Basin coal show measureable concentrations of lead, barium, beryllium, chromium, copper, manganese, nickel, strontium, vanadium, zinc, boron, cobalt, molybdenum, thorium, uranium, arsenic, selenium, mercury, fluorine, cadmium, chlorine, and other elements and volatiles. Many of these substances could be emitted as a parts per million (ppm) fraction of the large TSP and gaseous emissions from this mine.⁸

For instance, if there is a total of 1000 tons per year of TSP emissions from this mining operation, and the TSP emissions are 6 ppm beryllium, this would result in emissions of 1.2 lb of

beryllium. This size of beryllium emission would exceed the PSD significant threshold for review of modified major sources.

The presence of these elements and substances in the TSP emissions from the lease site may have significant environmental consequences. As one EPA study pointed out:

"Toxic metals can also be carried away from mining sites by high winds as particulates or contaminated dust ... (T)he wind may carry small particles of dust and toxic metals to populations living downwind ... The result is human exposure to toxic metals via inhalation, or the breathing of contaminated air. For certain metals, such as cadmium, this route of exposure can be particularly dangerous."

"(T)he carcinogenic potency of arsenic is estimated by some to be approximately one order of magnitude greater when the metal is inhaled than when it is ingested. Dust ... inhaled by individuals living nearby (mines) is therefore of paramount concern."

"Chronic inhalation of cadmium is known to cause an emphysema-like condition. Inhalation of cadmium dust is known to cause increased occurrence of prostate cancer in workers. Inhalation exposures are therefore an important concern at mining sites."

*Nickel ... is known to be carcinogenic when inhaled."

The EA fails to evaluate the possible impacts from emissions of mineralized and toxic materials which would be entrained in the TSP emissions from the mining on the proposed lease.

RECENT STUDIES SHOW ADVERSE HEALTH EFFECTS AT LOW LEVELS OF PARTICULATE

The reason we are dwelling on particulate emissions is because of recently published studies demonstrating that PM-10 and TSP are far more harmful than previously considered. In one study of the Seattle area, days of high particulate concentrations in the air were correlated with increased hospital visits for asthma. In another series of similar studies, days of high particulate concentrations were correlated with days of high death rates in Santa Clara, California, Steubenville, Ohio, Birmingham, Alabama, and Philadelphia, Pennsylvania, among seven separate studies on this topic. Particulates have been recently, convincingly implicated in harm to pulmonary function.

Some important conclusions from these studies is that harmful health effects occur even when particulate concentrations are far below the legal limits. Harmful health effects are apparently caused by very minor increases in particulate concentrations.

It appears from these studies that any increase in PM-10 and TSP levels may cause an adverse impact for certain health conditions. This is a significant impact that should have been discussed in the DEIS.¹⁰

EMISSIONS INVENTORY

The existing mine operation, which will continue as a result of this lease, may have several point sources of lead, mercury, selenium, arsenic, crystalline silica, metals, CO, NOx, ammonia and other toxics, acid, HC, PM and SOx. These potential sources may include crushers, conveyors, silos, elevators, natural gas, oil or coal-fired heaters and boilers, driers, loading and unloading operations, and storage of materials including but not limited to solvents, carbon, acids, diesel, and gasoline.

But the project's expected emissions in parts per million, lb/hr, and ton/yr, from both point and non-point sources, and the average and maximum concentrations of these pollutants at different distances from the project was not provided.

An EIS should be prepared that would include but not be limited to listing of projected concentrations of air pollutants near the mine site, at populated areas, and at the nearest Class I air shed. The EIS should also contain an emissions and air pollution source inventory for the nearby mines and other air pollution sources, including but not limited to mineral exploration projects. Criteria, non-criteria and toxic pollutants should be listed.

BACT/LAER SHOULD HAVE BEEN DISCUSSED

Air pollution controls for the proposed expansion were described in the EA only in passing. There was no discussion in the EA of the Best Available Control Technology (BACT) and Lowest Achievable Emission Rate (LAER) for the potential point and non-point air pollution sources of the proposed lease area.

An EIS should be prepared to discuss potential air emission controls and alternative control methods, including but not be limited to road watering or paving, drilling and explosive dust controls, enclosure of crushing processes, and alternative low pollution vehicle and engine fuels such as methanol and propane.

Air permits for similar facilities, and the Eagle Butte air permit application, should have been appended to the EA, to provide an overview of emissions and controls that could be expected.

PREVENTION OF SIGNIFICANT DETERIORATION (PSD) REVIEW

The EA did not contain sufficient information to determine if the project will emit more than the PSD threshold for modified major sources, of any single air pollutant from its point sources. If the Eagle Butte project exceeds this threshold then

it is required to undergo a PSD review by the Wyoming DEQ.

SUGGESTED PROJECT ALTERNATIVES THAT PROVIDE MITIGATION OF AIR QUALITY IMPACTS

Alternative low-pollution fuels for vehicle and equipment engines, the alternative of using enclosed conveyors, rather than haul trucks to move the coal, and road dust control measures should have been described in detail.

Surfacing of all roads on the project grounds, and of several public and private unpaved roads and driveways within Campbell County, would also mitigate the project's air impacts during both mine road construction, and also during the mine production phase.

Many industrial engineering sources recommend road paving as a practical dust control measure, despite its expense. For instance, one study prepared for the Federal Environmental Agency states:

"At active sites ... bulldozers and dump trucks creates most fugitive dust emissions while loading and unloading and transporting the material over roads. Fugitive emissions from mining haul roads ... are most effectively controlled by paving these roads."¹¹

The EPA's own publications state that: "Common (dust) control techniques for unpaved roads are paving."¹²

The need for road paving is recommended in this instance because of the possibility of crystalline silica and other toxic materials in dust from the proposed Eagle Butte site.

The cost and benefits of paving are worth a comprehensive analysis. An EIS should be prepared with a detailed discussion of road paving and alternative, less expensive measures of road dust control, and their relative dust control efficiencies. But if the project does not contain paved roads, or equivalent dust controls, then road dust and the entrained crystalline silica and other toxic emissions, during construction and the mine life, are a potentially significant adverse effect.

SOLVENTS

Mines frequently use solvents and de-greasers for cleaning of equipment. These chemicals will be stored on site and will also evaporate in use and in storage, adding to HC emissions. The types of solvents should be listed and their use and storage and effects described. Effects of spills and releases should be described.

TOXIC AIR POLLUTANTS FROM DIESEL

Since nickel is emitted in diesel (and gasoline and fuel oil) exhaust from mine equipment and vehicles, the amount of emissions from

the mine and associated operations, including nickel and other toxics such as chromium, aldehydes, benzene, benzopyrene, and polyaromatic hydrocarbons (PAH) should be estimated from diesel use and other sources.

According to one recent study, floating dusts in ore mines have large surface areas. At mines using diesel vehicles, this dust accumulates high percentages of highly toxic carbon black (1.1-35%). In addition, 3,4-benzopyrene was found in some samples, and other PAHs have been found on mine dust with concentrations 10-15 times higher than those of 3,4 benzopyrene. 17

GROUND WATER QUALITY

The aquifers will be drawn down for one mile to the south for an extended period; several years. This is a significant adverse impact that is unmitigated.

RUNOFF

There are 13 inches of rain per year. Since the disturbed area will be twelve hundred acres, there will be over 1200 acre-feet, or about 400 million gallons of rain water, discharged or infiltrated from or into this disturbed area.

This is a significant impact, because of the increased turbidity and sedimentation caused by this large rainfall on an area disturbed by mining. The EA does not contain clear mitigations for this significant adverse impact.

SURFACE WATER QUALITY

Little Rawhide Creek and its ephemeral tributaries are within the lease area. There are alluvial valley floors within the LBA. (p. 34, 40) The EA did not have a map of this feature. At page 67, the EA referred to water discharges from areas disturbed by mining, to these drainages of the Rawhide Creek system, but these drainages may be waters of the United States. Discharges should not be allowed to this system until the mine owner obtained an NPDES permit.

WILDLIFE HABITAT

Some avian, pronghorn, grouse, deer and sagebrush habitat will be lost. Also, as mentioned above, existing water drainage systems will be filled. It is possible that many animals are dependant on the current configuration of water drainage systems. These losses of habitat should be mitigated. (p. 90. P 40-42, p. 74)

HAZARDOUS WASTE

Treatment, storage, and disposal of hazardous, toxic and solid waste was not described in the EA.

MINING NEAR AIRPORT

This site will be within the Gillette city buffer zone and close to the Campbell County regional airport. However, the Federal Aviation Administration was not on the BLM public notice list for this project.

ENDNOTES

1. For instance, non-point particulate emissions from the Amax Hayden Hill project, a gold mine covering 2922 acres, will emit 1315 tons per year of PM10. (United States Environmental Protection Agency, Region IX, Notice of Violation No. 9-92-30; In the Matter of Lassen Gold Mining, Inc.)
 2. Assumptions for this calculation are 2500 sq. ft. area per blast, 15 ft. depth, 2% moisture in rock. Engineering Evaluation of Hayden Hill Gold mine, by Lassen County (CA) Air Pollution Control District, November, 1991. These calculations, and assumption for the following estimates of TSP emissions from the Eagle Butte mine, are derived from estimates for the Hayden Hill facility, which is a hard road mine. Therefore certain assumptions used for Hayden Hill's emissions may not be identical to those that should be used for Eagle Butte emissions
 3. Hayden Hill Engineering Evaluation, cited in endnote 3 above.
 4. Hayden Hill mine Engineering Evaluation, cited above.
 5. See "Size Distribution of Airborne Dust Produced by the Drilling Process." Gueyagueler, Tefvik. Mining Science and Technology. 3 Dec 1991. p. 389-394.
 6. See "Estimating the Quartz-related Fibrogenic Potential of Respirable Coal Mine Dusts." Grayson, Larry, Harison, Joel, Wallace, William, Simonyi, Thomas. New Technologies in Mine Health and Safety. p. 165-173. 1992.
 7. Study of Adverse Effects of Solid Wastes From All Mining Activities on the Environment, PEDCO Environmental, Inc. (Prepared for the US EPA. 1979). Page 159.
 8. Wyodak Coal analysis, submitted to Wyoming DEQ as part of application for Neil Simpson #2 power plant, Attachment 1-1. 1992.
 9. United States Environmental Protection Agency. Mining Wastes in the West: Risks and Remedies. August, 1987. p. 4-6
 10. Particulate Air Pollution and Hospital Emergency Room Visits for Asthma in Seattle. American Review of Respiratory Disease. Schwartz, Slater, Larson, Pierson, and Koenig. V. 147, pp 826-831, 1993.
- Air Pollution and Daily Mortality in Birmingham, Alabama. American Journal of Epidemiology. Joel Schwartz. Vol. 137, No.

10. 1993. See particularly figure 6, page 1145 for an illustration of how any increase in PM10 correlates to increased deaths.

Air Pollution and Daily Mortality in Steubenville, Ohio. American Journal of Epidemiology. Joel Schwartz and Douglas Dockery. Vol. 135, No. 1. 1992.

Increased Mortality in Philadelphia Associated with Daily Air Pollution Concentrations. American Review of Respiratory Disease. Schwartz & Dockery. 145:600-604. 1992.

Pulmonary Function and Ambient Particulate Matter. Archives of Environmental Health. Chestnut, Schwartz, Savitz, and Burchfiel. May/June 1991 (Vol. 46 (No.3) p 135-144.

Particulate Air Pollution and Daily Mortality: A Synthesis. Schwartz. Public Health Review 1991/92: 19:39-60/

11. Study of Adverse Effects of Solid Wastes From All Mining Activities on the Environment, PEDCO Environmental, Inc. (Prepared for the US EPA. 1979). Page 143 and 159. Corbitt, Robert A. Standard Handbook of Environmental Engineering. McGraw-Hill, New York. 1990. P. 4.81-.85 for paving alternatives.

12. EPA AP-42 Factors, page 11.21-5. 1988.

13. Studies of the Organic and Non-organic Components of Diesel Engine Exhausts absorbed on the ore-mine aerosol Particles. Chebotarev, A. G. Goryachev, N. S. Belan, G. B. Gigiena Truda i Professorinal 'nye Zabolevaniya. 8 August 1991. p. 8-10.

Response to Letter 15, from LASER (Legal and Safety Employer Research)

The BLM requested and received information from the Wyoming Department of Environmental Quality, Air Quality Division (WDEQ/AQD) on comments that were received relating to the potential air quality impacts of the Eagle Butte LBA. WDEQ/AQD is the agency responsible for implementing air quality regulations in the State of Wyoming.

Paragraph heading in this response correspond to paragraph heading in the comment letter

Summary of Concerns

The proposed lease would allow the operation of the Eagle Butte Mine at its existing level of operation, the impacts of which have been evaluated in several site-specific and regional environmental analyses (See list of pertinent environmental analyses in the EA in Section III.A., General Setting). The purpose of this environmental assessment is to determine if the mining of the Eagle Butte LBA tract would have significantly greater impacts than the existing mining operations at Eagle Butte.

The level of analysis that you describe in some of your comments goes beyond the scope of what is analyzed during the leasing stage. These types of issues are considered in detail during the mining permit approval process after the coal is leased, but prior to mining. At that point, a mine plan containing the level of detail necessary for these types of analyses has been prepared and can be evaluated. For the purposes of leasing, the BLM must determine if there will be significantly greater impacts as a result of issuing this lease as compared with the current operation. If a mine is currently in compliance with the requirements of its existing air quality permit and the requirements of its existing mining permit, if the proposed lease tract is substantially similar to existing leases, and if the mine does not plan to alter its rate or method of production, then it is reasonable to assume that the mine can remain in compliance with all of its permit requirements in the course of mining the additional coal, and that the impacts of mining that additional coal will not be significantly different than the impacts of mining the existing leased coal other than to extend their duration. If a mine cannot stay in compliance with the requirements of federal and state regulations as specified in its permits, then it cannot stay in operation.

Air Pollution Impacts

The potential air pollution sources listed in the comment letter are discussed in the EA. The LBA does not extend any closer to Gillette than the existing lease, so mining in the proposed tract does not represent an incremental increase in impacts but a continuation of impacts of mining the existing lease.

The extension of mining into the proposed LBA tract will require an amendment to the current air quality permit which will require an in-depth analysis of all air quality impacts and compliance with federal and state ambient air quality standards. Areas where an increase in

impacts to nearby residents may be possible will require verification of compliance with ambient standards through additional monitoring.

EA Failed to Identify Possible Sensitive Air Pollution Receptors

According to WDEQ/AQD: It is not necessary to identify sensitive air quality receptors among the population which may be impacted if compliance with air quality standards, which were developed to protect the health of all the public, is maintained.

According to WDEQ/AQD: It is not necessary to identify nearby Class I areas for this analysis because this is not a PSD permitting process. The nearest PSD Class I areas are the Rosebud Indian Reservation in Montana and Wind Cave National Park in South Dakota, which are not expected to receive any incremental impact as a result of this action due to the distances involved.

Particulate Information Not Complete

The WDEQ/AQD has tracked compliance with the revised particulate standard based on PM10 since 1987 and has concluded that the PM10 standard of 150 micrograms per cubic meter on a 24 hour average has not been exceeded anywhere in the basin.

TSP and Gaseous Emissions from Haul Road Building and Mining

The discharges associated with haul road construction and mining operation in the LBA will be similar to the impacts associated with these activities on the current mine site, and these activities have been evaluated in the current air quality permit. Prior to mining in the LBA area, Eagle Butte must obtain an amendment to the existing air quality permit, for which an application must be submitted. The application for the existing air quality permit does include, and the application to amend it must also include a listing of all equipment and associated emissions to determine compliance with all air quality standards and regulations.

Mining TSP Emissions

These types of activities are ongoing with the current Eagle Butte Mine operations, and the impacts have been analyzed and evaluated in the existing Eagle Butte Mine air quality permit. An amendment to this permit will be required prior to mining the proposed LBA tract and compliance with federal and state ambient air quality standards will be required.

*PM and Gaseous Emissions from Increased Blasting,
Mine Vehicle Emissions, and
Haul Road Dust*

The overburden is thicker on the remaining portion of the existing lease as well as the LBA, so that any resulting increase in blasting will occur with or without the LBA. The proposed lease does not extend any closer to Gillette than the existing lease, so mining operations will occur closer to Gillette with or without the LBA.

Truck loading and hauling are ongoing in the existing mining operations at Eagle Butte, and have been evaluated in the existing air quality permit. As stated in the EA, no changes in size and numbers of machinery are being proposed at this time. As also stated in the EA, the haul distance from the LBA tract to the coal preparation plant would approximate the currently proposed haul distance from the southeastern portion of the existing lease to the plant, so there would not be a significant increase in haul road dust from current permitted levels when the LBA is mined.

As stated above (2,6), compliance with federal and state ambient air quality standards will be required when the LBA is mined, as it is for the existing operation.

Regarding the references to estimated impacts of blasting, truck loading and hauling, and haul road length at one mine in the western United States (Hayden Hill Gold Mine, California): while tailpipe emissions would not be expected to differ by any significant degree, blasting and haul road emissions may differ, depending on soil types and mitigation of potential emissions.

Large Percentages of Very Fine Particulate Produced from Drilling

According to WDEQ/AQD: Emission from the drilling of overburden and coal seams are not expected to be significant if appropriate control equipment such as fabric filter baghouses are utilized as required in all mining air quality permits.

Crystalline Silica air Contaminant Hazard (Quartz Dust)

Silica or quartz is a common component of soils and in some zones within the overburden, which are removed from the top of the coal before it is mined. The coal itself is primarily carbon, and contains very little silica dust. The coal "ore" undergoes very little in the way of processing other than crushing, and the mines are equipped with baghouses and other means of limiting coal dust at the crushing facilities.

According to WDEQ/AQD: Silica is part of the particulate matter for which ambient health standards are set to protect public health. Therefore, compliance with ambient particulate standards should be sufficient to protect the public's health with regard to silica. The safety and health of mine workers is protected by the Mine Safety and Health Administration, which conducts regular inspections of the mine operations in the Powder River Basin.

Mobility of Toxic Metals from Mining Site

Airborne dust from mining activities will most likely contain trace elements of metals in the same proportion as all the soils in and around Gillette, and therefore, the WDEQ/AQD does not believe there is any threat to public health due to these emissions.

According to WDEQ/AQD: Using concentrations from typical Powder River Basin coal, a composite of all metals would result in 12.5 lbs of emissions per hundred tons of coal emissions. Trace element concentrations in coal dust may be greater than in the other soils at the mine, but assuming all dust emissions from the mine contain trace metals in the same concentration as the coal would result in a total of 125 pounds of metal emissions for 1000 tons of TSP emissions. This equates to a concentration of around 60 parts per million total for all trace metals in TSP. The resulting concentration of metals would be around 0.002 micrograms annual average for Gillette based on the current level of TSP in Gillette of around 30 micrograms per cubic meter annual average. This is not significant.

Recent Studies Show Adverse Health Effects at Low Levels of Particulate

Recent studies have shown adverse health effects at levels of particulate matter which are lower than current federal and state standards. Several of these studies are now referenced in the EA, and the potential impacts are discussed. EPA has not completed research on this matter or determined what appropriate standards might be. If the standards change, then compliance with those standards will be required. In the meantime, the mines are required to comply with current standards. (Please see response to Letter 14, from the Powder River Basin Resource Council.)

Emissions Inventory

The WDEQ/AQD is not aware that there are any point sources at the Eagle Butte Mine which emit significant amounts of the toxic air pollutants listed in the comment letter.

BACT/LAER Should Have Been Discussed

According to WDEQ/AQD: The current mine is required by permit to utilize BACT and any expansion of the mine into new leases will require the same.

Prevention of Significant Deterioration (PSD) Review

The current mining operation is not a "major emitting" facility under PSD by definition, and therefore no analysis under PSD permit requirements is required.

Suggested Project Alternatives that Provide Mitigation of Air Quality Impacts

Mitigation of air quality impacts is addressed in the current air quality permit for the Eagle Butte Mine, and will be addressed in an amendment to that plan that will be required prior to mining the LBA tract.

The paving of haul roads is not a viable option due to the massive loads such a surface would experience.

Solvents

The use and storage of solvents at the mine is not expected to have any significant impact on air quality. Also, as indicated in the EA, the Eagle Butte Mine has taken waste minimization steps such as production substitution, technological changes and recycling to reduce the generation of hazardous waste, such as solvents.

Toxic Air Pollutants from Diesel

The combustion of all fuels gives rise to some toxic emissions. The amounts and types of such emissions as a result of mining the LBA are not expected to be significantly different from the existing mining operations. An analysis of such emissions will be performed in the permitting process to include the new lease in the air quality permit if the WDEQ/AQD determines there could be significant impacts.

Ground Water Quality

The drawdown of the aquifers is not unmitigated. As stated in the EA (Section IV. C. Mitigation Measures), the Surface Mining Control and Reclamation Act (SMCRA) and Wyoming law require that these wells be mitigated by replacement with water from an alternate source of equivalent quality and quantity if they are interrupted by mining. (Please see response to Letter 14, from the Powder River Basin Resource Council for further discussion of this issue.)

Runoff

This issue is another of the issues that is addressed in detail during the mine permitting process, when the mining sequence and reclamation procedures have been determined. The mines are required to control runoff-related impacts through the use of sedimentation ponds which trap the runoff and allow sediment to settle out before the water leaves the mine site.

Surface Water Quality

As shown in the EA (Table 3: Federal and State Permitting Requirements and Actions), and NPDES permit is one of the additional permits that the mine must obtain prior commencing mining activities on their leases.

It is also important to point out that not all of this area would be disturbed at any one time, and that reclamation is ongoing concurrently with mining.

Wildlife Habitat

BLM must consult with the U.S. Fish and Wildlife Service (USFWS) as part of the leasing process regarding application of the coal unsuitability criteria relating to wildlife to the proposed lease area (See Comment Letter 1). The U.S. Fish and Wildlife Service and the Wyoming Game and Fish Department must be consulted on a variety of wildlife issues (e.g., raptor mitigation plans, adequacy of proposed reclamation for wildlife values) as part of the mine permitting process.

Hazardous Waste

As stated in the EA (Section IV.A.14., Hazardous Waste), materials determined to be hazardous by EPA are currently disposed of at an EPA-permitted hazardous waste facility. This procedure would continue when the LBA is mined.

Mining Near Airport

The Federal Aviation Administration does not have jurisdiction over mineral leasing or permitting, however, as indicated in the EA (Section IV.A.12., Transportation Facilities), Amax is already working with the company to resolve potential areas of concern. According to a newspaper report ("Mine Plans to Expand Near City Limits of Gillette", by Michael Riley, Casper Star Tribune, November 26, 1993), the airport manager indicated that AMAX has been working with the airport to mitigate potential hazards, and that the lease sale may benefit aircraft by removing a hill that has been an obstacle.

16

93 DEC 20 AM 10:27

3420(LBA)
WY0124783
Eagle Butte

December 13, 1993

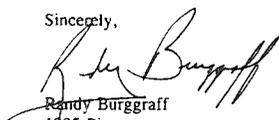
Nancy Dolger
Bureau of Land Management
1701 East "E" Street
Casper, Wyoming 82601

Dear Nancy:

I am writing to state my support for the Amax Coal West, Inc. Eagle Butte Mine Lease by Application (LBA). As a citizen of Campbell County, and Gillette in particular I feel that the economic gains from continued employment, taxes and royalties from mining this coal will benefit the citizens in the immediate area as well as throughout the entire state. I am concerned about the environmental impacts but I feel that the various regulatory agencies involved are capable of assuring minimal environmental degradation.

Thank You.

Sincerely,



Randy Burggraff
1005 Pioneer
Gillette, Wyoming 82718
682-0144 (Home)
687-3306 (Work)

17

December 13, 1993

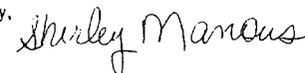
Nancy Doelger
Bureau of Land Management
1701 East "E" Street
Casper, Wyoming 82601

Dear Ms Doelger;

I am writing to state my support for the Amax Coal West, Inc. Eagle Butte Mine Lease by Application (LBA). As a citizen of Campbell County, and Gillette in particular I feel that the economic gains from continued employment, taxes and royalties from mining this coal will benefit the citizens in the immediate area as well as throughout the entire state. I am concerned about the environmental impacts but I feel that the various regulatory agencies involved are capable of assuring minimal environmental degradation.

Thank You.

Sincerely,



A-38

COMMENT LETTERS

18

December 13, 1993

Nancy Doelger
Bureau of Land Management
1701 East "E" Street
Casper, Wyoming 82601

Dear Ms Doelger;

I am writing to state my support for the Amax Coal West, Inc. Eagle Butte Mine Lease by Application (LBA). As a citizen of Campbell County, and Gillette in particular I feel that the economic gains from continued employment, taxes and royalties from mining this coal will benefit the citizens in the immediate area as well as throughout the entire state. I am concerned about the environmental impacts but I feel that the various regulatory agencies involved are capable of assuring minimal environmental degradation.

Thank You.

Sincerely,

Clare Scroggins

19

December 13, 1993

Nancy Doelger
Bureau of Land Management
1701 East "E" Street
Casper, Wyoming 82601

Dear Ms Doelger;

I am writing to state my support for the Amax Coal West, Inc. Eagle Butte Mine Lease by Application (LBA). As a citizen of Campbell County, and Gillette in particular I feel that the economic gains from continued employment, taxes and royalties from mining this coal will benefit the citizens in the immediate area as well as throughout the entire state. I am concerned about the environmental impacts but I feel that the various regulatory agencies involved are capable of assuring minimal environmental degradation.

Thank You.

Sincerely,

Johnnie R. Scroggins

A-39

COMMENT LETTERS

20

3420 (LBA)
wyw 34783
Eagle Butte

December 13, 1993

Nancy Doelger
Bureau of Land Management
1701 East "E" Street
Casper, Wyoming 82601

Dear Ms Doelger;

I am writing to state my support for the Amax Coal West, Inc. Eagle Butte Mine Lease by Application (LBA). As a citizen of Campbell County, and Gillette in particular I feel that the economic gains from continued employment, taxes and royalties from mining this coal will benefit the citizens in the immediate area as well as throughout the entire state. I am concerned about the environmental impacts but I feel that the various regulatory agencies involved are capable of assuring minimal environmental degradation.

Thank You.

Sincerely,

Miranda Scroggins

21

December 13, 1993

Nancy Doelger
Bureau of Land Management
1701 East "E" Street
Casper, Wyoming 82601

Dear Ms Doelger;

I am writing to state my support for the Amax Coal West, Inc. Eagle Butte Mine Lease by Application (LBA). As a citizen of Campbell County, and Gillette in particular I feel that the economic gains from continued employment, taxes and royalties from mining this coal will benefit the citizens in the immediate area as well as throughout the entire state. I am concerned about the environmental impacts but I feel that the various regulatory agencies involved are capable of assuring minimal environmental degradation.

Thank You.

Sincerely,

Sharon Scroggins

A-40

COMMENT LETTERS

22

December 13, 1993

Nancy Doelger
Bureau of Land Management
1701 East "E" Street
Casper, Wyoming 82601

Dear Ms Doelger;

I am writing to state my support for the Amax Coal West, Inc. Eagle Butte Mine Lease by Application (LBA). As a citizen of Campbell County, and Gillette in particular I feel that the economic gains from continued employment, taxes and royalties from mining this coal will benefit the citizens in the immediate area as well as throughout the entire state. I am concerned about the environmental impacts but I feel that the various regulatory agencies involved are capable of assuring minimal environmental degradation.

Thank You.

Sincerely,



23

December 13, 1993

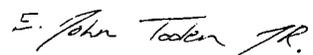
Nancy Doelger
Bureau of Land Management
1701 East "E" Street
Casper, Wyoming 82601

Dear Ms Doelger;

I am writing to state my support for the Amax Coal West, Inc. Eagle Butte Mine Lease by Application (LBA). As a citizen of Campbell County, and Gillette in particular I feel that the economic gains from continued employment, taxes and royalties from mining this coal will benefit the citizens in the immediate area as well as throughout the entire state. I am concerned about the environmental impacts but I feel that the various regulatory agencies involved are capable of assuring minimal environmental degradation.

Thank You.

Sincerely,



A-41

COMMENT LETTERS

24

3420 (LBA)
WY 124783
Eagle Butte

DATE: 1/6/94

January 6, 1994

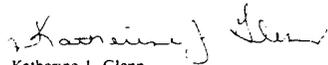
Nancy Doelger
Bureau of Land Management
1701 East "E" Street
Casper, Wyoming 82601

Dear Ms Doelger;

I am writing to state my support for the Amax Coal West, Inc. Eagle Butte Mine Lease by Application (LBA). As a citizen of Campbell County, and Gillette in particular I feel that the economic gains from continued employment, taxes and royalties from mining this coal will benefit the citizens in the immediate area as well as throughout the entire state. I am concerned about the environmental impacts but I feel that the various regulatory agencies involved are capable of assuring minimal environmental degradation.

Thank You.

Sincerely,


Katherine J. Glenn
P.O. Box 2372
Gillette, Wyoming 81717-2372
686-6487 (Home)
687-3316 (Work)

25

3420 (LBA)
WY 124783
Eagle Butte

DATE: 1/6/94

January 6, 1994

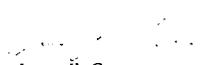
Nancy Doelger
Bureau of Land Management
1701 East "E" Street
Casper, Wyoming 82601

Dear Ms Doelger;

I am writing to state my support for the Amax Coal West, Inc. Eagle Butte Mine Lease by Application (LBA). As a citizen of Campbell County, and Gillette in particular I feel that the economic gains from continued employment, taxes and royalties from mining this coal will benefit the citizens in the immediate area as well as throughout the entire state. I am concerned about the environmental impacts but I feel that the various regulatory agencies involved are capable of assuring minimal environmental degradation.

Thank You.

Sincerely,


James F. Goss
1109 West Granite
Gillette, Wyoming 82718
687-7148 (Home)
687-3365 (Work)

A-42

COMMENT LETTERS

A-43

26

3420 (LBA)
WY 124783
Eagle Butte

JAN 12 1994

January 6, 1994

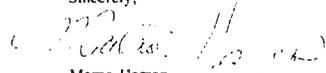
Nancy Doelger
Bureau of Land Management
1701 East "E" Street
Casper, Wyoming 82601

Dear Ms Doelger;

I am writing to state my support for the Amax Coal West, Inc. Eagle Butte Mine Lease by Application (LBA). As a citizen of Campbell County, and Gillette in particular I feel that the economic gains from continued employment, taxes and royalties from mining this coal will benefit the citizens in the immediate area as well as throughout the entire state. I am concerned about the environmental impacts but I feel that the various regulatory agencies involved are capable of assuring minimal environmental degradation.

Thank You.

Sincerely,



Marna Harrop
609 Frontier Drive
Gillette, Wyoming 82718
686-7748 (Home)
687-3317 (Work)

27

3420 (LBA)
WY 124783
Eagle Butte

JAN 12 1994

January 6, 1994

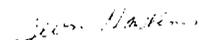
Nancy Doelger
Bureau of Land Management
1701 East "E" Street
Casper, Wyoming 82601

Dear Ms Doelger;

I am writing to state my support for the Amax Coal West, Inc. Eagle Butte Mine Lease by Application (LBA). As a citizen of Campbell County, and Gillette in particular I feel that the economic gains from continued employment, taxes and royalties from mining this coal will benefit the citizens in the immediate area as well as throughout the entire state. I am concerned about the environmental impacts but I feel that the various regulatory agencies involved are capable of assuring minimal environmental degradation.

Thank You.

Sincerely,



Kevin Haskins
814 Wagon Trail
Gillette, Wyoming 82718
682-7089 (Home)
687-3300 (Work)

COMMENT LETTERS

28

3420 (LBA)
WY 124783
Eagle Butte

January 6, 1994

Nancy Doelger
Bureau of Land Management
Casper District Office
1701 East "E" Street
Casper, Wyoming 82601

RE Eagle Butte LBA

Dear Nancy

I'm all in favor of this LBA by Eagle Butte.
I believe it will contribute to the economy of
Combsell County and continue the employment of its
residents.

Eagle Butte has done a good job of being a
neighborly and environmentally conscience
company.

Sincerely
Mr and Mrs Michael Myers

BUREAU OF LAND MANAGEMENT
91 JAN 12 AM 10:28

A-44

29

From the Desk of ...

3420 (LBA)
WY 124783
Eagle Butte

Frank Ferris

BUREAU OF LAND MANAGEMENT
DISTRICT OFFICE

To: Nancy Doelger

94 JAN 10 AM 10:29

Re: Federal coal lease for
Eagle Butte Mine

Dear Ms Doelger:

the coal business has helped
Wyoming & Gillette. I support
the continuation of active coal mines.

Thank you

Date 1-7-93



COMMENT LETTERS

30

3420 (LDA)
WY 124783
Eagle Butte

RECEIVED JAN 29 1994

January 7, 1994

Nancy Doelger
Bureau of Land Management
1701 East "E" Street
Casper, WY 82601

RE: Eagle Butte Mine LBA

I am writing in support of the AMAX Coal West, Eagle Butte Mine - Lease by Application. This coal lease will have nothing but positive impacts on Campbell County, its workforce, and the State of Wyoming in terms of lease fees and royalties in the future.

It would also be a pass coal that would have been mined if not acted upon now. As I understand, its environmental impacts are minimal and economic benefits are great well into the future. I also have great comfort in AMAX or the State of Wyoming to see that impacts are corrected and all the mineral is extracted in a prudent manner.

In closing, I am in support of this lease sale continuing for the good of all interested parties.

Sincerely,

Bill Gustafson

31

3420 (LDA)
WY 124783
Eagle Butte

January 7, 1994

Ms. Nancy Doelger
Bureau of Land Management
Casper District Office
1701 East "E" Street
Casper, Wyoming 82601

Dear Ms. Doelger,

Please allow Peggy and me to go on record as residents in support of the Lease by Application that AMAX Coal West, Eagle Butte Mine has applied for.

We view the impact as one that will benefit Gillette, Campbell County and the Great State of Wyoming.

AMAX Coal West, Eagle Butte and the remainder of the mines in Campbell County are solid corporate citizens and genuinely add value to our area.

Thank you for your time.

Regards,

Dave Katsilometes

Peggy Katsilometes

904 Clarion Drive
Gillette, Wyoming 82718

A-45

COMMENT LETTERS

32

3420(LBA)
WYO 124
Eagle Butte

January 11, 1994

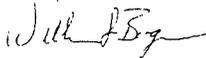
Nancy Doelger
Bureau of Land Management
1701 East "E" Street
Casper, Wyoming 82601

Dear Ms Doelger:

I am writing to state my support for the Amax Coal West, Inc. Eagle Butte Mine Lease by Application (LBA). As a citizen of Campbell County, and Gillette in particular I feel that the economic gains from continued employment, taxes and royalties from mining this coal will benefit the citizens in the immediate area as well as throughout the entire state. I am concerned about the environmental impacts but I feel that the various regulatory agencies involved are capable of assuring minimal environmental degradation.

Thank You.

Sincerely,



Bill Boger
1147 Almon Street
Gillette, Wyoming 82716
682-1416 (Home)
687-3310 (Work)

33

3420(LBA)
WYO 124-783
Eagle Butte

January 11, 1994

Nancy Doelger
Bureau of Land Management
1701 East "E" Street
Casper, Wyoming 82601

Dear Ms Doelger:

I am writing to state my support for the Amax Coal West, Inc. Eagle Butte Mine Lease by Application (LBA). As a citizen of Campbell County, and Gillette in particular I feel that the economic gains from continued employment, taxes and royalties from mining this coal will benefit the citizens in the immediate area as well as throughout the entire state. I am concerned about the environmental impacts but I feel that the various regulatory agencies involved are capable of assuring minimal environmental degradation.

Thank You.

Sincerely,



George VanBuren
267 Westhills Loop
Gillette, Wyoming 82718
687 0264 (Home)
687-3366 (Work)

34

ENERGY STATE DIVISION

94 JAN 12 AM 10:28

3420 (LBA)
WY 0124-183
Eagle Butte

Nancy Doelger:

I'm writing this letter to express my support for the recent lease application by Cyprus Amax Minerals Company (Eagle Butte Mine) via the Lease by Application (LBA) process for additional Federally owned coal.

By granting the lease would insure jobs for the future, both directly and indirectly with in the community and around the state. With both State and Federal governments benefiting from the initial leasing fee paid by Cyprus Amax Minerals Company as well as the royalties that are paid while the coal is being mined.

While we can not predict future technological advancements for producing power, we can surely see efforts being made in that direction. By using the LBA process, it will allow us to use our resources while they are a vital necessity.

I have lived in Campbell County for 14 years and have seen the mining process up close. The wild-life impact change, would only be that it has increased around the mining areas. As far as the reclamation process goes, one only need to see for themselves the great job and effort that goes into this important operation.

Thank you for your time, and I trust that the LBA process will become an important procedure in securing the future, for the people and State of Wyoming!

Sincerely,

Mark Mayworm
Gillette, Wyoming

35

January 12, 1994
Casper District Office, BLM
Nancy Dolger
1701 East "E" Street
Casper, Wyoming 82601

Re: The Eagle Butte LBA

As a resident of Campbell County and an employee of the coal industry, I would like to express my support for the Eagle Butte LBA.

As you well know, coal mining is at the heart of the Campbell County economy and directly or indirectly provides livelihood for numerous families throughout the United States. I believe that leasing additional coal reserves to Eagle Butte can only be positive, as it will extend employment opportunities and bolster the economy. For these reasons, I look forward to a positive decision on the Eagle Butte Environmental Assessment.

Thank you for the chance to comment on this issue.

Yours sincerely,

Mike Nicholson
Mike Nicholson

A-47

COMMENT LETTERS

36

January 13, 1994

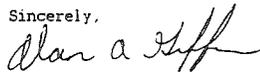
Nancy Doelger
Bureau of Land Management
1701 East "E" Street
Casper, WY 82601

Dear Ms. Doelger:

I am writing to state my support for the Amax Coal West, Inc. Eagle Butte Mine Lease by Application (LBA). As a citizen of Campbell County, and Gillette in particular I feel that the economic gains from continued employment, taxes and royalties from mining this coal will benefit the citizens in the immediate area as well as throughout the entire state. I am concerned about the environmental impacts but I feel that the various regulatory agencies involved are capable of assuring minimal environmental degradation.

Thank you.

Sincerely,



Alan A. Griffin
624 Oregon Ave.
Gillette, WY 82718

37

January 13, 1994

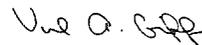
Nancy Doelger
Bureau of Land Management
1701 East "E" Street
Casper, WY 82601

Dear Ms. Doelger:

I am writing to state my support for the Amax Coal West, Inc. Eagle Butte Mine Lease by Application (LBA). As a citizen of Campbell County, and Gillette in particular I feel that the economic gains from continued employment, taxes and royalties from mining this coal will benefit the citizens in the immediate area as well as throughout the entire state. I am concerned about the environmental impacts but I feel that the various regulatory agencies involved are capable of assuring minimal environmental degradation.

Thank you.

Sincerely,



Vicki A. Griffin
624 Oregon Ave.
Gillette, WY 82718

A-48

COMMENT LETTERS

38

January 13, 1994

Nancy Doelger
Bureau of Land Management
Casper District Office
1701 East "E" Street
Casper, Wyoming 82601

RE: Eagle Butte LBA

Dear Nancy,

I, Galen W. Lee, 38 Nathan Hale Rd., Gillette, Wyoming, am a citizen of Campbell County Wyoming and I support the lease application process for Eagle Butte Mine.

I feel it will be good for the economy for our county and state and for our community, employees, etc.

Sincerely yours,



A-49

39

January 14, 1994

Nancy Doelger
Bureau of Land Management
Casper District Office
1701 East E Street
Casper, WY. 82601

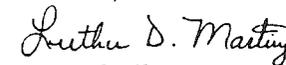
Dear Ms. Doelger,

This letter is being sent in reference to the Lease by Application process currently under way in Campbell County by Cyprus-Amax to increase the size of the coal lease at the Eagle Butte Mine.

I am a current employee of the Eagle Butte Mine so naturally anything of significance that would help increase the job security of my co-workers and myself is of interest to my family and I, as it should be to the entire community. As an employee I can assure you that Amax has always gone the extra step to not only comply but exceed environmental regulations. Indeed we employees see it first hand. In todays job market security and longevity are of utmost importance. This lease will only help in both of those areas.

Thank you for your time.

Sincerely Yours,



Luther D. Martinez
1 Apache Cr.
Gillette, WY. 82718
(307) 682-4885

COMMENT LETTERS

40

3420(LBA)
WY 1247B3
Eagle Butte

Box 409
Moorcroft, Wyo. 82721
January 14, 1994

Nancy Doelger
Bureau of Land Management
Casper District Office
1701 East "E" Street
Casper, Wyo. 82601

Dear Ms. Doelger,

As a lifelong citizen of northeastern Wyoming, I have developed a strong loyalty and concern for the good of this region. Because of the combination of abundance of needed resources and small population, the area could easily be exploited. This must be guarded against.

Not to be forgotten, the prudent harvest of these resources will help the country's need for energy, aid the economy of the area, and have no lasting negative effect on the land itself.

Cyprus Amax has proven that they can mine coal, provide aid and assistance to the economy (national, state, and area), be a good neighbor, and take excellent care of the land and environment. The mines they operate have very good reclamation records. The economy of the area has benefited greatly from their presence. Not only does Cyprus Amax supply many good paying jobs in the area and pay large amounts of taxes, they contribute to many of the local organizations and activities.

By granting Cyprus Amax the new lease, this company will be able to aid the region for years to come. By obtaining this lease, Cyprus Amax will be able to provide more financial aid to the area. Their employees will be able to continue employment for a longer period of time. The country will benefit from the recovery of the coal. Most important, the land and environment will not be harmed by this process.

In conclusion, to grant this lease would provide more needed American energy for our country; provide revenue for the national government, the state government, and the local government; provide assistance to local organizations and activities; provide good jobs for many of the area residents; and assure the land and environment will be properly maintained and returned to the original condition.

I would like to thank you for this opportunity to express my support for the Lease by Application by Cyprus Amax. The granting of this lease will benefit everyone involved.

Sincerely,

Ellen Plimmons

41

3420(LBA)
WY 1247B3
Eagle Butte

Box 409
Moorcroft, Wyo. 82721
January 14, 1994

Nancy Doelger
Bureau of Land Management
Casper District Office
1701 East "E" Street
Casper, Wyo. 82601

Dear Ms. Doelger,

As a lifelong citizen of northeastern Wyoming, I have developed a strong loyalty and concern for the good of this region. Because of the combination of abundance of needed resources and small population, the area could easily be exploited. This must be guarded against.

Not to be forgotten, the prudent harvest of these resources will help the country's need for energy, aid the economy of the area, and have no lasting negative effect on the land itself.

Cyprus Amax has proven that they can mine coal, provide aid and assistance to the economy (national, state, and area), be a good neighbor, and take excellent care of the land and environment. The mines they operate have very good reclamation records. The economy of the area has benefited greatly from their presence. Not only does Cyprus Amax supply many good paying jobs in the area and pay large amounts of taxes, they contribute to many of the local organizations and activities.

By granting Cyprus Amax the new lease, this company will be able to aid the region for years to come. By obtaining this lease, Cyprus Amax will be able to provide more financial aid to the area. Their employees will be able to continue employment for a longer period of time. The country will benefit from the recovery of the coal. Most important, the land and environment will not be harmed by this process.

In conclusion, to grant this lease would provide more needed American energy for our country; provide revenue for the national government, the state government, and the local government; provide assistance to local organizations and activities; provide good jobs for many of the area residents; and assure the land and environment will be properly maintained and returned to the original condition.

I would like to thank you for this opportunity to express my support for the Lease by Application by Cyprus Amax. The granting of this lease will benefit everyone involved.

Sincerely,

John Plimmons

A-50

COMMENT LETTERS

42

3420 (LBA)
WY 124783
Eagle Butte

Nancy Doelger,

I fully support Amos Eagle Butte Mine, on getting this lease. I feel it will benefit the community, and it will be good for the environment.

Linda Voegelé-Heagney
Box 4386
Gillette WY 82717
Phone: 307-686-3733

A-51

43

3420 (LBA)
WY 124783
Eagle Butte

Dear Nancy,

Eagle Butte mine has applied for a new lease to increase the mine's reserves. I encourage the approval of this lease. The state & community would benefit through, not only the fees from leasing, but also the royalties.

This community has especially benefited from Eagle Butte mines support of community activities from the National High School Rodeo, Bowling leagues, Little League support, Camp lex support, and numerous other activities.

High coal competition in the coal market has slowed the growth of this community down. Jobs are being lost & people are leaving Wyoming. Any growth in Eagle Butte mine will have more benefits for this community than disadvantages. I would like to see them stay in business as long as possible. Thank you for your consideration.

Carol Jandreau
5105 Rocky Pnt Dr
Gillette, WY 82718

COMMENT LETTERS

Response to Letters 16 through 43, from local citizens and mine employees

Thanks to all of the Gillette residents who commented on issuing the proposed Eagle Butte LBA. The comments on coal leasing actions that the BLM receives from local residents are an important consideration in the leasing process.

**APPENDIX B:
POTENTIALLY IMPACTED
GROUNDWATER RIGHTS ADJACENT
TO THE EAGLE BUTTE MINE**

List of 31 Potentially Impacted Ground Water Rights

EAGLE BUTTE MINE

Source: Table 3.5- 13, Eagle Butte Permit 428-T2

GROUND WATER RIGHTS

Permit Number	WELL LOCATION						LOCATED...			Permit Status	AMAX WELL STATUS				
	T	R	S	QQ	Easting	Northing	w/in Deed	w/in Permit	w/in 3 mile		In Use	Inactive Present	Mined out	Can/Aba	Not Known
P41246	50	71	18	SWSW			2	2	1	UNA					
P13354W	50	72	4	NWSE			1	2	2	UNA					1
P46512W	50	72	4	NWSW			2	2	1	ADJ					
P26423W	50	72	8	SESE			2	2	1	ADJ					
P29098W	50	72	9	NESW			2	2	1	UNA					
P44836W	50	72	9	NWSE			2	2	1	UNA					
P27645W	50	72	9	NWSW			2	2	1	UNA					
P26528W	50	72	9	SENE			2	2	1	UNA					
P49493W	50	72	9	SENW			2	2	1	ADJ					
P24602W	50	72	9	SESE			2	2	1	UNA					
P30148W	50	72	9	SESW			2	2	1	UNA					
P40764W	50	72	9	SESW			2	2	1	UNA					
P33261W	50	72	9	SWNW			2	2	1	UNA					
P40765W	50	72	9	SWSW			2	2	1	ADJ					
P11322W	50	72	10	NWNE			2	2	1	UNA					
P20536W	50	72	14	NWNE			2	2	1	UNA					
P27917W	50	72	14	NWNE			2	2	1	UNA					
P30792W	50	72	14	NWNE			2	2	1	UNA					
P23590W	50	72	14	NWSW			2	2	1	UNA					
P13513W	50	72	14	SESW			2	2	1	UNA					
P32855W	50	72	17	NENE			2	2	1	UNA					
P27230W	51	72	17	SESW			1	1	2	UNA					1
P7295W	51	72	20	NENE			2	2	1	UNA					
P34181W	51	72	20	NWNE			2	2	1	UNA					
P8896W	51	72	20	SENE			2	2	1	UNA					
P23443W	51	72	20	SENW			1	2	2	UNA					1
P22762W	51	72	20	SWNE			1	2	2	UNA					1
P18752P	51	72	33	NENW			1	2	2	UNA					1
P2757W	51	72	33	SESE			1	2	2	UNA					1
P18750P	51	72	33	SWNE			1	2	2	UNA					1
P18751P	51	72	34	SWNW			1	1	2	UNA					1

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EAGLE BUTTE MINE

GROUND WATER RIGHTS

Permit Number	AMAX Well Records Status	Applicant Name	Well Name	PERMITTED USE						
				Dew	Dom	Ind	Irr	Oil	Mis	Mon
P41246		COUNTRYSIDE WATER USERS CO., INC.	COUNTRYSIDE WAT USERS WELL #2	2	2	2	2	2	1	2
P13354W	No records	FLECK, MARTIN & PAULETTE	FLECK #1	2	1	2	2	2	2	2
P46512W		NATIONAL TANK COMPANY	NATIONAL TANK CO #1	2	2	2	2	2	1	2
P26423W		BARBOUR, RALPH E & GEORGIA L	MORRIS COULTER #1	2	2	2	2	2	1	2
P29098W		STEEL-BUILT INC.	STEEL BUILT #1	2	2	2	2	2	1	2
P44836W		BARNES, JOHN K & RITA J	BARNES #1	2	1	2	2	2	2	2
P27645W		MC GEE, JOHN E	MC GEE #1	2	1	2	2	2	2	2
P26528W		DOLCATER, ROBERT A & BETTY L	DOLCATER #1	2	1	2	2	2	2	2
P49493W		S & M CONSTRUCTION INC	S & M CONSTRUCTION #1	2	2	2	2	2	1	2
P24602W		BARGMANN, RICHARD & CLARICE	BARGMANN #1	2	1	2	2	2	2	2
P30148W		WEBB, RAY L	RL WEBB #1	2	2	2	2	2	1	2
P40764W		DONALD CROSS DISTRIBUTING	REINFORCED EARTH #1	2	2	2	2	2	1	2
P33261W		OVERHEAD DOOR OF GILLETTE, INC	OHD #1	2	2	1	2	2	2	2
P40765W		DUDLEY'S INC	DUDLEY #1	2	2	2	2	2	1	2
P11322W		HARROD, MARY & BERNARD L.	HARROD #1	2	2	2	2	2	2	2
P20536W		JODOZI, PETER WAYNE	JODOZI #1	2	1	2	2	2	2	2
P27917W		MCKENNEY SUBDIV HOMEOWNER'S ASSOC	MCKENNEY #1 (DEEPENED)	2	1	2	2	2	2	2
P30792W		PARNELL, GENE	CP #1	2	1	2	2	2	2	2
P23590W		KNIGHTEN, DANIEL C	KNIGHTEN #1	2	1	2	2	2	2	2
P13513W		WILLIAMS, MILTON B./PHILLIPS, WILLIAM R	WILLIAMS-PHILLIPS #1	2	2	2	2	2	2	2
P32855W		MORRIS, WILLIS	MORRIS #1	2	2	2	2	2	1	2
P27230W	No records	HARDY, W E	HARDY WELL #2	2	2	2	2	2	1	2
P7295W		MARTIN, DADE/COULTER, DARRELL & MILTON	MARTIN #1	2	1	2	2	2	2	2
P34181W		THOMAS, B M	THOMAS #1	2	1	2	2	2	2	2
P8896W		COULTER, MILTON	MARTIN #2	2	1	2	2	2	2	2
P23443W	No records	VANDEKOPPEL, TONY	VANDEKOPPEL #2	2	1	2	2	2	2	2
P22762W	No records	WANDLER, LEON E	WANDLER #1	2	1	2	2	2	2	2
P18752P	No records	GRAMS, MARY H	MARY GRAMS #3	2	2	2	2	2	2	2
P2757W	No records	DAVIS, C H	DAVIS #1	2	2	2	2	2	2	2
P18750P	No records	GRAMS, MARY H	MARY GRAMS #1	2	2	2	2	2	2	2
P18751P	No records	GRAMS, MARY H	MARY GRAMS #2	2	2	2	2	2	2	2

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EAGLE BUTTE MINE

GROUND WATER RIGHTS

Permit Number					Well Depth	Priority Date
	Res	Sto	Tem	Wil		
P41246	2	2	2	2	320	760603
P13354W	2	1	2	2	340.00	720320
P46512W	2	2	2	2	363.00	790112
P26423W	2	2	2	2	400.00	740319
P29098W	2	2	2	2	340.00	741028
P44836W	2	2	2	2	360.00	780825
P27645W	2	2	2	2	403.00	740809
P26528W	2	2	2	2	400.00	740430
P49493W	2	2	2	2	305.00	790823
P24602W	2	2	2	2	360.00	730921
P30148W	2	2	2	2	408.65	750520
P40764W	2	2	2	2	470.00	771102
P33261W	2	2	2	2	360.00	760427
P40765W	2	2	2	2	432.00	771104
P11322W	2	1	2	2	339.00	711202
P20536W	2	2	2	2	290.00	730403
P27917W	2	2	2	2	900.00	740912
P30792W	2	2	2	2	314.00	750731
P23590W	2	2	2	2	280.00	730719
P13513W	2	1	2	2	318.00	720406
P32855W	2	2	2	2	425.00	760422
P27230W	2	2	2	2	490.00	740626
P7295W	2	2	2	2	230.00	701201
P34181W	2	2	2	2	324.00	760713
P8896W	2	2	2	2	245.00	710428
P23443W	2	1	2	2	60.00	730416
P22762W	2	2	2	2	118.00	730702
P18752P	2	1	2	2	290.00	570131
P2757W	2	1	2	2	276.00	690801
P18750P	2	1	2	2	158.00	361031
P18751P	2	1	2	2	162.00	430531

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CODES USED BY THE WYOMING STATE ENGINEER'S OFFICE FOR WATER RIGHTS

The following codes show the authorized use of water:

BAT	BATHING	MIL	MILLING
CHE	CHEMICAL	MIN	MINING
COM	COMMERCIAL	MIS	MISCELLANEOUS
CUL	CULINARY	MON	MONITORING
DEW	DEWATERING	MUN	MUNICIPAL
DOM	DOMESTIC	OIL	OIL REFINING/PRODUCTION
DRI	DRILLING	POW	POWER DEVELOPMENT
DSP	DOMESTIC SUPPLY	PRE	PREFERRED USE
ERO	EROSION CONTROL	RAI	RAILROAD
FIR	FIRE PROTECTION	REC	RECREATION
FIS	FISH/WILDLIFE	REF	REFINING
FLO	FLOOD CONTROL	RES	RESERVOIR SUPPLY
ICE	ICE CUTTING	STE	STEAM ENGINE
IND	INDUSTRIAL	STO	STOCK
IRR	IRRIGATION	TEM	TEMPORARY USE
ISF	INSTREAM FLOW	TRA	TRANSPORTATION
MAN	MANUFACTURING	UTI	PUBLIC UTILITY
MEC	MECHANICAL	WIL	WILDLIFE

Received from SEO 8/17/92

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