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**U.S. Department of the Interior**  
Bureau of Land Management  
Wyoming State Office

Casper Field Office

June 2004



**FINAL**  
**ENVIRONMENTAL IMPACT STATEMENT for the**  
**West Hay Creek Coal Lease Application**  
**(Federal Coal Lease Application WYW151634)**



## MISSION STATEMENT

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

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# United States Department of the Interior

## BUREAU OF LAND MANAGEMENT

Wyoming State Office  
P.O. Box 1828  
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In Reply Refer To:  
3425 (LBA) (922 Janssen)  
WYW151634  
Phone No: (307) 775-6206  
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June 4, 2004

Dear Reader:

The Bureau of Land Management (BLM) has prepared this Final Environmental Impact Statement (EIS) to document and disclose the results of an environmental analysis of an application received by BLM to lease Federal coal to an existing mine in the Wyoming Powder River Basin. A copy of this document is provided for your review and comments. The Final EIS may be reviewed on the BLM Wyoming homepage ([www.wy.blm.gov](http://www.wy.blm.gov)). Copies of the Final EIS also are available for public inspection at the following BLM offices.

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

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

The Draft EIS was published in March 2003, and a formal public hearing was held in Gillette, Wyoming, on April 16, 2003, to receive comments on the Draft EIS and on the fair market value and on the maximum economic recovery of the Federal coal resources in the tract. Comments from one speaker recorded at the public hearing and eight written comment letters received by the BLM on the Draft EIS are included with agency responses as Appendix H in this Final EIS

The BLM will accept public comments on this Final EIS for thirty (30) days commencing on the date the Environmental Protection Agency publishes a Notice of Availability in the *Federal Register*. When the BLM becomes aware of the date of that publication, the BLM will notify all parties on this project's mailing list of the final date when comments will be accepted. Comments received after the end of the 30-day comment period will be considered in preparation of the Final EIS as time permits. The BLM is also publishing a Notice of Availability and Notice of Hearing in the *Federal Register*.

If you wish to comment on the Final EIS, your comments should relate directly to the document. We request that you make your comments as specific as possible and that you cite the location or locations in the document on which you are commenting. Substantive comments should: (1) give any new information that could alter conclusions; (2) show why or how analysis or assumptions in the Final EIS are flawed; (3) show errors in data, sources, or methods; or (4) request clarifications that bear on conclusions. Opinions or preferences will not receive a formal

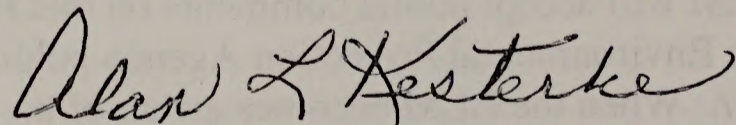
response; however, they will be considered and included as part of the BLM decision making process.

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

Comments, including names and street addresses of respondents, will be available for public review at the address listed below during regular business hours (7:45 a.m. - 4:30 p.m.), Monday through Friday, except holidays, and will be published as part of the Final EIS. Individual respondents may request confidentiality. If you wish to withhold your name or street address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

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

If you have any questions or would like to obtain additional copies of this Final EIS, please contact Patricia Karbs at (307) 261-7612 or at the above address.



Alan L. Kesterke  
Associate State Director

I Attachment

1 – Final EIS

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## EXECUTIVE SUMMARY

On August 31, 2000, Triton Coal Company, LLC (Triton) filed an application with the Bureau of Land Management (BLM) for federal coal reserves in a tract located to the north and west of, and adjacent to, Triton's Buckskin Mine in Campbell County, Wyoming (figures ES-1 and ES-2). This coal lease application was assigned case number WYW151634, and is referred to as the West Hay Creek lease by application (LBA) tract. As applied for, the West Hay Creek LBA tract includes approximately 840 acres and an estimated 145 million tons of in-place federal coal reserves. The lands applied for in this application are located in northern Campbell County, Wyoming, approximately 12 miles north of the city of Gillette, Wyoming.

This lease application was reviewed by the BLM, Wyoming State Office, Division of Mineral and Lands Authorization, and it was determined that the application and the lands involved met the requirements of the regulations governing coal leasing on application at Title 43 of the Code of Federal Regulations Part 3425.1 (43 CFR 3425.1). The PRRCT reviewed this lease application at a public meeting held on October 25, 2000, in Cheyenne, Wyoming. At that meeting, the PRRCT recommended that the BLM continue to process the lease application.

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

To evaluate the environmental impacts of leasing and mining the coal, the BLM must prepare an environmental assessment (EA) or an environmental impact statement (EIS) to evaluate the site-specific and cumulative environmental and socioeconomic impacts of leasing and developing the federal coal in the application area. The BLM made a decision to prepare an EIS for this lease application.

The Draft EIS for the West Hay Creek LBA Tract was mailed to the public in March 2003. The US Environmental Protection Agency (EPA) published a notice announcing the availability of the DEIS in the *Federal Register* on March 28, 2003. BLM published a Notice of Availability and Notice of Public Hearing in the *Federal Register*, also on March 21, 2003. A 60-day comment period on the DEIS commenced with publication of the EPA's Notice of Availability and ended on May 30, 2003. The BLM's *Federal Register* notice announced the date and time of a public hearing, as required under 43 CFR 3425.4 (a) (1). The public hearing was held at the Clarion Western Plaza in Gillette, Wyoming, at 7:00 p.m., on April 16, 2003. The purpose of the public hearing was to solicit public comments on the DEIS and on the fair market value, the maximum economic recovery, and the proposed competitive sale of federal coal from the LBA tract. One comment was recorded at the public hearing, and eight written comment letters were received on the Draft EIS. The comment letters and responses are

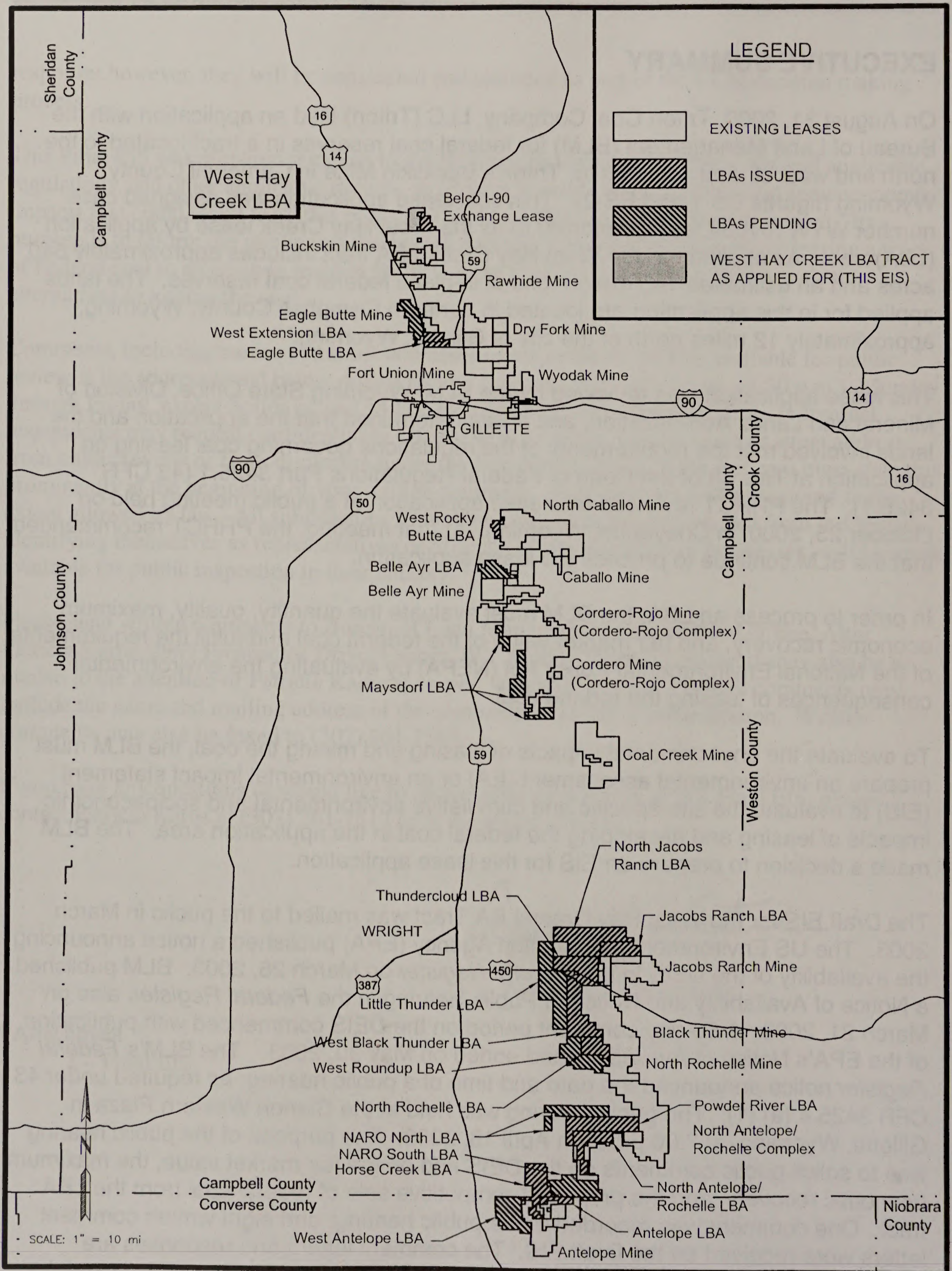
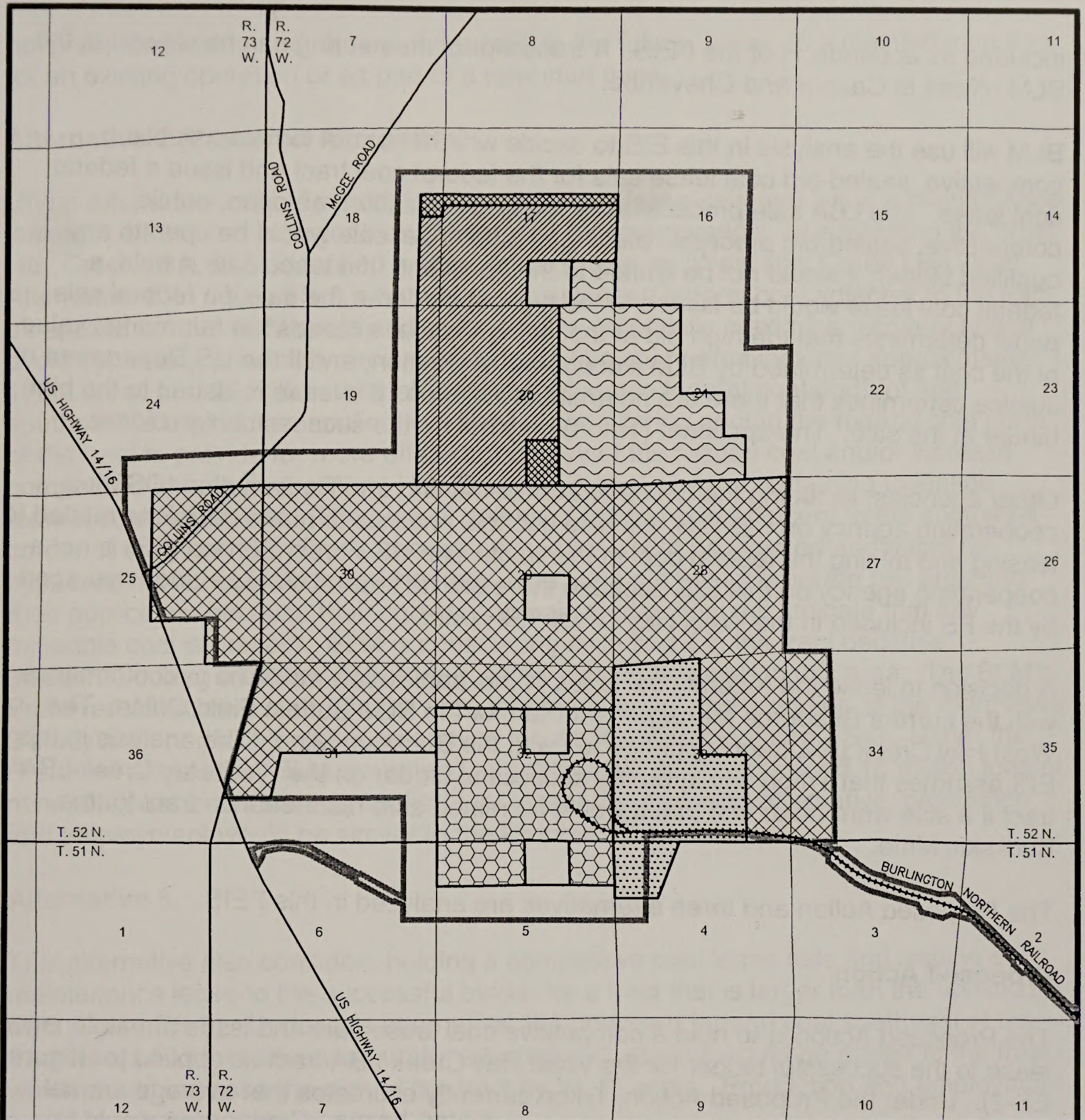



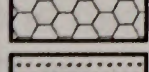

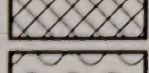
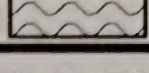
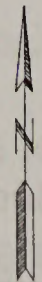


Figure ES-1. General Location Map with Federal Coal Leases and LBAs.



**LEGEND**

-  BUCKSKIN MINE PERMIT BOUNDARY
-  WEST HAY CREEK LBA TRACT AS APPLIED FOR
-  AREA ADDED UNDER BLM'S PREFERRED ALTERNATIVE
-  W-0325878
-  WYW-129205
-  WYW-78634
-  WYW-150152



SCALE: 1" = 5000'

Figure ES-2. Existing Federal Leases and LBA Preferred Alternative Tract Configuration.

included as appendix H of the FEIS. A transcript of the hearing can be viewed at the BLM offices in Casper and Cheyenne.

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

Other agencies, including the Office of Surface Mining and Reclamation (OSM), a cooperating agency on this EIS, will also use this analysis to make decisions related to leasing and mining the federal coal in this tract. The US Forest Service (FS) is not a cooperating agency on this EIS because there are no federal surface lands managed by the FS included in the West Hay Creek LBA tract.

A decision to lease the federal coal lands in this application would be in conformance with the current Resource Management Plan for the BLM Buffalo Field Office. The West Hay Creek LBA tract is contiguous with the Buckskin Mine. The analysis in this EIS assumes that Triton would be the successful bidder on the West Hay Creek LBA tract if a sale were held, and that it would be mined as a maintenance tract for the Buckskin Mine.

The Proposed Action and three alternatives are analyzed in this FEIS.

### **Proposed Action**

The Proposed Action is to hold a competitive coal lease sale and issue a maintenance lease to the successful bidder for the West Hay Creek LBA tract as applied for (figure ES-2). Under the Proposed Action, Triton currently estimates that average annual production would be 25 million tons per year, the life of the existing mine would be extended by approximately 5 years, and employment would be about 225 persons. The proposed action includes 838.13 acres.

### **Alternative 1**

Under alternative 1, the No Action alternative, the LBA tract would not be leased and the Buckskin Mine would mine its remaining leased coal reserves in approximately 12 years at an average annual production rate of 25 million tons per year. Average employment would be 225 persons. Portions of the surface of the LBA tract adjacent to the existing Buckskin leases will be disturbed when those leases are developed in accordance with the existing approved mining plans. Selection of this alternative would



not preclude leasing and mining of this tract in the future, either as a maintenance tract for an existing operation or as part of a new start mine.

### **Alternative 2 (Preferred Alternative)**

Under alternative 2, BLM would hold a competitive lease sale and issue a maintenance lease for a tract that is larger than the applied for configuration. In evaluating the West Hay Creek LBA, BLM identified a study area, shown as "West Hay Creek LBA Tract Alternative 2" in figure ES-2, which includes unleased federal coal adjacent to the tract as applied for that BLM could add to the tract to potentially maximize recovery and/or avoid bypassing potentially recoverable coal. The study area includes approximately 176.2 acres and 25 million tons of unleased mineable federal coal north of and southeast of the tract as applied for. BLM is considering adding the federal coal north of the tract to provide for more efficient recovery of the federal coal and/or increase competitive interest in the West Hay Creek LBA tract and the remaining unleased federal coal in this area. The area of unleased federal coal adjacent to the southeast corner of the West Hay Creek tract as applied for would be isolated and might be bypassed if it is not included in the tract. The mine did not incorporate this area into their application because their current geologic model does not indicate that any mineable coal is present. BLM is considering including it in the tract because additional drilling may indicate there is some recoverable coal in this area. The BLM's Preferred Alternative is to add the area to the southeast and a portion of the Alternative 2 study area north of the tract as applied for, as illustrated in figure ES-3. Under the Preferred Alternative, BLM would add approximately 83.06 acres and 15 million tons of mineable coal to the tract as applied for. Under the preferred alternative, production and employment would be similar to the Proposed Action.

### **Alternative 3**

This alternative also considers holding a competitive coal lease sale and issuing a maintenance lease to the successful bidder for a tract that is larger than the applied for tract (figure ES-3). Under this alternative, the unleased federal coal southeast of the tract as applied for (discussed under alternative 2, above) would be added to the tract, which would increase the size of the tract by 31.13 acres. Production and employment would be similar to the Proposed Action.

Table ES-1 summarizes coal production, surface disturbance, and mine life for the Buckskin Mine under each alternative. The environmental impacts of mining the LBA tract would be similar under the proposed action, the preferred alternative and alternative 3.

Other alternatives that were considered but not analyzed in detail include:

- holding a competitive coal lease sale and issuing a lease to the successful bidder (not the applicant) for the purpose of developing a new stand-alone mine. This alternative was considered and eliminated from detailed study because the

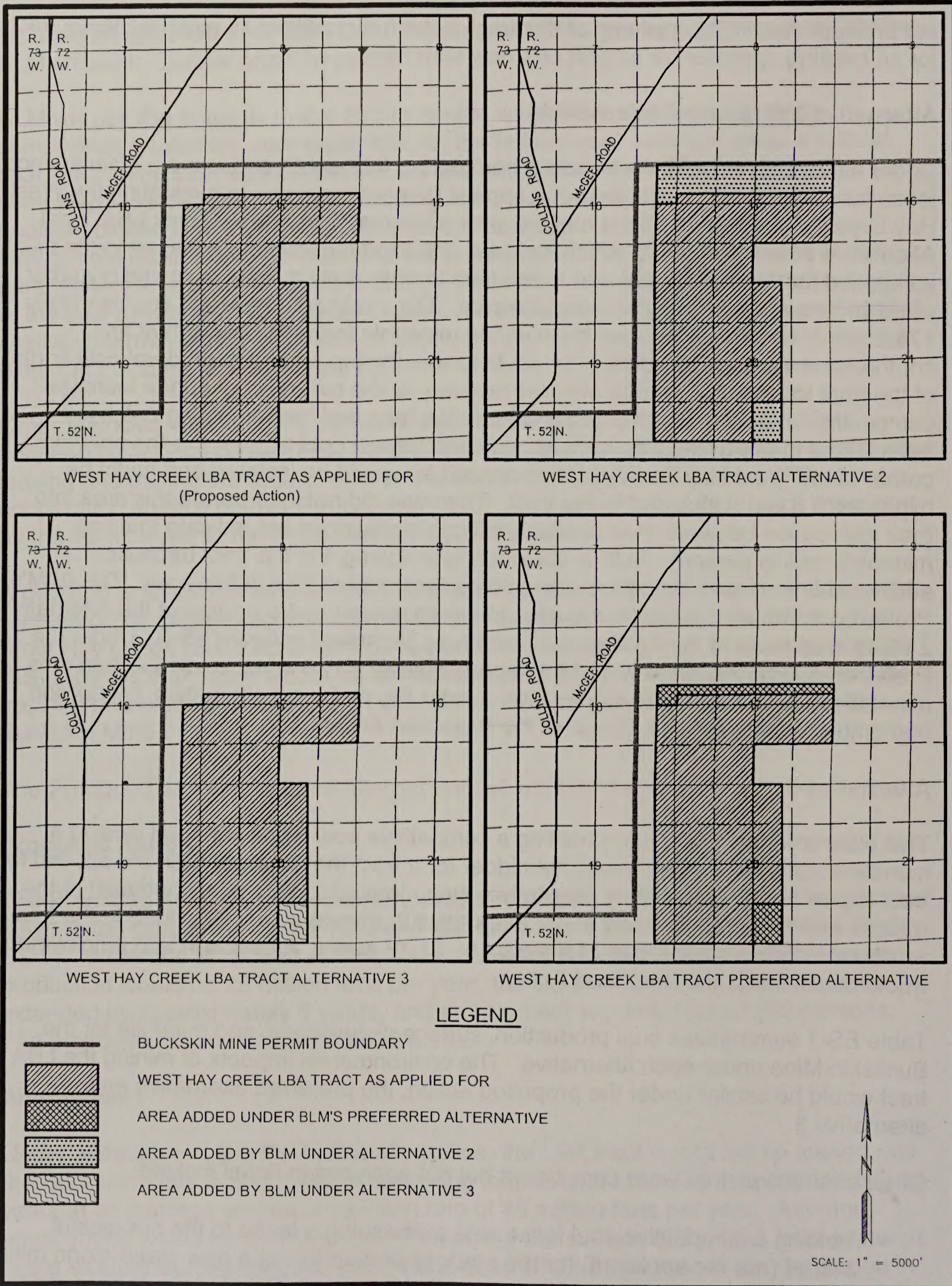


Figure ES-3. West Hay Creek LBA Tract Configurations.

**TABLE ES-1  
COMPARISON OF COAL PRODUCTION, SURFACE DISTURBANCE,  
AND MINE LIFE**

Item	No Action Alternative (existing Buckskin Mine)	Added by Proposed Action	Added by Alternative 2 (Preferred Alternative)	Added by Alternative 3
In-place <sup>1</sup> federal coal (as of 1/1/02)	512 mmt	145 mmt	160 mmt	150 mmt
Recoverable coal <sup>2</sup> (as of 1/1/02)	434 mmt	130 mmt	140 mmt	130 mmt
Coal mined <sup>3</sup> , 12/31/01	189.9 mmt	---	—	---
Lease acres <sup>4</sup>	4,949 ac	838.1975 ac	921.1575 ac	869.26 ac
Total area to be disturbed <sup>4</sup>	5,099 ac	830 ac	897 ac	830 ac
Permit area <sup>4</sup>	7,602 ac	0 ac	0 ac	0 ac
Average annual post-2001 coal production	25 mmt	0 mmt	0 mmt	0 mmt
Remaining life of mine (post-2001)	12.4 yrs	5.2 yrs	5.6 yrs	5.2 yrs
Average no. of employees	225	0	0	0
Total projected state revenues (post-2001) <sup>5</sup>	\$477 million	\$143 million	\$154 million	\$143 million
Total projected federal revenues (post-2001) <sup>6</sup>	\$165 million	\$49 million	\$53 million	\$49 million

<sup>1</sup>In-place coal includes all Canyon and Anderson coal within the lease area.

<sup>2</sup>Buckskin Mine defines recoverable coal as an estimate of the extractable coal that can be recovered. Excludes all mining losses that occur during normal mining operations, including wedge losses, coal left in pillars and fenders, and top and bottom coal cleaning.

<sup>3</sup>Assumes 90% to 92% recovery of extractable coal.

<sup>4</sup>Lease area includes Federal coal leases only and does not include state and private coal within the permit boundary. The permit area is larger than leased or disturbed areas to assure that all disturbed lands are within the permit boundary and to allow an easily defined legal land description. The permit area would not need to be changed for any of the action alternatives.

<sup>5</sup>Projected revenue to the state of Wyoming is \$1.10 per ton of coal sold and includes income from severance tax, property and production taxes, sales and use taxes, and Wyoming's share of federal royalty payments (University of Wyoming 1994).

<sup>6</sup>Federal revenues based on \$4.00 per ton price x federal royalty of 12.5% x amount of recoverable coal plus bonus payment on LBA coal of \$0.26 per ton based on average of last 11 LBAs (table 1-1) x amount of recoverable coal less state's 50% share.

current economics of mining in the Powder River Federal Coal Region appear to make construction of a new mine economically unfeasible on a tract of federal coal of this size.

- delaying the sale of the West Hay Creek LBA tract as applied for to increase the benefit to the public afforded by higher coal prices and/or to allow more complete recovery of the potential CBM resources in the tract prior to mining. This alternative was not analyzed in detail because it would not produce significantly different impacts than other alternatives analyzed in detail. Royalty and tax payments increase as coal prices increase because they are collected at the time the coal is sold. Recovery of a substantial portion of the CBNG resources on the tract would be feasible after lease issuance.

Critical elements of the human environment (BLM 1988) that could be affected by the proposed project include air quality, cultural resources, Native American religious concerns, threatened, endangered (T&E), and candidate plant and animal species, hazardous or solid wastes, water quality, wetlands/riparian zones, environmental justice, and invasive nonnative species. Five critical elements (areas of critical environmental concern, prime and unique farmland, wild and scenic rivers, floodplains, and wilderness) are not present in the project area and are not addressed further. In addition to the critical elements that are potentially present in the project area, the EIS discusses the status and potential effects of the project on topography and physiography, geology and mineral resources, soils, water availability and quality, alluvial valley floors, vegetation, wildlife, land use and recreation, paleontological resources, visual resources, noise, transportation resources, and socioeconomics.

The analysis area, which is shown in Figure ES-2, is located in the Powder River Basin (PRB), a part of the Northern Great Plains that includes most of northeastern Wyoming. The Buckskin Mine, which is located on the gently dipping eastern limb of the structural basin, is the northernmost operating mine within the Wyoming PRB. The West Hay Creek LBA tract is in an area consisting primarily of elevated ridges broken by minor drainages with an elevation ranging from 4,100 to 4,340 feet. In the LBA tract, there are two mineable coal seams, referred to as the Anderson and the Canyon coal seams. The Anderson coal seam averages 40 feet thick and the underlying Canyon seam averages 66 feet. The parting thickness between the Anderson and Canyon coal seams averages about 15 feet in the tract. The average overburden thickness is about 204 ft.

The existing topography on the LBA tract would be substantially changed during mining. A highwall with a vertical height equal to overburden plus coal thickness would exist in the active pits. Following reclamation, the average surface elevation would be lower due to removal of the coal. The reclaimed land surface would approximate premining contours and the basic drainage network would be retained, but the reclaimed surface would contain fewer, gentler topographic features. This could contribute to reduced habitat diversity and wildlife carrying capacity on the LBA tract.

These topographic changes would not conflict with regional land use, and the postmining topography would adequately support anticipated post-mining land use.

The geology from the base of the coal to the land surface would be subject to considerable long-term change on the LBA tract under any alternative. An average of 204 feet of overburden, 18 feet of interburden and 106 feet of coal would be removed from the LBA tract. The replaced overburden would be a relatively homogeneous mixture compared to the premining layered overburden. Development of other minerals potentially present on the LBA tract could not occur during mining but could occur after mining. There are no conventional oil and gas wells within the LBA tract at this time, but if any are drilled, they would have to be plugged and abandoned prior to mining but could be recompleted after mining if the remaining reserves justify the expense of the recompletion. There were six active CBM wells, three shut-in CBM wells, and three CBM wells that were permitted or had started drilling within the LBA tract itself as of April 9, 2004. CBM resources that are not recovered prior to mining would be vented to the atmosphere and irretrievably lost when the coal is removed. CBM could be produced from the existing wells, and other wells could be drilled during the time it takes to lease and permit the LBA tract and, on a case by case basis, until mining activity approaches each well. BLM's policy is to optimize recovery of both resources, ensure the public receives a reasonable return, and encourage agreements between lessees or use BLM authority to minimize loss of publicly owned resources.

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

If the West Hay Creek LBA tract is leased and mined as proposed under the Proposed Action or any of the alternatives, there would be a continuation of the impacts to air quality that are occurring as a result of the currently permitted mining operations. Dust would be visible to the public when mining occurs near Wyoming 14-16, Collins Road, or McGee Road. Overburden thickness, coal thickness, and interburden thickness in the LBA tract under the Proposed Action and action alternatives are similar to the existing mine. Concentrations of particulate matter would be elevated in the vicinity of mining operations on the LBA tract. From 1995 through 2003, the mine produced an average of 15.9 million tons of coal per year. During that time, there was one exceedance of the PM<sub>10</sub> 24-hour standard at one of the Buckskin Mine's air quality monitoring sites; it has been flagged by the Wyoming Department of Environmental Quality/Air Quality Division (WDEQ/AQD) in the Aerometric Information and Retrieval System (AIRS) database as having been impacted by winds in excess of 40 mph during the collection period. If Triton acquires a lease for the West Hay Creek LBA tract, they would be required to modify the WDEQ/AQD air quality permit for the Buckskin Mine to include the tract before it could be mined.

There is public concern in the Wyoming PRB over releases of nitrogen oxides (NO<sub>x</sub>) that sometimes occur during blasting operations conducted prior to coal removal. Low-lying, gaseous orange clouds containing NO<sub>x</sub> that can be transported by wind have sometimes formed after overburden blasting. Exposure to NO<sub>x</sub> can cause adverse health effects. EPA has expressed concerns that NO<sub>x</sub> levels in some blasting clouds may be sufficiently high at times to cause human health effects. As a result of these incidents, the mines have been evaluating new blasting techniques, which have been able to reduce, but not eliminate, the production of NO<sub>x</sub> during blasting. The WDEQ/Land Quality Division (LQD) has directed some mines to take steps designed to mitigate the effects of NO<sub>2</sub> emissions occurring from overburden blasting. To date, there have been no complaints to the Buckskin Mine or the WDEQ/LQD about blasting clouds at the Buckskin Mine. Based on the size and nature of their blasting, the WDEQ/LQD has not directed the Buckskin Mine to take any of the required steps to mitigate or prevent blasting clouds.

Changes in runoff characteristics and sediment discharges would occur during mining of the LBA tract, and erosion rates could reach high values on the disturbed areas because of vegetation removal. However, state and federal regulations require that surface runoff from mined lands be treated to meet effluent standards, so sediment would be deposited in ponds or other sediment-control devices before the surface runoff water is allowed to leave the permit area. After mining and reclamation are complete, surface water flow, quality, and sediment discharge would approximate premining conditions.

Mining the LBA tract would increase both the areal extent of drawdown in water levels in the coal and overburden aquifers and the size of the area where the existing coal and overburden aquifers would be replaced by mine backfill. Drawdown in the coal aquifer, which is considered to be a regional aquifer, would be expected to increase roughly in proportion to the increase in area affected by mining and would extend farther than drawdown in the overburden aquifers, which are typically limited in areal extent. The data available indicate that hydraulic properties of the backfill would be comparable to the premining overburden and coal aquifers. Total dissolved solids concentrations in the backfill could initially be expected to be higher than in the premining overburden and coal aquifers, but would be expected to meet Wyoming Class III standards for use as stock water.

The West Hay Creek LBA tract has been evaluated for the presence of AVFs, and there are none. Jurisdictional wetlands that are disturbed by mining must be replaced during the reclamation process.

A total of 17.51 acres of jurisdictional wetlands have been identified within the analysis area. Existing wetlands in the LBA tract would be impacted by mining operations. The Army Corps of Engineers (COE) requires replacement of all impacted jurisdictional wetlands in accordance with section 404 of the Clean Water Act and determines the number of acres to be restored. WDEQ/LQD allows and sometimes requires mitigation

of nonjurisdictional wetlands affected by mining, depending on the values associated with the wetland features.

Mining would progressively remove the native vegetation on the LBA tract. Reclamation and revegetation of disturbed land would occur contemporaneously with mining. Reestablished vegetation would be dominated by species mandated in the reclamation seed mixtures, which are approved by the WDEQ. The majority of these species would be native to the LBA tract. Initially, the reclaimed land would be dominated by grassland vegetation, which would be less diverse than the premining vegetation. Estimates for the time it would take to restore sagebrush to premining density levels range from 20 to 100 years. An indirect impact associated with this vegetative change would potentially be a decreased big game habitat carrying capacity. However, a diverse, productive, and permanent vegetative cover would be established on the LBA tract within about 10 years following reclamation, prior to release of the final reclamation bond. The decrease in plant diversity would not seriously affect the potential productivity of the reclaimed areas, and the proposed postmining land uses (wildlife habitat and rangeland) should be achieved even with the changes in vegetation composition and diversity. The reclamation plans for the LBA tract would also include steps to control invasion by weedy (invasive, nonnative) plant species.

In the short term, wildlife would be displaced from the LBA tract in areas of active mining and the acreage of habitat available for wildlife populations would be reduced. Habitat would be disturbed in parcels, with reclamation progressing as new disturbance occurs. The LBA tract does not contain any unique or crucial big game habitat. Sage grouse have been found on lands within and adjacent to the LBA tract and are yearlong residents in this area. No leks have been recorded on the LBA tract during baseline surveys or annual mine surveys and there are currently no active leks in the area of the tract. No broods were recorded during formal brood surveys but breeding and brood-rearing habitat is present in the analysis area. There are no intact raptor nest sites on the West Hay Creek LBA Tract, but five raptor species (the burrowing owl, great horned owl, ferruginous hawk, red-tailed hawk and golden eagle) have been identified nesting within 2 miles of the LBA tract. In the long term, following reclamation, carrying capacity and habitat diversity may be reduced due to flatter topography, less diverse vegetative cover, and reduction in sagebrush density.

T&E plant and wildlife surveys specific to the proposed lease tract were conducted in 1999. No suitable roosting habitat, known nest sites, or concentrated prey or carrion sources for bald eagles have been identified during baseline or annual wildlife surveys in the West Hay Creek analysis area. Historically, this species has infrequently been seen foraging in the general vicinity of Buckskin Mine. No prairie dog colonies are currently located on or within ½-half mile of the West Hay Creek LBA tract. No evidence of black-footed ferrets has ever been recorded by qualified biologists during general or specific surveys in the Buckskin Mine area. Potential habitat for Ute ladies-tresses orchid was surveyed within the West Hay Creek LBA tract. No Ute ladies'-

tresses were observed during this survey, and none have been identified during surveys for other mines in this area.

Active mining would preclude other land uses, including livestock and wildlife grazing use and recreational use of the LBA tract. There is no public surface included in the tract, the surface of the tract is owned entirely by Triton. Within 10 years after initiation of each reclamation phase, rangeland and wildlife use would return to near premining levels. The cumulative impacts of energy development (coal mining, oil, and gas) in the PRB are and will continue to contribute to a reduction in hunting opportunities for some animals (pronghorn, mule deer, and sage grouse).

Mining would impact oil and gas development on the leased lands during active mining. The federal oil and gas rights are leased. As discussed above, there are active CBM wells on the tract under the Proposed Action and Alternatives 2 and 3. CBM that is not recovered prior to mining would be vented and irretrievably lost as the coal is removed.

Cultural resources surveys have been conducted on the West Hay Creek tract LBA area. A data recovery plan has been developed for the one site found on the LBA tract which meets the eligibility criteria for the NRHP. This data recovery plan will be carried forward in the mining and reclamation plan and implemented before the site is disturbed.

No sites of Native American religious or cultural importance have been identified on the LBA tract. The OSM completed Native American consultation on the lands within the analysis area in 2000. No comments were received. If such sites or localities are identified at a later date, appropriate action must be taken to address concerns related to those sites.

No unique or significant paleontological resources have been identified on the West Hay Creek LBA Tract, and the likelihood of encountering significant paleontological resources is small.

Mining activities at the existing Buckskin Mine are currently visible from Collins Road and McGee Road and Wyoming 14-16, and mining activities on the West Hay Creek LBA tract would also be visible from these roads. Mining would affect landscapes classified by BLM as VRM Class IV, and the landscape character would not be significantly changed following reclamation. No unique visual resources have been identified on or near the LBA tract.

Noise levels on the LBA tract would be increased considerably by mining activities (blasting, loading, hauling, and possibly in-pit crushing). The nearest occupied dwelling is just over ½ mile from the LBA tract, which is about the same distance as the nearest occupied dwelling to the existing Buckskin Mine permit boundary.

No new or reconstructed coal transportation facilities would be required under the Proposed Action or Alternatives 2 or 3, but leasing the LBA tract would extend the



length of time that coal is shipped from the existing facilities for the permitted Buckskin Mine. Active pipelines and utility lines would have to be relocated in accordance with previous agreements, or agreements would have to be negotiated for their removal or relocation.

Royalty and bonus payments for the coal in the LBA tract would be collected by the federal government and split with the state. A 1994 University of Wyoming study estimated that the total direct fiscal benefit to the State of Wyoming from coal mining taxes and royalties is \$1.10/ton of coal mined. Using that estimate, mining the coal in the West Hay Creek LBA Tract under the action alternatives would provide a tax and royalty benefit to the State of Wyoming of \$143 to \$154 million, expressed in current dollars. Triton anticipates that employment levels would be the same with or without the West Hay Creek LBA tract. Mine life and employment, would be extended up to about 6 years at the Buckskin Mine, and Triton projects that employment at the mine would remain at 225 persons.

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

As stated previously, the impacts of mining the coal, which are described in the paragraphs above, would be similar under the proposed action and the action alternatives (preferred alternative and alternative 3).

Under the No Action Alternative, the coal lease application would be rejected; the area contained in the application would not be offered for lease at this time. The tract could be nominated for lease again in the future. Under the No Action Alternative, the impacts described in the preceding paragraphs to topography and physiology, geology and minerals, soils, air quality, water resources, alluvial valley floors, wetlands, vegetation, wildlife, threatened, endangered and candidate species, land use and recreation, cultural resources, Native American concerns, paleontological resources, visual resources, noise, transportation, and socioeconomics would occur on the existing Buckskin coal leases. These impacts would not be extended onto the LBA tract. Portions of the West Hay Creek LBA tract adjacent to the existing Buckskin Mine would be disturbed to recover the coal in the existing leases.

If impacts are identified during the leasing process that are not mitigated by existing required mitigation measures, BLM can include additional mitigation measures, in the form of stipulations on the new lease, within the limits of its regulatory authority. BLM has not identified additional special stipulations that should be added to the BLM lease or areas where additional or increased monitoring measures are recommended.

Cumulative impacts result from the incremental impacts of an action added to other past, present, and reasonably foreseeable future actions, regardless of who is

responsible for such actions. Cumulative impacts can result from individually minor, but collectively significant, actions occurring over time.

Since decertification of the Powder River Federal Coal Region in 1990, the BLM Wyoming State Office has issued 11 new federal coal leases containing approximately 3.178 billion tons of coal using the LBA process. This leasing process has undergone the scrutiny of two appeals to the Interior Board of Land Appeals and one audit by the General Accounting Office.

None of the leases issued since decertification have been adjacent to the Buckskin Mine, but Triton acquired federal coal lease WYW150152, which is adjacent to the Buckskin Mine, from EOG Resources in 2000. This lease was issued to EOG Resources in exchange for federal coal lease WYW0322794, the Belco I-90 lease. This exchange was authorized by the I-90 Exchange Act of 1978.

Eight additional coal lease applications, including the West Hay Creek application, are currently pending. The pending LBA applications contain approximately 2.2 billion tons of coal.

Three regional EISs evaluating surface coal development in the PRB in Wyoming were previously prepared. They are:

- *Final Environmental Impact Statement, Eastern Powder River Coal Basin of Wyoming*, BLM, October 1974;
- *Final Environmental Impact Statement, Eastern Powder River Coal*, BLM, March 1979; and
- *Final Environmental Impact Statement, Powder River Coal Region*, BLM, December 1981.

A draft document for a fourth regional EIS, the *Draft Environmental Impact Statement for Round II Coal Lease Sale in the Powder River Region*, was prepared by BLM and released in January 1984, but a final document was not prepared and the actions considered in that EIS were not implemented.

Since 1989, coal production in the Powder River Basin has increased by approximately 6.8% per year. The increasing state production is primarily due to increasing sales of low-sulfur, low-cost PRB coal to electric utilities that must comply with Phase I requirements of Title III of the 1990 Clean Air Act Amendments. Electric utilities account for 97% of Wyoming's coal sales.

Oil production has decreased in the Wyoming PRB since 1990, but natural gas production has been increasing, particularly in Campbell County. This is due to the development of shallow CBM resources in the basin. CBM exploration and production are currently ongoing throughout the Wyoming PRB. Since the early 1990s, BLM has

completed numerous environmental assessments (EAs) and EISs analyzing CBM projects. The latest of these is the *Final Environmental Impact Statement and Draft Planning Amendment for the Powder River Basin Oil and Gas Project*, which was completed in January 2003. The project area for this EIS includes almost eight million acres of mixed federal, state, and private lands within the Wyoming portion of the PRB. The EIS evaluates the impacts of drilling, completing, operating, and reclaiming almost 39,400 new federal, state, and private CBM wells in addition to the roughly 12,100 federal, state, and private CBM wells that were already drilled or permitted within the project area when the EIS analysis was prepared. The EIS also analyzes the impacts of developing 3,200 new conventional oil and gas wells, as well as constructing, operating, and reclaiming various ancillary facilities needed to support the new CBM and conventional wells, including roads, pipelines for gathering gas and produced water, electrical utilities, and compressors.

Under the current process for approving CBM drilling, CBM wells can be drilled on private and state oil and gas leases after approval by the Wyoming Oil and Gas Conservation Commission (WOGCC) and the Wyoming State Engineer's Office (SEO). On federal oil and gas leases, BLM must analyze the individual and cumulative environmental impacts of all drilling, as required by NEPA, before CBM drilling can be authorized. CBM wells have been drilled in or around the West Hay Creek LBA tract. CBM drilling and production are expected to continue in the Wyoming PRB. Due to the proximity of surface coal mining to some of the CBM production operations, cumulative impacts to groundwater, surface water, air quality, and wildlife have occurred and are likely to continue as more CBM resources are developed adjacent to existing surface coal mines.

Other mineral development levels in the Wyoming PRB are currently lower than predicted in the regional coal EISs. In the 1970s, significant uranium development was anticipated in southwest Campbell County and northwest Converse County. This development did not materialize because the price of uranium dropped in the early 1980s. There are currently two *in situ* uranium operations in Converse and Johnson counties, but no mines and no mills. Wyoming uranium production is expected to decrease this year.

In addition to the ongoing coal mining and leasing and the CBM development, other projects planned in the vicinity of the northern mine group include the construction of the Wygen II coal-fired power plant which has been proposed at the Black Hills Corporation energy complex near the Wyodak Mine site. The power plant could be expected to have some overlapping impacts with the impacts of mining the West Hay Creek LBA tract.

Most of the other projects proposed in the PRB are located some distance south of the LBA tract near the middle and southern portion of the basin. These include the construction and operation of the North American Power Group's Two Elk and Two Elk Unit 2 power plants east of the Black Thunder Mine; construction and operation by North American Power Group of a 500-megawatt coal fired power plant at the Cordero

Rojo Complex; and construction and operation of the proposed DM&E rail line. The impacts of mining the West Hay Creek LBA tract would not be expected to overlap with the impacts of building and operating these projects. The existing and proposed development in the PRB has and will continue to result in the introduction of additional roads, railroads, power lines, fences, oil and gas production equipment and mine structures. This area has already undergone change from a semi-agriculturally based economy to a coal mining and oil and gas economy.

Environmentally, the open, basically treeless landscape in the Wyoming PRB has been visibly altered by construction, equipment, and human activities. Leasing the LBA tract to an existing mining operation would increase the total area that would be affected by mining by up to about 921 acres. Mining disturbance is progressive with reclamation proceeding contemporaneously.

Cumulative impacts vary by resource and range from being almost undetectable to being substantial. Cumulative impacts on air quality, groundwater quantity and wildlife habitat have created the greatest concern.

An air quality impact assessment predicting potential far-field cumulative air quality impacts, using the EPA CALMET/CALPUFF dispersion modeling system, has been prepared to predict maximum potential air quality impacts at mandatory federal PSD Class I areas downwind of proposed oil and gas development in the PRB in northeast Wyoming and southeast Montana. The assessment considered potential air pollutant emission sources from proposed CBM development in Wyoming and Montana combined with other reasonably foreseeable development (RFD) emission sources to predict the total potential cumulative impact to air quality. Surface coal mining operations in Montana and Wyoming were included as other RFD emission sources in this assessment.

The cumulative far-field impacts predicted in the air quality impact assessment would not increase or decrease under the proposed action and all of the alternatives for leasing or not leasing federal coal considered in the West Hay Creek LBA tract because it is a maintenance tract which would be leased to extend operations at the existing Buckskin mine. Selection of the proposed action, the preferred alternative or Alternative 3 would not introduce new sources of impacts to air quality, but would change the location of the sources of those impacts to the newly leased tracts and would extend the period of time that those existing sources would be in operation. Selection of the no action alternative (alternative 1) would not affect the currently approved mining operations at Buckskin Mine existing leases. Table ES-2 presents the maximum predicted air pollutant concentrations at specified PSD Class I areas. The Northern Cheyenne Reservation is located approximately 70 miles northwest of the LBA Tract and the Absaroka-Beartooth Wilderness Area is located approximately 170 miles northwest of the LBA Tract.

Table ES-3 summarizes the range of projected visibility impacts as the annual average number of days over the 11-year periods predicted to equal or exceed a 1.0 deciview

“just noticeable change.” The Class I areas shown in Table ES-3 range from 70 miles (Northern Cheyenne Reservation) to 350 miles (Gates of the Mountains Wilderness Area) from the West Hay Creek LBA Tract. Most of the areas are more than 200 miles from the LBA tract.

**TABLE ES-2**  
**MAXIMUM PREDICTED PSD CLASS I AREA**  
**CUMULATIVE FAR-FIELD IMPACTS (in  $\mu\text{g}/\text{m}^3$ ) UNDER WYOMING PRB OIL AND**  
**GAS PROJECT EIS ALTERNATIVE 1 (PROPOSED ACTION) AND ALL WEST HAY**  
**CREEK LEASE APPLICATION EIS ALTERNATIVES**

Pollutant	Averaging Period	Class I Area	Maximum Modeled Concentration (cumulative)	PSD Class I Increment
Nitrogen dioxide	Annual	Northern Cheyenne Reservation	4.2	2.5
PM <sub>10</sub>	24-hour	Northern Cheyenne Reservation	12.8	8
	Annual	Northern Cheyenne Reservation	1.7	4
Sulfur dioxide	3-hour	Northern Cheyenne Reservation	5.1	25
	24-hour	Absaroka-Beartooth Wilderness	2.4	5
	Annual	Northern Cheyenne Reservation	0.3	2

**Source:** Argonne 2002

Coal mines develop predictive models to assess the potential air quality impacts of their mining operations. The predictive modeling conducted for PRB mines indicates that mining operations do not have significant offsite particulate pollution impacts, even when production and pollution from neighboring mines are considered. This modeling is based on the assumption that mining activities are sufficiently removed from the permit boundaries and that neighboring mines are not actively mining in the immediate vicinity (within 0.6 to 2.5 miles).

Figure ES-5 shows modeled and extrapolated worst-case coal aquifer drawdown as a result of mining at the northern group of mines. Monitoring of backfill areas indicates that reclaimed areas are being recharged with water generally suitable for livestock use, which is the main premining use.

**TABLE ES-3  
PREDICTED VISIBILITY IMPACTS IN CLASS I AREAS –  
DAILY FLAG-REFINED METHOD**

(average number of days per year predicted to equal or exceed a 1.0 dv “just noticeable change”)

Class I Area	Alt 1	Alt 2A	Alt 2B	Alt 3	Nonproject Sources	Cumulative Sources
Badlands Wilderness Area <sup>1</sup>	3	3	1	0	13 to 17	18 to 28
Bridger Wilderness Area	4	4	3	1	7 to 9	8 to 12
Fitzpatrick Wilderness Area	4	3	3	1	6 to 9	8 to 12
Gates of the Mtns Wilderness Area	0	0	0	0	3 to 4	3 to 4
Grand Teton National Park	1	1	0	0	3 to 5	4 to 8
North Absaroka Wilderness Area	4	3	2	0	9 to 13	11 to 15
Red Rock Lakes Wilderness Area	0	0	0	0	0 to 1	0 to 3
Scapegoat Wilderness Area	0	0	0	0	2 to 2	2 to 3
Teton Wilderness Area	3	3	2	0	6 to 9	7 to 11
Theodore Roosevelt NMP <sup>2</sup> (North Unit)	0	0	0	0	1 to 1	1 to 3
Theodore Roosevelt NMP <sup>2</sup> (South Unit)	1	0	0	0	1 to 3	2 to 7
U.L. Bend Wilderness Area	1	1	1	0	4 to 5	5 to 8
Washakie Wilderness Area	5	4	4	1	10 to 14	12 to 18
Wind Cave National Park	4	3	2	0	17 to 21	22 to 28
Yellowstone National Park	3	2	1	0	8 to 11	9 to 13
Northern Cheyenne Reservation <sup>3</sup>	17	16	14	7	27 to 82	33 to 92

**Note:** Results shown are the predicted impacts under Wyoming PRB Oil and Gas Project Alternatives 1, 2A, 2B, and 3; impacts related to coal mining under all West Hay Creek lease application EIS (alternatives are included Under “Non-Project Sources”)

<sup>1</sup> Congress designated the wilderness area portion of Badlands National Park as a mandatory federal PSD Class I area. The remainder of Badlands National Park is a PSD Class II area.

<sup>2</sup> NMP - National memorial park.

<sup>3</sup> Although the Northern Cheyenne Reservation is a tribal designated PSD Class I area, it is not a mandatory federal PSD Class I area subject to EPA’s regional haze regulations.

**Nonproject Sources** – The impact of all air pollutant emission sources not included in Wyoming PRB Oil and Gas Project EIS Alt 1, Alt 2A, Alt 2B or Alt 3, including existing surface coal mines in Wyoming and Montana and the Montana Statewide EIS sources. The range of potential annual average days above a 1.0 dv “just noticeable change” in visibility corresponds to including Montana Alternative A (low) to Montana Alternative B/C/E (high).

**Cumulative Sources** – The impact of all cumulative air pollutant emission sources combined, including Wyoming PRB Oil and Gas Project EIS Alt 1, Alt 2A, Alt 2B, Alt 3, and nonproject sources (which include the West Hay Creek Lease Application EIS Proposed Action and alternatives and Montana Statewide EIS sources). The range of potential annual average days above a 1.0 dv “just noticeable change” in visibility corresponds to: including nonproject, Wyoming Alternative 3 and Montana Alternative A sources (low); up to including nonproject, Wyoming Alternative 1 and Montana Alternative B/C/E sources (high).

**Source:** Argonne 2002

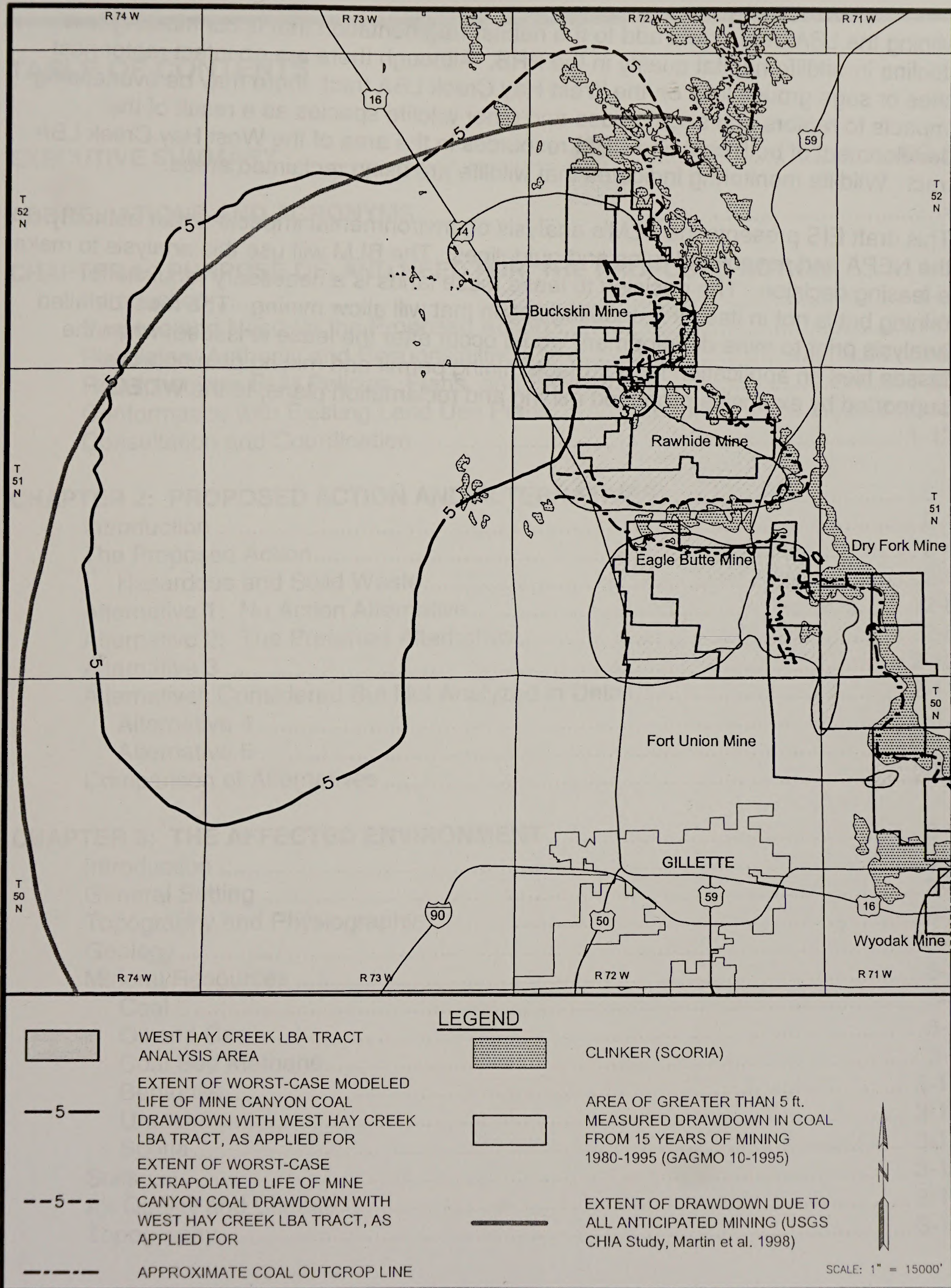


Figure ES-4. Modeled and Extrapolated Worst-Case Coal Aquifer Drawdown Scenarios Showing Extent of Actual 15-yr Drawdowns and USGS Predicted Cumulative Drawdowns.

Mining the LBA tract would add to the habitat fragmentation that is contributing to a decline in wildlife habitat quality in the PRB. Although there are no intact raptor nest sites or sage grouse leks on the West Hay Creek LBA tract, there may be overlapping impacts to raptors and sage grouse and other wildlife species as a result of the development of both coal and CBM resources in the area of the West Hay Creek LBA tract. Wildlife monitoring indicates that wildlife are using reclaimed areas.

This draft EIS presents the BLM's analysis of environmental impacts under authority of the NEPA and associated rules and guidelines. The BLM will use this analysis to make a leasing decision. The decision to lease these lands is a necessary requisite for mining but is not in itself the enabling action that will allow mining. The most detailed analysis prior to mine development would occur after the lease is issued, when the lessee files an application for a surface mining permit and mining plan approval, supported by extensive proposed mining and reclamation plans, to the WDEQ.



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## ABBREVIATIONS

AAQS	ambient air quality standards
ANC	acidification neutralization capacity
AQRV	air quality related values
AREV	State engineer's office water rights database and program
AVF	alluvial valley floor
BACT	best available control technology
bcy	bank cubic yards
BLM	Bureau of Land Management
B.P.	before present
Btu	British thermal units
CAA	Clean Air Act of 1990
CAAA	Clean Air Act Amendment
CBM	coal bed methane
CASTNet	Clean Air Status and Trends Network
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CHIA	Cumulative Hydrologic Impact Assessment
CO	carbon monoxide
COE	Army Corps of Engineers
cy	cubic yards
dba	A-weighted decibels
DEIS	draft environmental impact statement
DM&E	Dakota, Minnesota & Eastern Railroad Corporation
DOE	Department of Energy
DOI	Department of the Interior
DOJ	Department of Justice
dv	deciview, a measure of view impairment

EA	environmental assessment
EC	elemental carbon particles (re: air quality)
EIS	environmental impact statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act of 1973
F	fahrenheit
FS	Forest Service
FCLAA	Federal Coal Leasing Act Amendments of 1976
FDM	fugitive dust model
FEIS	final environmental impact statement
FLAG	Federal land managers' air quality
FLM	Federal land management
FLPMA	Federal Land Policy Management Act of 1976
FWS	Fish and Wildlife Service
GAGMO	Gillette Area Ground Water Monitoring Organization
GNP	gross national product
gpm	gallons per minute
GSP	gross state product
HAP	hazardous air pollutant
IBLA	Interior Board of Land Appeals
IMPROVE	Interagency Monitoring of Protected Visual Environments
ISCLT	Industrial Source Complex Model-Long Term version 3
IWAQM	Interagency Workgroup on Air Quality Monitoring
Km	kilometers
Kv	kilovolts
LAC	level of acceptable change (re: air quality)
LBA	lease by application
lbs/mmBtu	pounds per million British thermal units
LFC	liquids from coal
LOP	life of project

LRMP	land and resource management plan
LW	lower Wyodak coal seam
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
$\mu\text{eq}/\text{L}$	microequivalents per liter
$\text{mi}^2$	square mile
$\text{mg}/\text{L}$	milligrams per liter
MLA	Mineral Leasing Act of 1920
MLE	most likely exposure
MEI	maximally exposed individual
mmbcy	million bank cubic yards
mmtpy	million tons per year
MSA	Metropolitan statistical area
MDEQ/AWM	Montana Department of Environmental Quality/Air and Waste Management Bureau
mw	megawatts
NAAQS	National Ambient Air Quality Standards
NADP	National Atmospheric Deposition Program
NAPG	North American Power Group
NEPA	National Environmental Policy Act of 1969
NIOSH	National Institute of Occupational Safety and Health
NMP	national memorial park
$\text{NO}_2$	nitrogen dioxide
$\text{NO}_x$	nitrogen oxides
NPS	National Park Service
NRHP	National Register of Historic Places
NSPS	National Source Performance Standards
$\text{O}_3$	photochemical oxidants
OC	organic carbon particles
OSHA	Occupational Safety and Health Administration
OSM	Office of Surface Mining Reclamation & Enforcement

PECS	passive enclosure control system
PM <sub>10</sub>	particulates finer than 10 microns
PMT	postmining topography
PP&L	Pacific Power and Light Company
PRB	Powder River Basin
PRBRC	Powder River Basin Resource Council
PRCC	Powder River Coal Company
PRES	Powder River Eagle Studies
PRRCT	Powder River Regional Coal Team
PSD	prevention of significant deterioration
R2P2	Resource Recovery and Protection Plan
RH	relative humidity
RMG	Reservoir Management Group (Wyoming State Office)
RMP	resource management plan
ROD	Record of Decision
ROW	right-of-way
scf	standard cubic feet
SARA	Superfund Amendment & Reauthorization Act of 1986
SEO	State Engineer's Office
SIP	State Implementation Plan
SHPO	State Historic Preservation Office
SHWD	Solid and Hazardous Waste Division (WDEQ)
SLAMS	state and local air monitoring stations
SMCRA	Surface Mining Control and Reclamation Act of 1977
SO <sub>2</sub>	sulfur dioxide
STB	Surface Transportation Board
T&E	threatened and endangered
TBCC	Thunder Basin Coal Company
TBNG	Thunder Basin National Grassland
TDS	total dissolved solids

tpy	tons per year
TSP	total suspended particulates
TWC	Thunderbird Wildlife Consulting, Inc.
USC	United States Code
USDI	US Department of the Interior
USDOC	US Department of the Census
USGS	US Geological Survey
UW	upper Wyodak coal seam
VRM	visual resource management
WAAQS	Wyoming ambient air quality standards
WAQSR	Wyoming air quality standards and regulations
WARMS	Wyoming air resources monitoring system
WCIC	Wyoming Coal Information Committee
WDEQ	Wyoming Department of Environmental Quality
WDEQ/AQD	Wyoming Department of Environmental Quality/Air Quality Division
WDEQ/LQD	Wyoming Department of Environmental Quality/Land Quality Division
WGFD	Wyoming Game and Fish Department
WMA	Wyoming Mining Association
WOC	Wyoming Outdoor Council
WOGCC	Wyoming Oil and Gas Conservation Commission
WGS	Wyoming State Geological Survey



# CHAPTER 1: PURPOSE OF, AND THE NEED FOR, THE PROPOSED ACTION

## INTRODUCTION

On August 31, 2000, Triton Coal Company, LLC (Triton) filed an application with the Bureau of Land Management (BLM) for federal coal reserves in a tract located to the north and west, and adjacent to the Buckskin Mine in Campbell County, Wyoming. On November 5, 2001, Triton filed an application to modify the tract configuration. The application area is located in Campbell County, Wyoming, approximately 12 miles north of Gillette, Wyoming (figure 1-1). The federal coal reserves were applied for as a maintenance tract for the Buckskin Mine under the regulations at 43 CFR (Code of Federal Regulations) 3425, Leasing on Application. At the time the application was filed, the Buckskin Mine was owned and operated by Triton, a subsidiary of Vulcan Intermediary, LLC. In May 2003, Arch Coal announced that it was purchasing Vulcan Coal Holdings, LLC, including the Buckskin Mine. In this environmental impact statement (EIS), the applicant for the tract will be referred to as Triton.

The West Hay Creek LBA tract as applied for and the existing federal coal leases in the adjacent Buckskin Mine are shown in figure 1-2. As applied for, the West Hay Creek LBA tract includes approximately 840 acres and an estimated 145 million tons of in-place coal reserves. Triton estimates that approximately 130 million tons of coal would be produced if the tract as applied for is leased, assuming a recovery factor of 90%.

Triton's coal lease application (case file WYW151634) was reviewed by the BLM's Wyoming State Office, Division of Mineral and Lands. They determined that it met the regulatory requirements for a lease by application (LBA). The tract is referred to as the West Hay Creek LBA tract.

The West Hay Creek LBA tract is located within the Powder River Federal Coal Region, which was decertified in January 1990. Although the Powder River Federal Coal Region is decertified, the Powder River Regional Coal Team (PRRCT), a federal/state advisory board established to develop recommendations concerning management of federal coal in the region, has continued to meet regularly and review all federal lease applications in the region. The PRRCT reviewed this lease application at a public meeting held on October 25, 2000, in Cheyenne, Wyoming. At that meeting, the PRRCT recommended that the BLM continue to process the lease application.

In order to process an LBA, the BLM must evaluate the quantity, quality, maximum economic recovery, and fair market value of the federal coal and fulfill the requirements of the National Environmental Policy Act (NEPA) by evaluating the environmental consequences of leasing the federal coal. This EIS has been prepared to evaluate the site-specific and cumulative environmental impacts of leasing and developing the federal coal included in the application area. BLM does not authorize mining by issuing

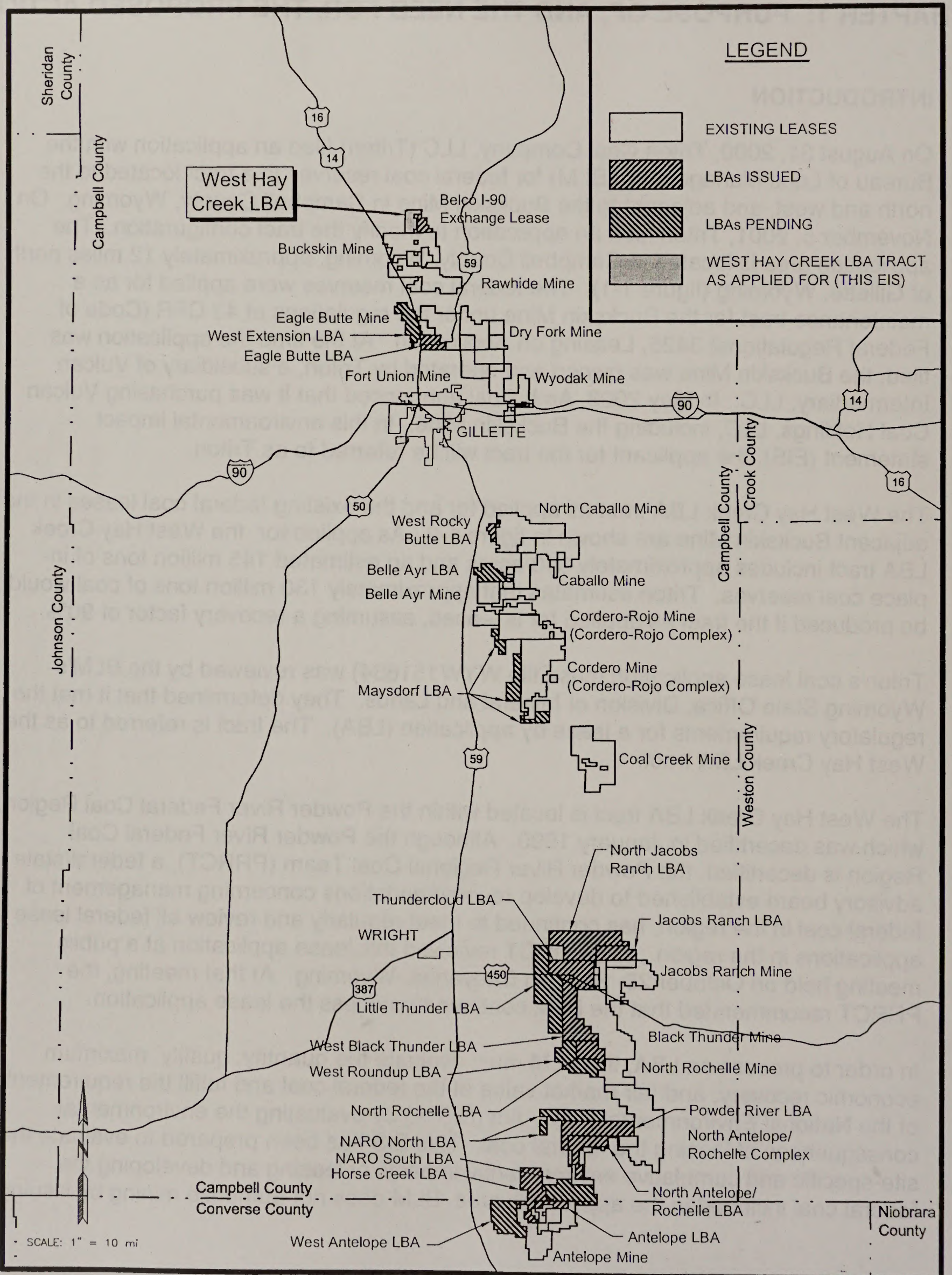
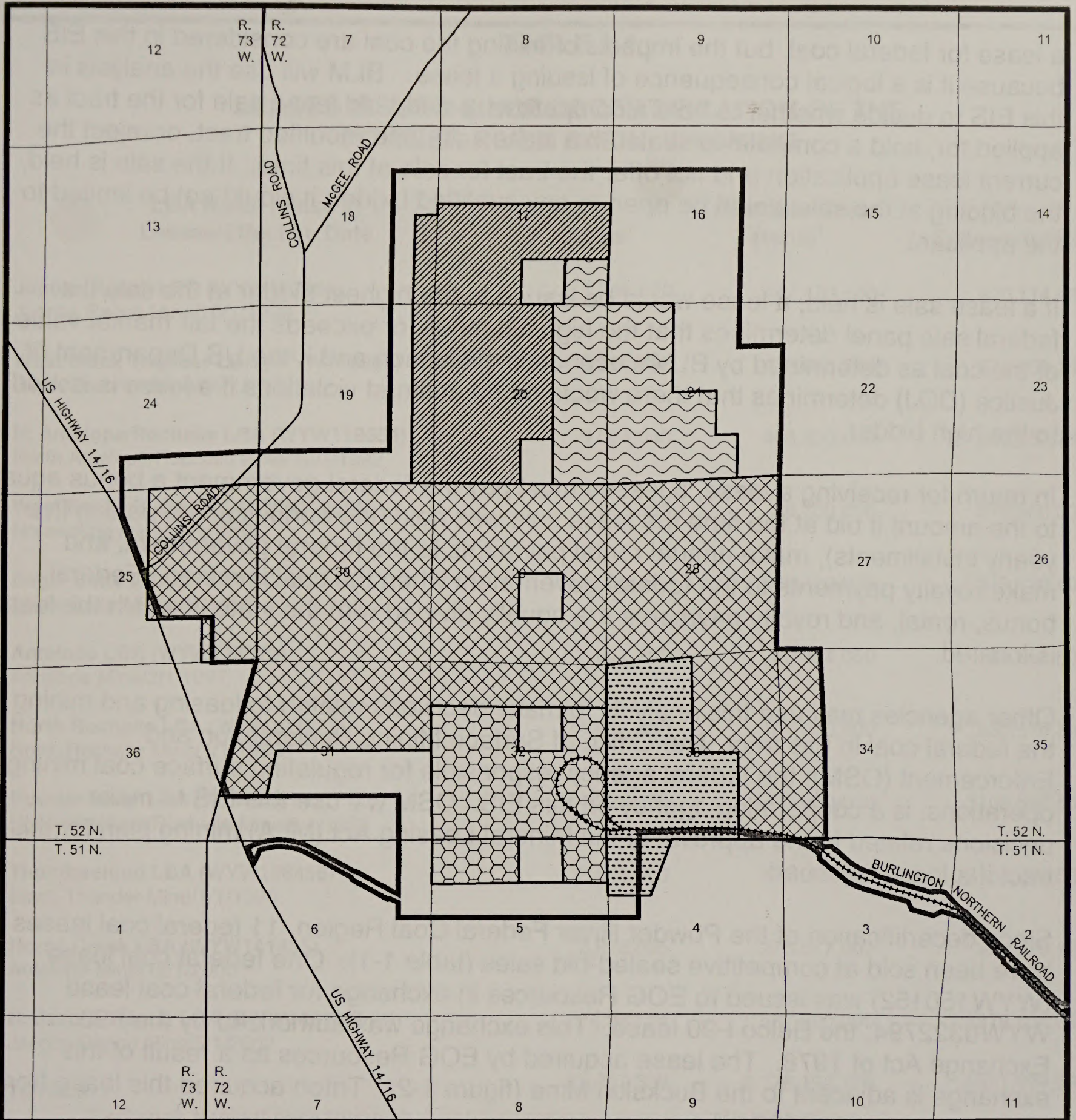








Figure 1-1. General Location Map with Federal Coal Leases and LBAs.





**LEGEND**

-  BUCKSKIN MINE PERMIT BOUNDARY
-  WEST HAY CREEK LBA TRACT AS APPLIED FOR
-  W-0325878
-  WYW-129205
-  WYW-78634
-  WYW-150152



SCALE: 1" = 5000'

Figure 1-2. Buckskin Mine Federal Coal Leases and the West Hay Creek LBA Tract as Applied For.

a lease for federal coal, but the impacts of mining the coal are considered in this EIS because it is a logical consequence of issuing a lease. BLM will use the analysis in this EIS to decide whether to hold a competitive, sealed-bid lease sale for the tract as applied for, hold a competitive sealed-bid lease sale for a modified tract, or reject the current lease application and not offer the tract for sale at this time. If the sale is held, the bidding at the sale would be open to any qualified bidder; it would not be limited to the applicant.

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

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

Other agencies may use this analysis to make decisions related to leasing and mining the federal coal in this tract. The Office of Surface Mining Reclamation and Enforcement (OSM), the federal agency responsible for regulating surface coal mining operations, is a cooperating agency on this EIS. OSM will use this EIS to make decisions related to the approval of the Mineral Leasing Act (MLA) mining plan for this tract if a lease is issued.

Since decertification of the Powder River Federal Coal Region, 11 federal coal leases have been sold at competitive sealed-bid sales (table 1-1). One federal coal lease (WYW150152) was issued to EOG Resources in exchange for federal coal lease WYW0322794, the Belco I-90 lease. This exchange was authorized by the I-90 Exchange Act of 1978. The lease acquired by EOG Resources as a result of this exchange is adjacent to the Buckskin Mine (figure 1-2). Triton acquired this lease from EOG Resources in 2000.

Table 1-2 summarizes the eight applications for federal coal that are currently pending in the Wyoming portion of the Powder River Basin (PRB). A coal exchange proposal by the Pittsburg and Midway Coal Mining Company is also currently being evaluated. Pittsburg and Midway proposes to exchange lands and minerals it owns in Lincoln, Carbon, and Sheridan counties, Wyoming for federal coal in Sheridan County, Wyoming.

The West Hay Creek LBA tract adjoins the Buckskin Mine (figure 1-2). The LBA tract lies within the current mine permit area for the Buckskin Mine. The area applied for is substantially similar to the area for which detailed site-specific environmental data have

**TABLE 1-1**

**LEASES ISSUED SINCE DECERTIFICATION OF THE  
POWDER RIVER BASIN, WYOMING**

<b>LBA Name (lease #) Lessee/Effective Date</b>	<b>Acres<sup>1</sup></b>	<b>Mineable Coal (tons)<sup>1</sup></b>	<b>Successful Bid</b>
Jacobs Ranch LBA (WYW117924) Jacobs Ranch Mine/10/1/1992	1,708.620	147,423,560	\$20,114,930.00
West Black Thunder LBA (WYW118907) Black Thunder Mine/10/1/1992	3,492.495	429,048,216	\$71,909,282.69
N. Antelope/Rochelle LBA (WYW119554) North Antelope/Rochelle Mine/10/1/1992	3,064.040	403,500,000	\$86,987,765.00
West Rocky Butte LBA (WYW122586) No existing mine <sup>2</sup> /1/1/1993	463.205	56,700,000	\$16,500,000.00
Eagle Butte LBA (WYW124783) Eagle Butte Mine/8/1/1995	1,059.175	166,400,000	\$18,470,400.00
Antelope LBA (WYW128322) Antelope Mine/2/1/1997	617.200	60,364,000	\$9,054,600.00
North Rochelle LBA (WYW127221) North Rochelle Mine/1/1/1998	1,481.930	157,610,000	\$30,576,340.00
Powder River LBA (WYW136142) North Antelope/Rochelle Mine/9/1/1998	4,224.225	532,000,000	\$109,596,500.00
Thundercloud LBA (WYW136458) Black Thunder Mine/1/1/1999	3,545.503	412,000,000	\$158,000,008.50
Horse Creek LBA (WYW141435) Antelope Mine/12/1/2000	2,818.695	275,577,000	\$91,220,120.70
N. Jacobs Ranch LBA (WYW146744) Jacobs Ranch Mine/5/1/2002	4,982.24	537,500,000	\$379,504,652.00
<b>TOTALS</b>	<b>27,457.328</b>	<b>3,178,122,776</b>	<b>\$991,934,598.89</b>
<b>Exchange Name (Lease Number) Lessee/Effective Date</b>	<b>Acres<sup>1</sup></b>	<b>Mineable Tons of Coal<sup>1</sup></b>	<b>Action</b>
EOG (Belco) I-90 Lease Exchange (WYW150152) EOG Resources (formerly Belco) <sup>3</sup> /4/1/2000	599.170	106,000,000	Exchanged for rights to Belco I-90 lease (WYW0322794)

<sup>1</sup>Information from sale notice.

<sup>2</sup>The West Rocky Butte lease is now owned by the Caballo Mine.

<sup>3</sup>The EOG Resources Belco Exchange lease is now owned by the Buckskin Mine

TABLE 1-2

PENDING LBAs, POWDER RIVER BASIN, WYOMING

LBA Name Lease # Applicant Mine	Application Date	Acres	Estimated Coal (tons) <sup>1</sup>	Status
NARO North WYW150210 North Antelope/ Rochelle	3/10/00	2,369.38	323 mm	Hearing 3/4/03 FEIS 12/03
NARO South WYW154001 North Antelope/ Rochelle	3/10/00	2,133.64	241 mm	Hearing 3/4/03 FEIS 12/03
Little Thunder WYW150318 Black Thunder	3/23/00	3,449.32	479.3 mm	Hearing 3/4/03 FEIS 12/03
West Roundup WYW151134 North Rochelle	7/28/00	1,870.64	192.6 mm	Hearing 3/4/03 FEIS 12/03
West Hay Creek WYW151634 Buckskin	8/31/00	840.00	130 mm	Hearing 4/16/2003 FEIS in preparation
West Antelope WYW151643 Antelope	9/12/00	3,542.19	293.9 mm	Hearing 3/4/03 FEIS 12/03
Maysdorf (formerly Mt. Logan) WYW154432 Cordero-Rojo	9/20/01	2,809.48	296.3 mm	PRRCT reviewed 5/30/2002
West Extension WYW155132 Eagle Butte	12/28/01	1,397.61	243 mm	PRRCT reviewed 5/30/2002
<b>TOTAL PENDING</b>		<b>18,412.26</b>	<b>2,199 mm</b>	

<sup>1</sup>Estimated tons of in-place coal as reported in the lease application.

been collected and for which environmental analyses have previously been prepared to secure the existing leases and the necessary mining permits.

Triton owns the surface of the West Hay Creek LBA tract. Current land uses of the tract include livestock grazing, wildlife habitat, cropland, pastureland, and oil and gas production.

If Triton acquires a federal coal lease for these lands, the West Hay Creek LBA tract coal resources would be mined as a maintenance tract to extend mine life at the Buckskin Mine. The mining method would be truck and shovel, which is the mining method currently in use at the Buckskin Mine. The coal would be used primarily for electric power generation.

After mining, the land would be reclaimed for livestock grazing, wildlife habitat, cropland and pastureland as is the current practice at the Buckskin Mine.

## **PURPOSE AND NEED FOR THE PROPOSED ACTION**

BLM administers the federal coal leasing program under the Mineral Leasing Act of 1920. A federal coal lease grants the lessee the exclusive right to obtain a mining permit for, and to mine coal on, the leased tract subject to the terms of the lease, the mining permit, and applicable state and federal laws.

This EIS was prepared in response to an application BLM received to lease a tract of federal coal received from an existing mine, the Buckskin Mine, in the Wyoming Powder River Basin. The purpose of this application is to allow the Buckskin Mine access to a continuing supply of low sulfur compliance coal, which it can continue to sell to power plants for the purpose of power generation. Continued leasing of PRB coal enables coal-fired power plants to meet Clean Air Act (CAA) of 1990 requirements without constructing new plants, revamping existing plants, or switching to existing alternative fuels, which would potentially significantly increase power costs for individuals and businesses.

A primary goal of the National Energy Policy is to add energy supplies from diverse sources, including domestic oil, gas and coal as well as hydropower and nuclear power. BLM recognizes that the continued extraction of coal is essential to meet the nation's future energy needs. As a result, private development of federal coal reserves is integral to the BLM coal leasing program under the authority of the Mineral Leasing Act of 1920 (MLA), as amended, as well as the Federal Land Policy Management Act of 1976 (FLPMA) and the Federal Coal Leasing Amendments Act of 1976 (FCLAA). The coal leasing program managed by BLM encourages the development of domestic oil, gas, and coal reserves and reduction of the US dependence on foreign sources of energy. As a result of the leasing and subsequent mining and sale of federal coal resources in the PRB, the public receives lease bonus payments, lease royalty payments, and a supply of low cost, low sulfur coal for power generation.

The Buckskin Mine, as currently permitted, includes 7,602.11 acres. As of January 1, 2002, Buckskin had an estimated 512 million tons of in-place federal coal reserves remaining at the mine, and the company estimates that approximately 434 million tons of those remaining reserves are recoverable. Triton's currently approved [by Wyoming Department of Environmental Quality, Air Quality Division (WDEQ/AQD)] air quality permit allows the production of up to 27.5 million tons of coal per year (mmtpy). The mine produced approximately 17.5 million tons in 2003. The company has applied for the coal reserves in the West Hay Creek LBA tract to extend the life of the Buckskin Mine. According to the most recent information from Triton, they would plan to produce approximately 25 mmtpy from the West Hay Creek LBA tract, which would extend the life of the mine by about five years. If the LBA tract is leased to Triton as a maintenance tract, Triton would have to revise their mine permit to include coal recovery in the new lease area before the coal could be mined. This process takes several years to complete. Triton is applying for federal coal reserves now so that they can negotiate new contracts and then complete the permitting process in time to meet anticipated new contract requirements.

This EIS analyzes the environmental impacts of issuing a federal coal lease and mining the federal coal in the West Hay Creek LBA tract as required by NEPA and associated rules and guidelines. A decision to hold a competitive sale and issue a lease for the lands in this application is a prerequisite for mining, but it is not the enabling action that would allow mining to begin. The BLM does not authorize mining operations by issuing a lease. After a lease has been issued but prior to mine development, the lessee must file a permit application package with the WDEQ, Land Quality Division (LQD) and OSM for a surface mining permit and approval of the MLA mining plan. An analysis of a site-specific mining and reclamation plan occurs at that time. Authorities and responsibilities of the BLM and other concerned regulatory agencies are described in the following sections.

## **REGULATORY AUTHORITY AND RESPONSIBILITY**

The Triton coal lease application was submitted and will be processed and evaluated under the following federal authorities:

- MLA, as amended;
- Multiple-Use Sustained Yield Act of 1960;
- NEPA;
- FCLAA;
- FLPMA; and
- Surface Mining Control and Reclamation Act of 1977 (SMCRA).

The BLM is the lead agency responsible for leasing federal coal lands under the MLA as amended by FCLAA and is also responsible for preparation of this EIS.

The West Hay Creek LBA tract is included in the area covered by the BLM *Approved Resource Management Plan (RMP) for Public Lands Administered by the Bureau of*

*Land Management Buffalo Field Office (BLM 2001)*. There are no US Forest Service (FS) lands included in the West Hay Creek LBA tract. Therefore, the FS is not a cooperating agency on this EIS, and FS consent will not be required if a lease sale is held.

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

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

If a proposed LBA tract is leased to an existing mine, the lessee is required to revise its coal mining permit before mining the coal, following the processes outlined above. As a part of that process, a new mining and reclamation plan would be developed showing how the lands in the LBA tract would be mined and reclaimed. The revised permit area would be larger than the revised lease area in order to allow for disturbances outside the actual coal removal areas for such purposes as reclaiming to undisturbed topography, constructing flood control and sediment control facilities, and related activities. Specific impacts which would occur during the mining and reclamation of the LBA tract would be addressed in the mining and reclamation plans as well as specific mitigation measures.

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

BLM also has a responsibility to consult with and obtain the comments of other state or federal agencies which have jurisdiction by law or special expertise with respect to potential environmental impacts. Appendix A presents other federal and state permitting requirements that must be satisfied to mine this LBA tract.

## **RELATIONSHIP TO BLM POLICIES, PLANS, AND PROGRAMS**

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

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

## **CONFORMANCE WITH EXISTING LAND USE PLANS**

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

Coal land use planning involves four planning screens to determine whether the subject coal is acceptable for further lease consideration. The four coal screens are:

- development potential of the coal lands;
- unsuitability criteria application;
- multiple land use decisions that eliminate federal coal deposits; and
- surface owner consultation.

Only those federal coal lands that pass these screens are given further consideration for leasing. BLM applied these coal screens to federal coal lands in Campbell County in the early 1980s. The results were published in the Buffalo RMP. In 1993, BLM began the process of reapplying these screens to federal coal lands in Campbell, Converse, and Sheridan counties. This analysis was adopted in the BLM Buffalo Field Office RMP update, discussed above. The results of this analysis are included in appendix D of the Buffalo RMP (BLM 2001).

A coal tract that is acceptable for further consideration for leasing must be located within areas that have been determined to have coal development potential. The BLM



has determined that the land in this coal lease application is within the area identified as having coal development potential.

The coal mining unsuitability criteria listed in the federal coal management regulations (43 CFR 3461) have been applied to high to moderate coal development potential lands in the Wyoming Powder River Basin. Appendix B summarizes the unsuitability criteria, describes the general findings for the Buffalo RMP, and presents a validation of these findings for the West Hay Creek LBA tract.

As indicated in appendix B, no lands in the West Hay Creek LBA tract have been found to be unsuitable for mining.

Surface owner consultation was completed during the preparation of the coal screening analyses published in 1985 and 2001. The surface on the West Hay Creek LBA tract is owned entirely by Triton.

As part of the coal planning for the 1985 Buffalo RMP, a multiple land use conflict analysis was completed to identify and eliminate additional coal deposits from further consideration for leasing to protect resource values of a locally important or unique nature not included in the unsuitability criteria, in accordance with 43 CFR 3420.1-4e(3). The 1985 multiple use conflict evaluation in the Buffalo RMP identified approximately 221,000 acres within Campbell, Sheridan, and Johnson counties that were potentially affected by multiple use conflicts in four categories (producing oil and gas fields, communities, recreation and public purpose facilities, and cultural resources). No lands within the West Hay Creek LBA tract were identified as potentially affected by multiple use conflicts.

No additional lands were specifically identified as potentially affected by multiple use conflicts in the multiple use analysis referenced in the 2001 Buffalo RMP update.

The 1985 Buffalo RMP addressed coal and oil and gas development conflicts in two planning decisions. Decision MM-4 recommended authorizing oil and gas drilling on coal leases only where drilling would not conflict with coal mining. Decision MM-5 recommended deferring coal leasing in producing oil and gas fields until coal development would not interfere with economic recovery of the oil and gas resource, as determined on a case by case basis. The multiple use analysis published in the 2001 Buffalo RMP update did not recommend changes to the existing 1985 RMP decisions.

As previously mentioned, the PRRCT reviewed the West Hay Creek lease application at a public meeting on October 25, 2000, in Cheyenne, Wyoming. The PRRCT recommended that the BLM proceed with leasing this tract.

Coal bed methane (CBM) wells have been drilled or are permitted to drill inside the West Hay Creek tract (see "Mineral Resources" section). BLM has approved applications to drill CBM wells on federal oil and gas leases inside the LBA tract so that the oil and gas lessees can start recovering the CBM resources. BLM has also

identified federal oil and gas leases and corresponding lessees within the Buckskin Mine's existing coal leases. Those oil and gas lessees have been and are being contacted and encouraged to develop and recover the CBM resources prior to coal mining. This approach is consistent with BLM's policy on conflicts between coal and CBM development, which is explained in BLM Instruction Memorandum No. 2003-253 (on file at the BLM's Casper Field Office). BLM's policy is to optimize the recovery of both resources and ensure that the public receives a reasonable return.

In summary, the lands in the West Hay Creek LBA tract have been subjected to the coal planning screens and determined acceptable for further lease consideration. Thus, a decision to lease the federal coal lands in this application would be in conformance with the BLM Buffalo RMP.

## **CONSULTATION AND COORDINATION**

### **Initial Involvement**

BLM received the West Hay Creek coal lease application on August 31, 2000. The application was initially reviewed by the BLM, Wyoming State Office, Division of Mineral and Lands. The BLM ruled that the application and lands involved met the requirements of regulations at 43 CFR 3425, Leasing on Application.

Notice that this application had been received was published in the *Federal Register* September 12, 2000. The Governor of Wyoming was notified on October 3, 2000, that Triton had filed a lease application with BLM for the West Hay Creek LBA tract. Copies of the notice were sent to voting and nonvoting members of the PRRCT, including the governors of Wyoming and Montana, the Northern Cheyenne Tribe, the Crow Tribal Council, OSM, United States Fish and Wildlife Service (FWS), National Park Service, and United States Geological Survey (USGS).

The PRRCT reviewed this lease application at a public meeting held on October 25, 2000 in Cheyenne, Wyoming. Triton presented information about their existing mine and pending lease application to the PRRCT at that meeting. The PRRCT recommended that the BLM process this application. The major steps in processing an LBA are shown in appendix C.

The BLM filed a Notice of Intent to prepare an EIS and Notice of Scoping in the *Federal Register* on June 25, 2002 and requested public comment.

A public scoping meeting was held on June 26, 2002 in Gillette, Wyoming. At the public meeting, Triton personnel presented information about their mine and their need for the coal. The presentation was followed by a question and answer period, during which one public comment was received. The scoping period extended from June 1 through July 31, 2002 during which time BLM received eight written comments.

Chapter 5 provides a list of other federal, state, and local governmental agencies that were consulted in preparation of this EIS (table 5-1) as well as the distribution list for this EIS (table 5-3).

### **Issues and Concerns**

Issues and concerns expressed by the public and government agencies relating to the West Hay Creek coal lease application and previous coal lease applications included:

- potential conflicts with existing conventional oil and gas development and existing and proposed CBM development;
- cumulative impacts of mineral development to all other resources;
- validity and currency of resource data;
- public access;
- potential impacts to threatened and endangered species and other species of concern;
- potential air quality impacts (including cumulative impacts to visibility);
- potential surface and groundwater quality and quantity impacts;
- potential impacts of and possible mitigation for nitrogen oxide emissions resulting from blasting of coal and overburden;
- the need to address increasing coal production in the Powder River Basin in the cumulative analysis;
- potential impacts on cultural and paleontological resources;
- wetland impacts;
- short- and long-term impacts on fish and wildlife.

### **Draft EIS (DEIS)**

Parties on the distribution list were sent copies of the DEIS, and copies were made available for review at the BLM offices in Casper and Cheyenne. The US Environmental Protection Agency (EPA) published a notice announcing the availability of the DEIS in the *Federal Register* on March 28, 2003. BLM published a Notice of Availability and Notice of Public Hearing in the *Federal Register* on March 21, 2003. A 60-day comment period on the DEIS commenced with publication of the EPA's Notice of Availability and ended on May 30, 2003.

The BLM's *Federal Register* notice announced the date and time of a public hearing, as required under 43 CFR 3425.4 (a) (1). The public hearing was held at the Clarion Western Plaza in Gillette, Wyoming, at 7:00 p.m., on April 16, 2003. The purpose of the public hearing was to solicit public comments on the DEIS and on the fair market value, the maximum economic recovery, and the proposed competitive sale of federal coal from the LBA tract. One comment was recorded at the public hearing. A transcript of the hearing can be viewed at the BLM offices in Casper and Cheyenne.

## Department of Justice Consultation

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

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## CHAPTER 2: PROPOSED ACTION AND ALTERNATIVES

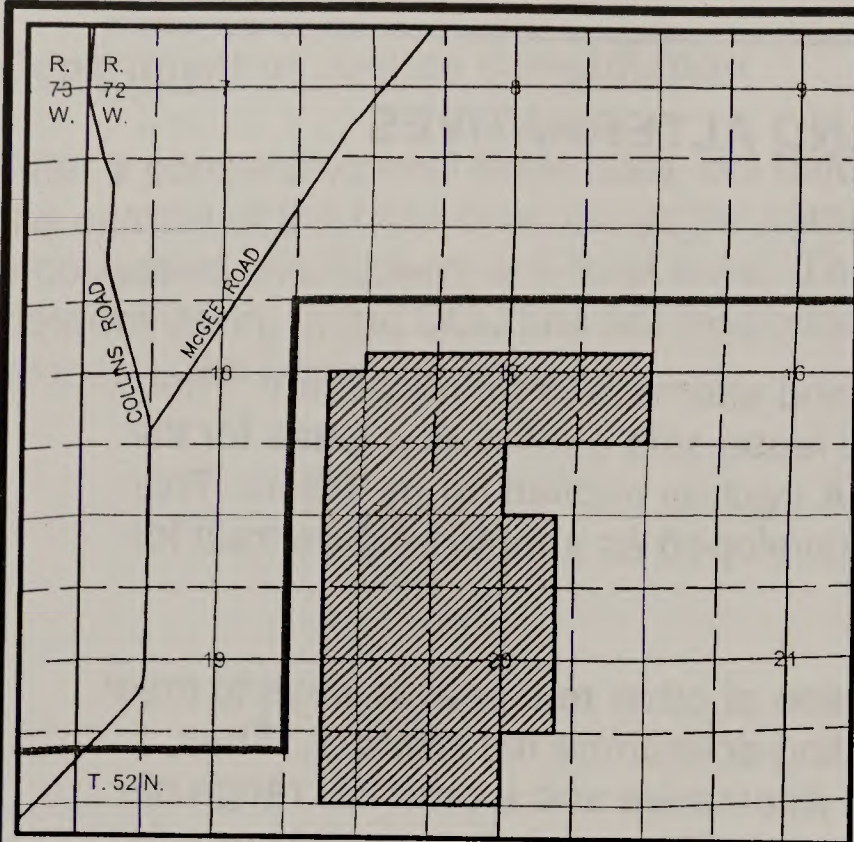
### INTRODUCTION

This chapter describes the Proposed Action and alternatives to this action. The Proposed Action is to hold a competitive coal lease sale and issue a lease for the federal coal lands in the West Hay Creek LBA tract as applied for by Triton. This alternative assumes that the tract would be developed as a maintenance tract for the Buckskin Mine.

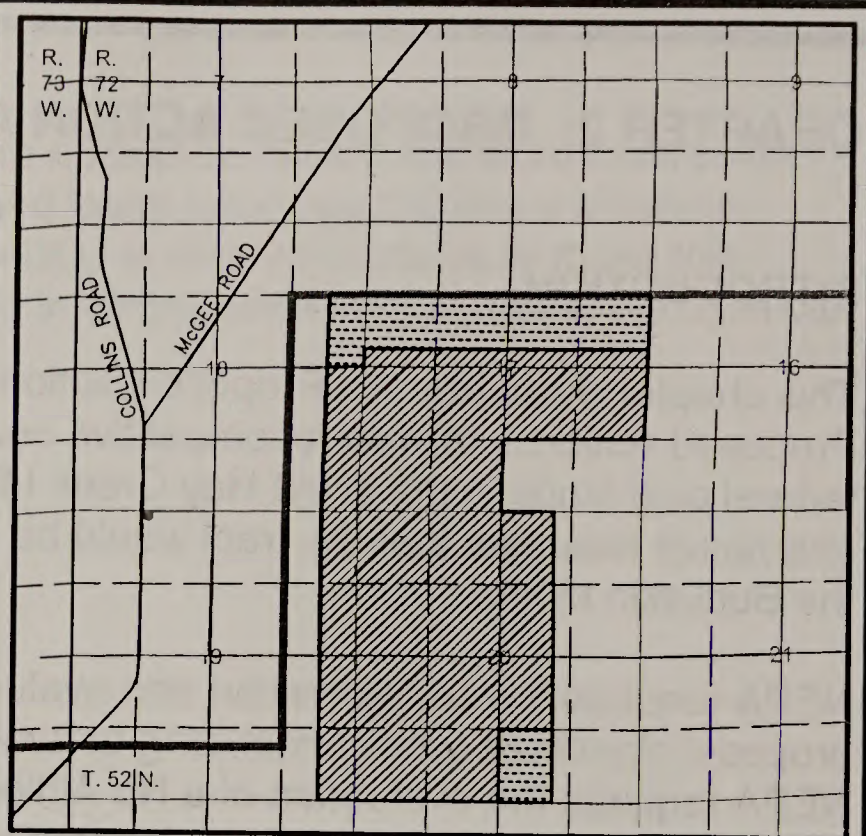
NEPA requires the consideration and evaluation of other reasonable ways to meet proposal objectives while minimizing or avoiding environmental impacts. Thus, NEPA requires the evaluation of a No Action Alternative and a practical range of other "reasonable" action alternatives that may avoid or minimize project impacts. Reasonable alternatives are defined by NEPA as those that are technically, economically, and environmentally practical and feasible. Reasonable alternatives are formulated to address issues and concerns raised by the public and agencies during scoping. These alternatives should represent another means of satisfying the stated purpose and need for the federal action. BLM Manual 3420-1 requires the BLM to evaluate the configuration of the tract based on providing for maximum economic recovery of the coal resource, maintaining or increasing the potential for competition, and avoiding future bypass or captive tract situations. If BLM identifies alternate tract configurations that meet these criteria, they are considered as alternatives to the Proposed Action.

The No Action Alternative (Alternative 1) is to reject the West Hay Creek lease application. Under the No Action Alternative, the tract would not be offered for competitive sale; existing mining at the Buckskin Mine would continue as permitted. Selection of the No Action Alternative would not necessarily preclude mining in this area as the applicant or some other party could submit another application to lease this coal in the future.

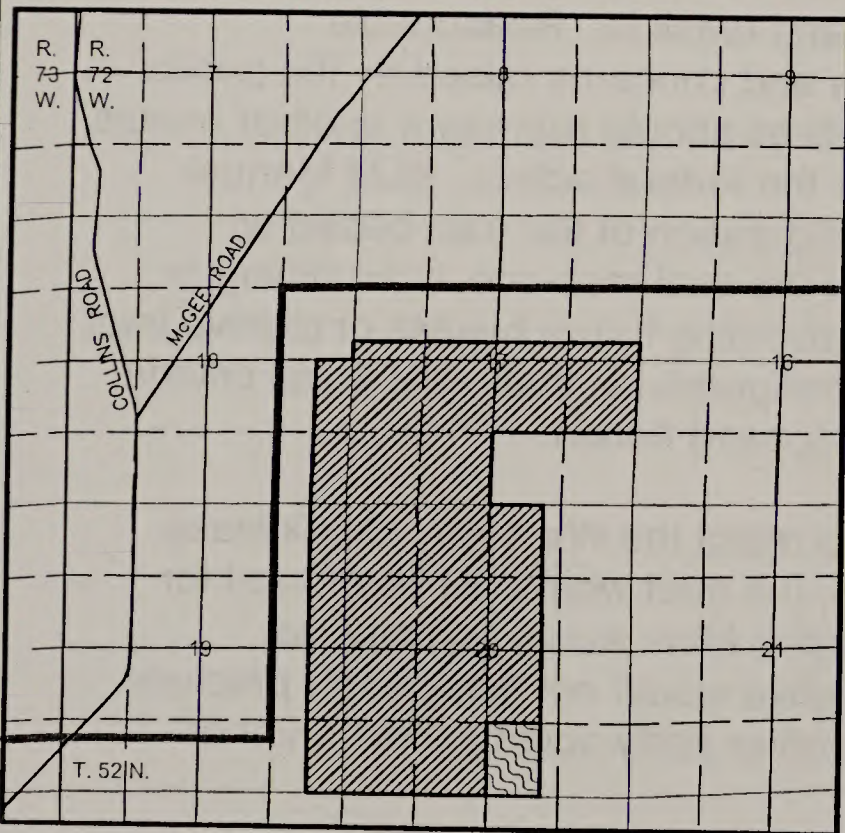
Alternatives 2 and 3 evaluate alternate tract configurations in which BLM considers adding coal to the tract as applied for. In evaluating this lease application, BLM identified a study area that includes adjacent unleased federal coal north and southeast of the West Hay Creek LBA tract as applied for. Alternative 2 evaluates adding all or part of the coal included in the entire study area to the tract as applied for. Alternative 3 evaluates adding only the coal included in the southeastern portion of the study area to the tract as applied for. Under alternatives 2 and 3, a competitive sale would be held and a lease issued for federal coal lands included in a tract modified by the BLM. The West Hay Creek LBA tract as applied for (Proposed Action) and the study area evaluated by BLM under alternatives 2 and 3 are shown in figure 2-1.



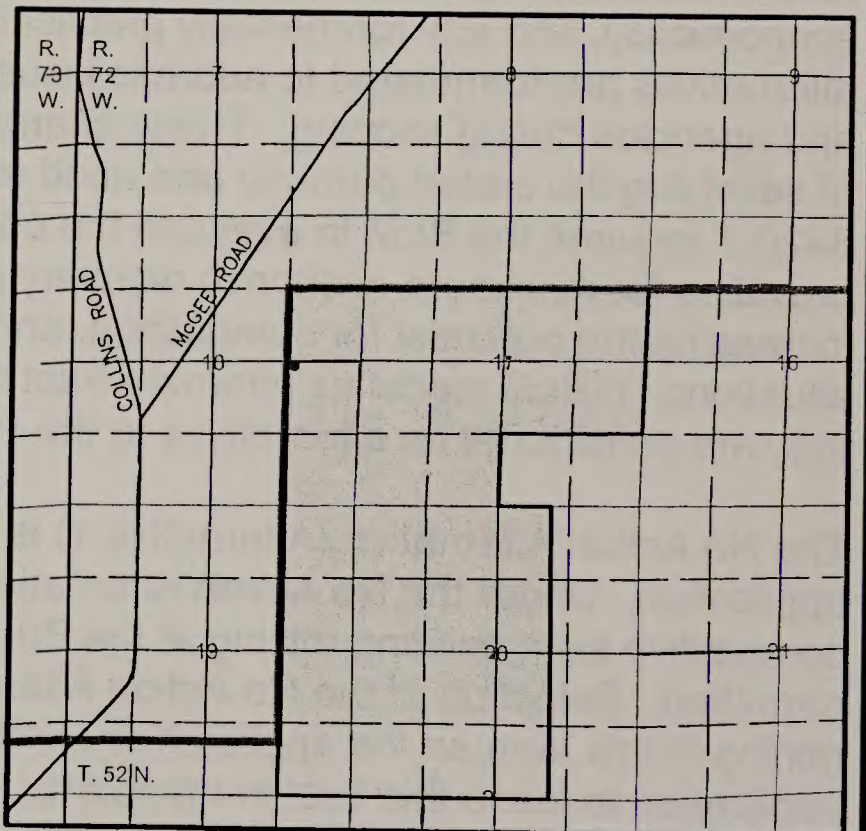
WEST HAY CREEK LBA TRACT AS APPLIED FOR  
(Proposed Action)



WEST HAY CREEK LBA TRACT ALTERNATIVE 2

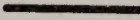
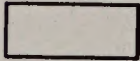





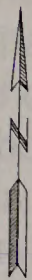
WEST HAY CREEK LBA TRACT ALTERNATIVE 3



WEST HAY CREEK LBA TRACT ANALYSIS AREA

LEGEND

-  BUCKSKIN MINE PERMIT BOUNDARY
-  WEST HAY CREEK LBA TRACT ANALYSIS AREA
-  WEST HAY CREEK LBA TRACT AS APPLIED FOR (Proposed Action)
-  AREA ADDED BY BLM UNDER ALTERNATIVE 2
-  AREA ADDED BY BLM UNDER ALTERNATIVE 3



SCALE: 1" = 5000'

Figure 2-1. West Hay Creek LBA Tract Configurations.

Other alternatives considered but not analyzed in detail include:

- holding a competitive lease sale and issuing a lease for federal coal lands included in the West Hay Creek tract (as applied for or as modified by BLM), with the assumption that the tract would be developed as a stand-alone mine (Alternative 4); or
- delaying the sale of the West Hay Creek LBA tract in order to take advantage of higher coal prices and/or to allow recovery of the potential CBM resources in the tract before mining (Alternative 5). Under this alternative, it is assumed that the tract could be developed as a maintenance tract or a new start mine, depending on how long the sale is delayed.

LBA tracts are nominated for leasing by companies with an interest in acquiring them but, as discussed in chapter 1, the LBA process is, by law and regulation, an open, public, competitive sealed-bid process. If the decision reached after this EIS is completed is to hold a lease sale, the applicant (Triton) may or may not be the high bidder.

The Proposed Action and alternatives 2 and 3 (the action alternatives) considered in this EIS assume that Triton would be the successful bidder if a competitive sale is held, and that the West Hay Creek LBA tract would be mined as a maintenance tract for the permitted Buckskin Mine.

If a decision is made to hold a competitive lease sale and there is a successful bidder, a detailed mining and reclamation plan must be developed by the successful bidder and approved before mining can begin. As part of the approval process, the mining and reclamation plan would undergo detailed review by state and federal agencies. This plan could potentially differ from the plan used to analyze the impacts of the Proposed Action and alternatives 2 and 3 in this EIS, but the differences would not be expected to significantly change the impacts described here. These differences would typically be related to the details of mining and reclaiming the tract, but major factors (tons of coal mined, yards of overburden removed, acres disturbed, etc.) would not be notably different from the plan used in this analysis.

The Proposed Action and action alternatives assume that an area larger than the tract would have to be disturbed in order to recover all of the coal in the tract. The disturbances outside the coal removal area would be due to activities like overstripping, matching undisturbed topography, and constructing flood control and sediment control structures.

## THE PROPOSED ACTION

Under the Proposed Action, the West Hay Creek LBA tract, as applied for by Triton, would be offered for lease at a competitive sale, subject to standard and special lease stipulations developed for the PRB (appendix D). The boundaries of the tract would be consistent with the tract configurations proposed in the West Hay Creek LBA tract lease application (figure 2-1). The Proposed Action assumes that Triton will be the successful bidder on the West Hay Creek LBA tract if it is offered for sale.

The legal description of the proposed West Hay Creek LBA tract coal lease lands as applied for by Triton under the Proposed Action is as follows:

T. 52 N., R. 72 W., 6th P.M., Campbell County, Wyoming

Section 17:	Lot 5 (S2S2)	10.265 acres
	6 (S2S2)	10.265
	7 (S2S2)	10.3475
	8 (S2S2)	10.3475
	9-14, inclusive;	247.24
Section 18:	Lot 13 (E2)	21.035
	20 (E2)	20.75
Section 19:	Lot 5 (E2)	20.71
	12 (E2)	20.84
	13 (E2)	20.935
	20 (E2)	21.065
Section 20:	Lot 2 (W2,W2E2)	31.1175
	3-6, inclusive;	165.38
	7 (W2, W2 E2)	31.1325
	10 (W2, W2E2)	31.1475
	11-14, inclusive	165.52
Total Acres		838.0975 acres

Land descriptions and acreage are based on the BLM Status of Public Domain Land and Mineral Title approved coal plat as of March 2, 2002.

As discussed in chapter 1 and appendix B, no lands in the West Hay Creek LBA tract were found to be unsuitable for mining. The tract as applied for includes approximately 838.0975 mineable acres. Triton estimates that it includes approximately 145 million tons of in-place coal, and that about 130 million tons of that coal would be recoverable. BLM will independently evaluate the volume and average quality of the coal resources included in the tract as part of the fair market value determination process. BLM's estimate of the mineable reserves and average quality of the coal included in the tract will be published in the sale notice if the tract is offered for sale. Some coal quality information in the area of the



West Hay Creek LBA tract is included in the "Geology" section in chapter 3.

The approved Buckskin mine permit (Triton 2002) includes monitoring and mitigation measures that are required by SMCRA and Wyoming state law. If Triton acquires the West Hay Creek LBA tract, these monitoring and mitigation measures would be extended to cover operations on the LBA tract when the coal mining permit is revised to include mining the tract. This permit would have to be approved before coal removal could take place. These monitoring and mitigation measures are considered to be a part of the Proposed Action and action alternatives during the leasing process because they are regulatory requirements.

The West Hay Creek LBA tract would be mined as an integral part of the Buckskin Mine under the Proposed Action. The Buckskin Mine is already operating under both an approved state mining permit and an MLA mining plan. As shown on figure 2-1, the LBA tract as applied for is entirely within the current Buckskin Mine permit boundary, and all environmental baseline studies have been conducted. Both the existing approved state mining permit and the MLA mining plan would require revision to include mining the LBA tract as applied for. Since the West Hay Creek LBA tract would be an extension of the existing Buckskin Mine, the facilities and infrastructure would be the same as those identified in the WDEQ/LQD Mine Permit 500 for the Buckskin Mine and the BLM's resource recovery and protection plan (R2P2) for the Buckskin Mine.

Triton's currently approved air quality permit from the WDEQ/AQD allows up to 27.5 million tons of coal per year. In 2002, the Buckskin Mine produced 18.3 million tons. In 2003, the mine produced approximately 17.5 million tons. Under the No Action Alternative, the 434 million tons of in-place leased federal coal reserves remaining as of January 1, 2002 will be mined in approximately 17 years at an average annual production rate of 25 million tons per year. Under the Proposed Action, Triton currently estimates that average annual production would be 25 million tons per year, and the life of the existing mine would be extended by approximately 5 years.

If Triton acquires the West Hay Creek LBA tract as applied for, they estimate that a total of 564 million tons of federal coal would be mined after January 1, 2002, with an estimated 130 million tons coming from the LBA tract. This estimate of recoverable reserves assumes that about 10% of the coal would be lost under normal mining practices, based on historical recovery factors at the Buckskin Mine. As of December 31, 2001, about 190 million tons of coal had been mined from within the current permitted area of the mine.

Topsoil removal would be performed before the overburden is removed. Whenever possible, direct transport to a reclamation area would be done, but due to scheduling, some topsoil would be temporarily stockpiled. As required by the reclamation plan, heavy equipment would be used to haul and distribute the stockpiled topsoil.

The Buckskin Mine is one of several coal mines currently operating in the PRB where the coal seams are notably thick, and the overburden is relatively thin. The truck-shovel mining method and hydraulic excavator have to date been used for overburden stripping and coal mining at the mine. The overburden is excavated and loaded into trucks by electric-powered shovels. Overburden would be removed within the West Hay Creek LBA tract by truck-shovel operations. Most overburden and all coal would be drilled and blasted to facilitate efficient excavation. As overburden is removed, most would be directly placed into areas where coal has already been removed. Elevations consistent with an approved post-mining topography (PMT) plan would be established as quickly as possible. Under certain conditions, the PMT may not be immediately achievable. This would occur when there is an excess of material which may require temporary stockpiling; when there is insufficient material available from current overburden removal operations; or when future mining could redisturb an area already mined.

Coal would be produced from two coal seams, which Triton refers to as the Anderson and Canyon, at several working faces to enable blending of the coal to meet customer quality requirements, to comply with BLM lease requirements for maximum economic recovery of the coal resource, and to optimize coal removal efficiency with available equipment. There are two existing crushing facilities within the Buckskin Mine permit area that provide the capacity to produce the permitted level. The two facilities employ one-stage crushing to size the coal to a nominal two-inch product. There are a total of 11 storage silos. While sufficient capacity exists, future facilities may be constructed to improve operating efficiency and air quality protection.

Current employment at the Buckskin Mine is 199. Production plans for the Buckskin Mine call for an increase to 25 million tons per year in 2004, with employment estimated at 225. If the LBA tract is acquired, Triton anticipates that production would be 25 million tons per year, and employment would be 225 persons.

### **Hazardous and Solid Waste**

Solid waste, which is produced at the existing Buckskin Mine, consists of floor sweepings, shop rags, lubricant containers, welding rod ends, metal shavings, worn tires, packing material, used filters, and office and food wastes. The mine disposes of its solid wastes within its permit boundary in accordance with the WDEQ-approved solid waste disposal plan. Sewage is handled by WDEQ-permitted sewage systems at the existing mine facilities. Maintenance and lubrication of most of the equipment takes place at shop facilities at the mine.

Major lubrication and oil changes of most equipment are performed inside the service building lube bays, where used oil is currently contained and deposited in storage tanks. Used oil is disposed of in accordance with WDEQ Solid and Hazardous Waste Division (SHWD) regulations.

Triton has reviewed the EPA's *Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Re-authorization Act (SARA) of 1986* (as amended) and EPA's *List of Extremely Hazardous Substances* as defined in 40 CFR 355 (as amended) for hazardous substances used at the Buckskin Mine. Triton maintains files containing material safety data sheets for all chemicals, compounds, and/or substances which are or would be used during the course of mining.

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

Any release of hazardous or extremely hazardous substances in excess of the reportable quantity, as established in 40 CFR 117, is reported as required by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended. The materials for which such notification must be given are the extremely hazardous substances listed in section 302 of the Emergency Planning and Community Right to Know Act and the hazardous substances designated under section 102 of CERCLA, as amended. If a reportable quantity of a hazardous or extremely hazardous substance is released, immediate notice must be given to the WDEQ Solid and Hazardous Waste Division and all other appropriate federal and state agencies.

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

- spill prevention control and countermeasure plans;
- spill response plans;
- inventories of hazardous chemical categories pursuant to section 312 of SARA, as amended; and
- emergency response plans.

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

Compliance with these rules is the current practice at Buckskin Mine. Acquisition of the West Hay Creek LBA tract by Triton would not change these current practices nor the amount or type of any wastes generated or disposed at the mine, although quantities of some wastes would increase in proportion to anticipated increases in coal production (fuel, lubricants, and shop and office wastes).

### **ALTERNATIVE 1: NO ACTION ALTERNATIVE**

Under the No Action Alternative, Triton's coal lease application would be rejected, the West Hay Creek LBA tract would not be offered for competitive sale, and the coal contained within the tract would not be mined. Rejection of the application would not affect permitted mining activities on existing leases at the adjacent Buckskin Mine. The mine currently leases approximately 4,949 acres of federal coal, about 160 acres of private coal, and about 640 acres of state coal (of which only 372 acres are within the permit boundary). Approximately 5,099 acres will eventually be affected. Under the No Action Alternative, Triton estimates that average annual production at the Buckskin Mine after 2002 will be 25 mmtpy, and average employment will be 225 persons. Portions of the surface of the LBA tract will be disturbed due to overstripping to allow coal to be removed from existing, contiguous leases.

In order to compare the economic and environmental consequences of mining these lands versus not mining them, this EIS analysis was prepared under the assumption that the West Hay Creek tract would not be mined in the near future if the No Action Alternative were selected. However, selection of this alternative would not preclude leasing and mining of this tract in the future, either as a maintenance tract for an existing operation or as part of a new start mine.

### **ALTERNATIVE 2: THE PREFERRED ALTERNATIVE**

Under Alternative 2, BLM would hold a competitive lease sale and issue a lease for a tract that is larger than the applied for configuration to the successful bidder. The modified tract would be subject to standard and special lease stipulations developed for the PRB and this tract (appendix D)

In evaluating the West Hay Creek coal lease application, BLM identified a study area, shown in figure 2-1 as "West Hay Creek LBA Tract Alternative 2" that includes unleased federal coal to the north and adjacent to the southeast corner of the tract as applied for. The study area includes approximately 176.2 acres and 25 million tons of in-place coal.

In identifying the northern study area, BLM wanted to evaluate the potential that another configuration of the tract would provide for more efficient recovery of the federal coal and/or increase competitive interest in the West Hay Creek LBA tract and the remaining unleased federal coal in this area.

In identifying the southeastern study area, BLM was concerned with the unleased lot of federal coal in Section 20 between the tract as applied for and the existing leases at the Buckskin Mine (See figure 1-2). If this lot is not leased with the adjacent federal coal, any mineable federal coal in the lot would potentially be bypassed when the surrounding coal is mined. (Note: Figure 1-2 also shows a gap between the LBA tract and the existing Buckskin leases in Section 17; the coal in that lot is private coal.) Before the Buckskin Mine applied for the West Hay Creek LBA, they evaluated the area adjacent to the southeast corner of the tract as applied for. The mine did not incorporate this area into their application because their current geologic model does not indicate that any mineable coal is present. As described in chapter 3, (Geology), modeling indicates the presence of a geologic anomaly along the southern portion of the tract.

The BLM's Preferred Alternative would add all of the study area to the southeast (approximately 31.16 acres) and a portion of the study area to the north (approximately 51.90 acres), as illustrated in figure 2-2. BLM added the southeast part of the study area to the Preferred Alternative because, if it is leased with the surrounding coal, it could be mined if additional drilling does indicate that there is some recoverable coal in the area. BLM added a portion of the study area the north of the tract as applied for to the Preferred Alternative in order to eliminate the notch in the northwest corner of the tract as applied for, as shown in figure 2-1. This would facilitate more efficient recovery of the coal.

The following lands would be added to the tract under the BLM's Preferred Alternative:

Section 17	Lot 5 (N2S2)	10.265
	6 (N2S2)	10.265
	7 (N2S2)	10.3475
	8 (N2S2)	10.3475
Section 18:	Lot 12 (SE4)	10.6725
Section 20:	Lot 15 (W2, W2E2)	31.1625
Total acres:		83.06 acres

Triton estimates the 83.06 acres which BLM would be added under the Preferred Alternative includes approximately 15 million tons of in-place coal, and that about 10 million tons of that coal would be recoverable.

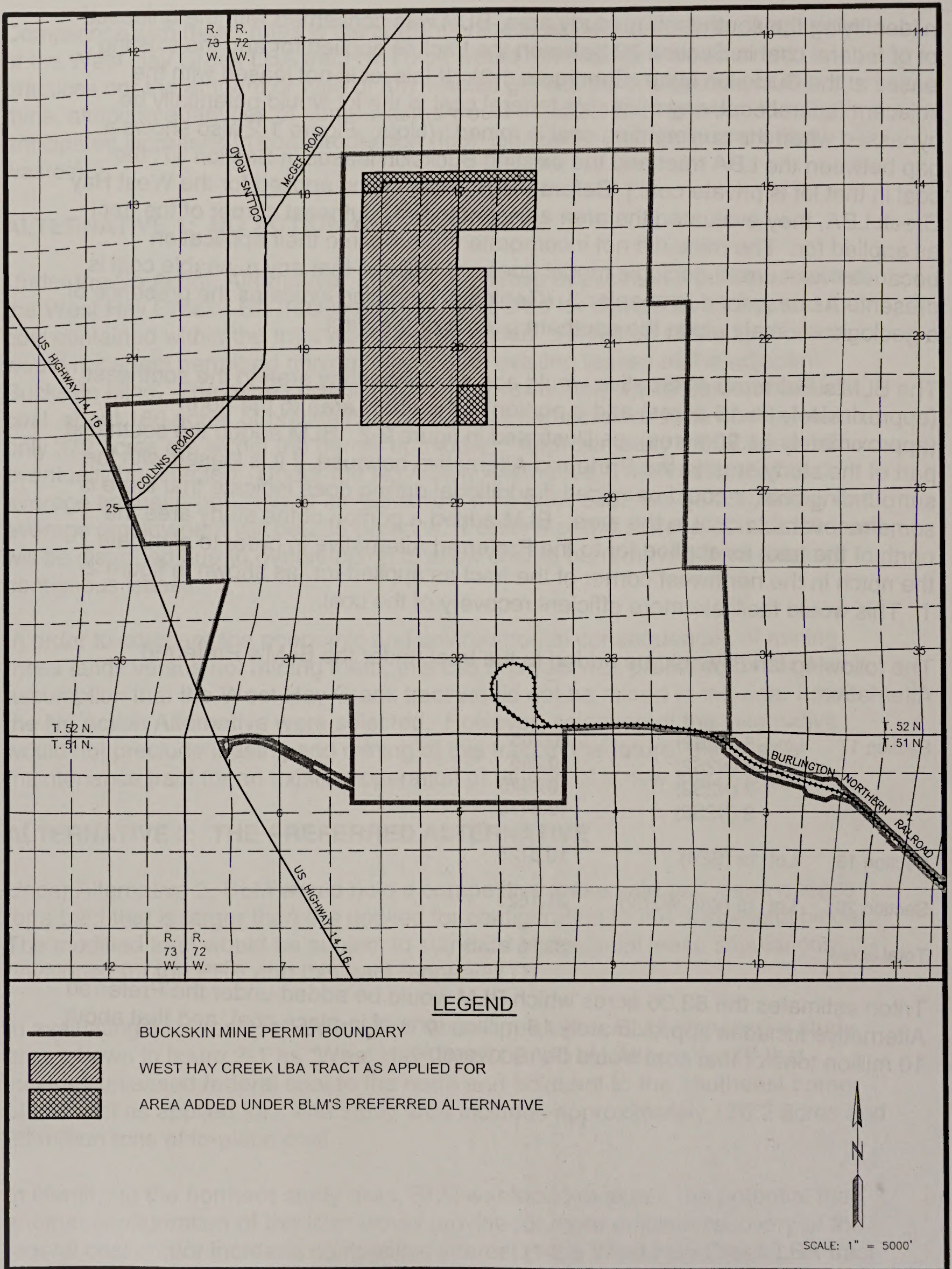


Figure 2-2. West Hay Creek LBA Preferred Alternative Tract Configuration.

The legal description of the West Hay Creek LBA Tract under the BLM's Preferred Alternative is:

T. 52 N., R. 72 W., 6<sup>th</sup> P.M., Campbell County, Wyoming

Section 17:	Lot	5 (S2)	20.53
		6 (S2)	20.53
		7 (S2)	20.695
		8 (S2)	20.695
		9-14, inclusive;	247.24
Section 18:	Lot	12 (SE4)	10.6725
		13 (E2)	21.035
		20 (E2)	20.75
Section 19:	Lot	5 (E2)	20.71
		12 (E2)	20.84
		13 (E2)	20.935
		20 (E2)	21.065
Section 20:	Lot	2 (W2, W2E2)	31.1175
		3-6, inclusive	165.38
		7 (W/2, W2E2)	31.1325
		10 (W2, W2E2)	31.1475
		11-14, inclusive	165.52
		15 (W2, W2E2)	31.1625

Total acres: 921.1575 acres

Triton estimates that the reconfigured tract includes approximately 160 million tons of in-place coal, and that approximately 140 million tons of that coal would be recoverable. BLM will independently evaluate the volume and average quality of the coal resources included in the tract offered for sale as part of the fair market value determination process.

As shown in figure 2-2, the Preferred Alternative is entirely within the Buckskin Mine permit boundary, and all environmental studies have been conducted. Both the existing approved state mining permit and MLA mining plan would require revision to include mining the tract under the Preferred Alternative. This alternative assumes that the tract would be developed as a maintenance tract for the Buckskin Mine. Production and employment would be similar to the Proposed Action. Other assumptions would also be the same as for the Proposed Action. Since the West Hay Creek LBA tract would be an extension of the existing Buckskin Mine, the facilities and infrastructure would be the same as those identified in the WDEQ/LQD Mine Permit 500 for the Buckskin Mine and the BLM R2P2 for the Buckskin Mine.

### ALTERNATIVE 3

Under Alternative 3, BLM would hold a competitive lease sale and issue a lease for a tract that is larger than the applied for configuration, if a sale is held and there is a successful bidder. The modified tract would be subject to standard and special lease stipulations developed for the PRB and this tract (appendix D). BLM is considering this tract configuration for the West Hay Creek LBA tract in order to minimize the risk of bypassing federal coal that would potentially become economically unrecoverable if it is not included in this tract.

As part of the preliminary geologic analysis of the federal coal resources in and around the West Hay Creek LBA tract, the BLM identified unleased federal coal southeast of the tract as applied for that would be isolated and might be bypassed if it is not included in the tract.

Specifically, this alternative would add approximately 31.1625 acres of unleased federal coal in the  $W\frac{1}{2} W\frac{1}{2} E\frac{1}{2}$  of lot 5 in section 20. As discussed above, the mine did not incorporate this area into their application because their current geologic model does not indicate that any mineable coal is present. BLM is considering adding this area to the lease because, as the model becomes further defined by additional drilling information, there may be portions of the area that include mineable coal.

The Alternative 3 tract is described as follows:

T. 52 N., R. 72 W., 6th P.M., Campbell County, Wyoming

Section 17:	Lot	5 (S2S2)	10.265 acres
		6 (S2S2)	10.265
		7 (S2S2)	10.3475
		8 (S2S2)	10.3475
		9	41.32
		9-14, inclusive;	247.24
Section 18:	Lot	13 (E2)	21.035
		20 (E2)	20.75
Section 19:	Lot	5 (E2)	20.71
		12 (E2)	20.84
		13 (E2)	20.935
		20 (E2)	21.065
Section 20:	Lot	2 (W2, W2E2)	31.1175
		3-6, inclusive;	165.38
		7 (W2, W2E2)	31.1325
		10 (W2, W2E2)	31.1475
		11-14, inclusive	165.52
		15 (W2, W2E2)	31.1625

Total acres: 869.26 acres



Since Triton estimates that no additional coal would be recoverable if this area is added to the tract, they estimate that the tract would include approximately 130 million tons of recoverable coal. BLM will independently evaluate the volume and average quality of the coal resources included in the tract offered for sale as part of the fair market value determination process.

As shown on figure 2-1, the tract in this alternative is entirely within the current Buckskin Mine permit boundary, and all environmental baseline studies have been conducted. Both the existing approved state mining permit and the MLA mining plan would require revision to include mining the Alternative 3 tract. This alternative assumes that the tract would be developed as a maintenance tract for the Buckskin Mine. Other assumptions would also be the same as for the Proposed Action. Since the West Hay Creek LBA tract would be an extension of the existing Buckskin Mine, the facilities and infrastructure would be the same as those identified in the WDEQ/LQD mine permit 500 for the Buckskin Mine and the BLM R2P2 for the Buckskin Mine.

## **ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL**

### **Alternative 4**

Under this alternative, as under the Proposed Action and alternatives 2 and 3, the BLM would hold a separate, competitive, sealed-bid sale for the lands included in the West Hay Creek LBA tract. Alternative 4 assumes that the successful qualified bidder would be someone other than the applicant, and that this bidder would acquire the tract in order to open a new mine to develop the coal resources in the tract.

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

BLM currently estimates that a tract would potentially need to include as much as 500 to 600 million tons of coal in order to attract a buyer interested in opening a new mine in the Wyoming PRB. This is based on the assumptions that an operator would construct facilities capable of producing 30 mmtpy to take advantage of the economies of scale offered by the coal deposits in the PRB, and 20 to 30 years of coal reserves would be needed to justify the expense of building the facilities described above. Given these assumptions, under the Proposed Action or alternatives 2 or 3, the tract does not include sufficient coal resources to consider opening a new mine. Therefore, it is unlikely that a company would lease the West Hay Creek LBA tract in order to open a new mine, and this

alternative is not analyzed in detail in this EIS.

The environmental impacts of developing a new mine to recover the coal resources in the West Hay Creek LBA tract would be greater than under the Proposed Action, the No Action Alternative, or alternatives 2 or 3 because of the need for new facilities, new rail lines, new employment, and the creation of additional sources of particulates (dust). In the event that a lease sale is held and the applicant is not the successful bidder, the successful bidder would be required to submit a detailed mining and reclamation plan for approval before any the tract could be mined. This NEPA analysis would be reviewed and supplemented as necessary before that mining and reclamation plan is approved.

### **Alternative 5**

Under Alternative 5, the BLM would delay the sale of the West Hay Creek LBA tract as applied for to increase the benefit to the public afforded by higher coal prices and/or to allow more complete recovery of the potential CBM resources in the tract prior to mining.

There are two major sources of revenue to state and federal governments from the leasing and mining of federal coal: 1) the competitive bonus bid paid at the time the coal is leased, and 2) a 12.5% royalty collected when the coal is sold. This alternative could potentially increase the fair market value of the coal resources in the LBA tract, thus increasing the bonus bid when the coal is leased. The price paid for coal from northeastern Wyoming decreased by more than \$1.00 per ton from 1992 to 2000, while production of low sulfur PRB coal increased annually since 1992. Prices for PRB coal increased in 2001 and 2002, and are projected to remain stable or decrease slightly from 2004 through 2008 (WGS 2003). There is no assurance that delaying the sale would result in a higher coal price.

The fair market value of the tract and the resulting bonus payment to the government could increase if the lease sale is postponed and if PRB coal prices do increase. The postponement would not necessarily lead to higher royalty income to the state or federal governments. Royalty payments are the larger of the two revenue sources. They increase automatically when coal prices increase because they are collected at the time the coal is sold, but they cannot be collected until the coal is leased and permitted which takes several years. If leasing is delayed until prices increase, then by the time the coal is mined the higher coal prices may or may not persist. If the higher coal prices do persist, they may enable the coal lessee to negotiate longer term contracts at higher prices, which would result in longer term, higher royalty payments. In contrast, if the existing mining operation runs out of coal reserves before prices rise, the operations may have to be shut down before additional coal can be leased and permitted for mining. In that case, the fair market value of the coal may actually

drop because the added expense of reopening a mine or starting a new mine would have to be factored into the fair market value.

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

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

CBM resources are currently being recovered from oil and gas leases on the West Hay Creek LBA tract and there are several mechanisms in place that can be used to allow continuing recovery of the CBM resources prior to mining if the Federal coal in the tract is leased now:

- BLM will attach a Multiple Mineral Development stipulation to the lease which states that BLM has the authority to withhold approval of coal mining operations that would interfere with the development mineral leases issued prior to the coal lease [see Attachment 2(c)].
- Mining of the West Hay Creek LBA Tract cannot occur until the coal lessee has a permit to mine the tract approved by the Wyoming Department of Environmental Quality and a MLA mining plan approved by the Secretary of the Interior. Before the MLA mining plan can be approved, BLM must approve the Resource Recovery and Protection Plan (R2P2) for mining the tract. Prior to approving the R2P2, BLM can review the status of CBM development on the tract and the mining sequence proposed by the coal lessee. The permit approval process generally takes the coal lessee several years, during which time CBM can be recovered.
- BLM has a policy in place on CBM-coal conflicts (BLM Instruction Memorandum No. 2003-253), which directs BLM decision makers to optimize the recovery of both resources and ensure that the public receives a reasonable return.

This alternative was not analyzed in detail because it would not produce substantially different impacts from other alternatives analyzed in detail. Rental and royalty provisions in the proposed lease provide for the United States to benefit if coal prices

have increased by the time of mining. Moreover, recovery of a large portion of the economically-recoverable CBM resources on the tract would be anticipated after lease issuance because of the mechanisms discussed above.

The environmental impacts of mining the coal later as part of an existing mine would be expected to be similar and about equal to the Proposed Action and the action alternatives. If a new mine start is required to mine the coal, the environmental impacts would be expected to be greater than if it were mined as an extension of an existing mine.

## **COMPARISON OF ALTERNATIVES**

Figure 2-1 shows the locations of the Proposed Action and alternatives 2 and 3 for the West Hay Creek LBA tract. Table 2-1 is a summary comparison of coal production, surface disturbance, mine life, and projected federal and state revenues for the Proposed Action and alternatives 2 and 3 for the West Hay Creek LBA tract.

Table 2-2 presents a comparative summary of the direct and indirect environmental impacts of implementing each alternative as compared to the No Action Alternative. The No Action Alternative assumes completion of currently permitted mining at the Buckskin Mine for comparison to anticipated mining if the West Hay Creek LBA tract is leased. Table 2-3 presents a comparative summary of cumulative environmental impacts of implementing each alternative. The environmental consequences of the Proposed Action and alternatives are analyzed in chapter 4.

These summary impact tables are derived from the following explanation of impacts and magnitude. As required by NEPA, all agencies of the federal government are required to provide a detailed statement by the responsible official on:

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

TABLE 2-1

COMPARISON OF COAL PRODUCTION, SURFACE DISTURBANCE,  
AND MINE LIFE

Item	No Action Alternative (existing Buckskin Mine)	Added by Proposed Action	Added by Alternative 2 (Preferred Alternative)	Added by Alternative 3
In-place <sup>1</sup> federal coal (as of 1/1/02)	512 mmt	145 mmt	160 mmt	150 mmt
Recoverable coal <sup>2</sup> (as of 1/1/02)	434 mmt	130 mmt	140 mmt	130 mmt
Coal mined <sup>3</sup> , 12/31/01	189.9 mmt	---	---	---
Lease acres <sup>4</sup>	4,949 ac	838.0975 ac	921.1575 ac	869.26 ac
Total area to be disturbed <sup>4</sup>	5,099 ac	830 ac	897 ac	830 ac
Permit area <sup>4</sup>	7,602 ac	0 ac	0 ac	0 ac
Average annual post-2001 coal production	25 mmt	0 mmt	0 mmt	0 mmt
Remaining life of mine (post-2001)	17.4 yrs	5.2 yrs	5.6 yrs	0 yrs
Average no. of employees	225	0	0	0
Total projected state revenues (post-2001) <sup>5</sup>	\$477 million	\$143 million	\$154 million	\$143 million
Total projected federal revenues (post-2001) <sup>6</sup>	\$165 million	\$49 million	\$53 million	\$49 million

<sup>1</sup> In-place coal includes all Canyon and Anderson coal within the lease area.

<sup>2</sup> Buckskin Mine defines recoverable coal as an estimate of the extractable coal that can be recovered. This figure excludes all mining losses that occur during normal mining operations, including wedge losses, coal left in pillars and fenders, and top and bottom coal cleaning.

<sup>3</sup> Assumes 90% to 92% recovery of extractable coal.

<sup>4</sup> Lease area includes federal coal leases only and does not include state and private coal within the permit boundary. The permit area is larger than leased or disturbed areas to assure that all disturbed lands are within the permit boundary and to allow an easily defined legal land description. The additional disturbance areas are less than the additional lease areas for the action alternatives because portions of the lease areas are included in the existing disturbance area for Buckskin Mine. The permit area would not need to be changed for Alternative 3 or the Preferred Alternative.

<sup>5</sup> Projected revenue to the state of Wyoming is \$1.10 per ton of coal sold and includes income from severance tax, property and production taxes, sales and use taxes, and Wyoming's share of federal royalty payments (University of Wyoming 1994).

<sup>6</sup> Federal revenues based on \$4.00 per ton price x federal royalty of 12.5% x amount of recoverable coal plus bonus payment on LBA coal of \$0.26 per ton based on average of last 11 LBAs (table 1-1) x amount of recoverable coal less state's 50% share.

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

**TABLE 2-2**

**SUMMARY COMPARISON OF DIRECT AND INDIRECT IMPACTS**

(Chapter 4 contains an additional description of the impacts.)

RESOURCE	MAGNITUDE TYPE AND DURATION OF IMPACT (Impacts are assumed to be adverse unless otherwise indicated)	
	NO ACTION ALTERNATIVE	PROPOSED ACTION AND ALTERNATIVES
<b>TOPOGRAPHY AND PHYSIOGRAPHY</b>		
<p>The topography following reclamation would be gentler and more uniform. This topographic moderation would be permanent and would potentially result in:</p> <ul style="list-style-type: none"> <li>- a potential reduction in microhabitats habitat diversity, and big game carrying capacity.</li> <li>- a reduction in water runoff and peak flows which would potentially help reduce erosion, enhance vegetative productivity, and accelerate groundwater recharge.</li> </ul>	<p>Impacts would be moderate but long term on the existing mine area. Some impacts would be beneficial.</p>	<p>Same as the No Action Alternative on expanded area of coal removal.</p>
<b>GEOLOGY AND MINERALS</b>		
<p>Coal, overburden and topsoil would be removed, topsoil and overburden would be replaced. The physical characteristics of the overburden and topsoil would be permanently altered when it is replaced. Unsuitable overburden material would be placed in areas where it would not affect groundwater quality or revegetation success. Coal bed methane would be lost through venting and depletion of hydrostatic pressure. Subcoal conventional oil and gas resources could not be developed during mining.</p>	<p>Impacts would be moderate and long term to permanent on existing mine area.</p>	<p>Same as the No Action Alternative on expanded area of coal removal.</p>
<b>SOILS</b>		
<p>Changes to physical properties would include increased near-surface bulk density and more uniformity in soil type, thickness, and texture. Soil material that is not suitable to support plant growth would not be salvaged for use in reclamation</p>	<p>Impacts would be moderate but long-term on the existing mine area. Some changes to the physical properties would be beneficial.</p>	<p>Same as the No Action Alternative on expanded area of coal removal.</p>
<p>Changes in chemical properties would include more uniform soil nutrient distribution.</p>	<p>Changes to the chemical properties would have a beneficial, long-term effect on existing mine area.</p>	<p>Same as the No Action Alternative on expanded area of coal removal.</p>
<p>Changes in biological properties would include a reduction in organic matter and microorganism populations. The existing plant habitat in stockpiled soils would be reduced.</p>	<p>Changes in biological properties would be moderate and short-term to long-term on the existing mine area.</p>	<p>Same as the No Action Alternative on expanded area of coal removal.</p>
<b>AIR QUALITY</b>		
<p>Overburden and coal blasting, coal hauling and dumping, and operation of mining equipment would cause elevated concentrations of particulate matter and gaseous emissions. Public would potentially be exposed to elevated particulate and gaseous emissions along publicly accessible roads and in occupied dwellings located near mining operations.</p>	<p>Impacts would be moderate and short term on the existing mine permit and surrounding area.</p>	<p>Same as the No Action Alternative on the expanded area of coal removal and surrounding area.</p>

**TABLE 2-2**  
(continued)

**MAGNITUDE TYPE AND DURATION OF IMPACT**  
(Impacts are assumed to be adverse unless otherwise indicated)  
**PROPOSED ACTION AND ALTERNATIVES**

RESOURCE	NO ACTION ALTERNATIVE	PROPOSED ACTION AND ALTERNATIVES
<b>WATER RESOURCES</b>		
<p><b>Surface water:</b> Changes in runoff characteristics and sediment discharge would be associated with disruption of surface drainage systems. Sediment control structures would moderate peak flows and help control sediment downstream. Vegetation removal during mining could result in increased erosion rates. Loss of soil structure after reclamation would act to increase runoff rates, but topographic moderation would help increase infiltration.</p>	<p>Impacts would be moderate and short term to long term on existing mine area.</p>	<p>Same as the No Action Alternative on expanded area of coal removal.</p>
<p><b>Groundwater:</b> Coal and overburden aquifers would be removed; the replaced overburden would have altered hydraulic properties; water levels in affected coal and overburden aquifers adjacent to the mine would be depressed. Groundwater quality in backfilled areas would be changed but would be expected to be similar to premining aquifers.</p>	<p>Impacts would be minor to moderate and long term on the existing mine area.</p>	<p>Same as the No Action Alternative on expanded area of coal removal.</p>
<b>ALLUVIAL VALLEY FLOORS (AVFs)</b>		
<p>AVF's significant to agriculture can be disturbed but must be replaced; AVFs not significant to agriculture would be removed and restored.</p>	<p>No impact on existing mine area.</p>	<p>No AVFs on expanded area of coal removal.</p>
<b>WETLANDS</b>		
<p>Wetlands would be removed by mining operations.</p>	<p>Impacts would be moderate and long term on existing mine area. Jurisdictional wetlands would be replaced in accordance with section 404 of the Clean Water Act; non-jurisdictional wetlands would be replaced as required by the surface land owner or WDEQ/LQD.</p>	<p>Same as the No Action Alternative on expanded area of coal removal.</p>
<b>VEGETATION</b>		
<p>During mining, progressive removal of native vegetation would result in increased erosion, loss of wildlife and livestock habitat, and loss of wildlife habitat carrying capacity.</p>	<p>Impacts would be moderate and short-to long-term on existing mine area.</p>	<p>Same as the No Action Alternative on expanded area of coal removal.</p>
<p>After reclamation, vegetation patterns would be changed, vegetation diversity would be decreased, shrub density could be reduced and wildlife carrying capacity would potentially be reduced. Nonnative plant species would potentially invade.</p>	<p>Impacts would be minor to moderate and long term on existing mine area. Steps to control invasion by nonnative plant species would be implemented.</p>	<p>Same as the No Action Alternative on expanded area of coal removal.</p>



**TABLE 2-2**  
(continued)

RESOURCE	MAGNITUDE TYPE AND DURATION OF IMPACT (Impacts are assumed to be adverse unless otherwise indicated)	
	NO ACTION ALTERNATIVE	PROPOSED ACTION AND ALTERNATIVES
<b>WILDLIFE</b>		
During mining, wildlife would be displaced from and habitat would be lost in active mining areas. Wildlife movement through mine permit area would be restricted. Small mammal mortality would increase. Foraging and nesting habitat for raptors and migratory birds and breeding and brood-rearing habitat for sage grouse would be lost. Habitat for waterfowl and aquatic species would be disturbed. Mine-related traffic would be responsible for road kills.	Impacts would be minor to moderate and short term on existing mine area.	Same as the No Action Alternative on expanded area of coal removal.
After reclamation, big game habitat carrying capacity and habitat diversity on reclaimed lands would potentially be decreased. Changes in sagebrush density on reclaimed lands may limit sage grouse repopulation until premining conditions are restored. Post mining aquatic habitat may not duplicate premining habitat.	Impacts would be moderate and long term on existing mine area.	Same as the No Action Alternative on expanded area of coal removal.
<b>THREATENED, ENDANGERED, AND PROPOSED SPECIES</b>		
Black-footed ferret	As determined by previous consultation with FWS for all species	No effect
Bald eagle habitat.		May affect, not likely to adversely affect
Ute ladies'-tresses		May affect, not likely to adversely affect
Black-tailed prairie dog		No effect
<b>LAND USE AND RECREATION</b>		
Livestock grazing use and wildlife habitat in active mining areas would be reduced before reclamation. Oil and gas production and transportation facilities would be removed prior to mining. Subcoal oil and gas reservoirs would not be accessible for development during mining and before reclamation. CBM not recovered prior to mining would be permanently lost. Hunting access would be restricted during mining and reclamation.	Impacts would be moderate and short term to long term on existing mine area.	Same as No Action Alternative on expanded area of coal mining.
<b>CULTURAL RESOURCES</b>		
Historic and prehistoric sites and isolated artifacts would be disturbed. All sites that meet the eligibility requirements for the NRHP would be avoided or mitigated through data recovery. Potential for vandalism and unauthorized collection would increase.	Eligible or unevaluated sites on existing mine area must be avoided or mitigated through data recovery; ineligible sites may be destroyed without further work.	Same as No Action Alternative on expanded area of coal mining.

**TABLE 2-2**  
(continued)

**MAGNITUDE TYPE AND DURATION OF IMPACT**  
(Impacts are assumed to be adverse unless otherwise indicated)

RESOURCE	NO ACTION ALTERNATIVE	PROPOSED ACTION AND ALTERNATIVES
<b>NATIVE AMERICAN CONCERNS</b>	No impact identified on existing mine area. Native American consultation completed for existing mine permit area.	Same as the No Action Alternative on expanded area of coal removal. OSM completed Native American consultation on the lands within the analysis area in 2000.
<b>PALEONTOLOGICAL RESOURCES</b>	Minor, long-term to permanent on existing mine area, some impacts would be beneficial.	Same as the No Action Alternative on expanded area of coal removal.
Plant, invertebrate, and vertebrate fossil material in overburden and coal would potentially be lost. Potential for unauthorized collection and vandalism would increase. Buried fossil material would potentially be exposed for scientific examination.		
<b>VISUAL RESOURCES</b>	Impacts would be moderate and short term on existing mine area during mining and reclamation. Following reclamation, impacts would be minor and long-term.	Same as the No Action Alternative on expanded area of coal removal.
During mining, a landscape altered by presence of facilities and mining operations would be visible from roads and dwellings in the area. Following reclamation, slopes would be smoother and sagebrush would be less dense.		
<b>NOISE</b>	Impacts would be moderate and short term on existing mine and surrounding area.	Same as the No Action Alternative on expanded area of coal removal.
Increased noise levels during mining could affect occupied dwellings within 1 mile and wildlife in immediate vicinity.		
<b>TRANSPORTATION</b>	Impacts would be moderate, short-term for mining operations on existing mine area	Same as the No Action Alternative on expanded area of coal removal
Railroads would be used to ship coal, employees would travel to and from work on existing roads, existing pipelines, phone lines, and electrical lines would be removed prior to mining.		
<b>SOCIOECONOMICS</b>	Impacts would be moderate and short term for mining operations on existing mine area.	Impacts would be moderate, beneficial, and short term for mining operations on expanded area of coal removal.
State and federal governments would receive revenues from royalties and taxes. Campbell and Converse counties would benefit from economic development, stable employment, and taxes.		

**TABLE 2-3**

**SUMMARY COMPARISON OF CUMULATIVE IMPACTS**

(Chapter 4 for contains an additional description of the impacts.)

RESOURCE	MAGNITUDE TYPE AND DURATION OF IMPACT (Impacts are assumed to be adverse unless otherwise indicated)	
	NO ACTION ALTERNATIVE	PROPOSED ACTION AND ALTERNATIVES
<b>TOPOGRAPHY AND PHYSIOGRAPHY</b>		
After reclamation, reduced topographic diversity could lower big game carrying capacity, increase precipitation infiltration, and reduce peak flows in affected portion of drainages.	Impacts would be minor and long term in the three groups of mines within the corridor extending from north of Gillette to south of Wright; some impacts could be beneficial.	Same as the No Action Alternative on up to 921 additional acres of leased federal coal in the northern mine group.
<b>GEOLOGY AND MINERALS</b>		
Nonrenewable coal and CBM resources in the PRB would be removed to generate heat and power and would not be available for use in the future.	Impacts would be moderate and short term. Coal removal would affect approximately 24,715 acres of federal coal in the northern mine group.	Same as the No Action Alternative on up to 921 additional acres of leased federal in the northern mine group.
<b>SOILS</b>		
Soils would be removed and replaced in the mine disturbance areas. Soil disturbance associated with CBM and other proposed development would be less intensive, but would be more widespread.	Impacts would be moderate and long term. Coal related disturbance would affect approximately 25,300 acres in the northern mine group.	Same as the No Action Alternative on up to 921 additional acres of leased federal coal in the northern mine group.
<b>AIR QUALITY</b>		
Potential cumulative impacts associated with exiting and proposed mining operations and Wyoming PRB Oil and Gas Project EIS Alternative 1 and Montana Statewide Oil and Gas EIS Alternative E would include:		
- Cumulative near-field concentrations of criteria pollutants.	Above PSD Class II increment for PM <sub>10</sub> 24-hour. Concentrations of other pollutants below increments.	Same as No Action.
- Cumulative far-field concentrations of NO <sub>2</sub> annual.	Above PSD Class I increment in Northern Cheyenne Reservation. Concentrations in other areas are below increments.	Same as No Action.
- Cumulative far-field concentrations of PM <sub>10</sub> 24-hour.	Above PSD Class I increment in Northern Cheyenne Reservation and Washakie Wilderness. Concentrations in other areas are below increments.	Same as No Action.
- Cumulative visibility impacts in mandatory Class I areas.	Potential impacts range from three days above 1.0 dV at Red Rock Lakes Wilderness to 32 days above 1.0 dV at Wind Cave National Park. Potential maximum deciview change is 29.0 dV at U.L. Bend Wilderness.	Same as No Action.
- Acidification of sensitive lakes.	Potential impacts are 180.0 percent of the level of acceptable change (LAC) in Upper Frozen Lake and 10.4 percent of the LAC in Florence Lake. Impacts at other lakes are below the LAC.	

**TABLE 2-3**

(continued)

RESOURCE	MAGNITUDE TYPE AND DURATION OF IMPACT (Impacts are assumed to be adverse unless otherwise indicated)	
	NO ACTION ALTERNATIVE	PROPOSED ACTION AND ALTERNATIVES
<b>WATER QUALITY</b>		
<u>Surface Water:</u> Mining disturbance would affect surface water quality and quantity within the Little Powder River drainage basin.	Disruption and diversions affecting approximately 7% of Little Powder River drainage basin during 50 years of mining and reclamation.	Same as the No Action Alternative on less than 8% of Little Powder River drainage basin.
- Potential for offsetting changes in surface water flow amounts due to overlapping development of coal and CBM resource.	Minor, short term, potentially beneficial on existing mine areas.	Same as No Action Alternative on expanded mine area.
<u>Groundwater:</u> Replacement of existing coal and overburden aquifers with backfill material	Minor to moderate in area of disturbance for existing leases in northern mine group	Size of backfill area would increase by disturbance area associated with mining 921 additional acres of leased federal coal.
- Overlapping drawdown in the coal and alluvial aquifers between surface coal mines.	Moderate, long term for existing leases in northern mine area.	Size of drawdown area would be affected by coal removal on up to 921 additional acres of leased federal coal.
- Overlapping drawdown in the coal aquifer caused by surface mining and CBM development.	Additive, long term in area immediately west of surface coal mines.	Same as No Action for expanded mine area.
- Water-level decline in the sub-coal aquifers as a result of all development.	No cumulative impacts anticipated for subcoal wells separated by 1 mile or more.	Same as No Action for expanded mine area.
- Change in groundwater quality as a result of all development.	No cumulative impacts anticipated.	Same as No Action for expanded mine area.
<b>ALLUVIAL VALLEY FLOORS (AVFs)</b>		
AVFs in coal removal area would be removed when coal is mined.	No cumulative impacts anticipated on existing mine area. AVFs disturbed by mining would be replaced.	Same as the No Action Alternative on expanded area of coal removal.
<b>WETLANDS</b>		
Wetlands in coal removal area would be removed when coal is mined.	Incremental, not additive, short term on existing leases, jurisdictional wetlands would be replaced as required under Section 404 of the Clean Water Act; non-jurisdictional wetlands would be replaced as required by the surface land owner or WDEQ/LQD.	Same as No Action on expanded area of coal removal.
<b>VEGETATION</b>		
Existing vegetation would be removed during mining and restored during reclamation. After reclamation, vegetation patterns would be changed, vegetation diversity would be decreased, shrub density could be reduced and wildlife carrying capacity would potentially be reduced. Nonnative plant species would potentially invade.	Impacts would be moderate and short term to long-term. Coal removal would affect approximately 24,715 acres of federal coal in the northern mine group. Steps to control invasion by nonnative plant species would be implemented.	Same as the No Action Alternative on up to additional 921 acres of leased federal coal in the northern mine group.

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**TABLE 2-3**

(continued)

**MAGNITUDE TYPE AND DURATION OF IMPACT**  
(Impacts are assumed to be adverse unless otherwise indicated)  
**NO ACTION ALTERNATIVE**                      **PROPOSED ACTION AND ALTERNATIVES****RESOURCE****WILDLIFE**

During mining, wildlife would be displaced from and habitat would be lost in active mining areas. Wildlife movement through mine permit areas would be restricted. Small mammal mortality would increase. Foraging and nesting habitat for raptors and migratory birds and habitat for sage grouse would be lost. Habitat for waterfowl and aquatic species would be disturbed. Mine-related traffic would be responsible for road kills. CBM development on or adjacent to coal mines could expand area of impacts to some species including raptors and sage grouse.

Impacts would be minor to moderate and short term to long-term. Coal removal would affect approximately 24,715 acres of federal coal in the northern mine group. Few sage grouse wintering areas or leks lie within mining disturbance area.

Same as the No Action Alternative on up to 921 additional acres of leased federal coal in the northern mine group. No active sage grouse leks would be added to area of mine disturbance.

After reclamation, big game habitat carrying capacity and habitat diversity on reclaimed lands would potentially be decreased. Changes in sagebrush density on reclaimed lands may limit sage grouse repopulation until premining conditions are restored. Post mining aquatic habitat may not duplicate premining habitat.

Impacts would be moderate and short term to permanent. Coal removal would affect approximately 24,715 acres of federal coal in the northern mine group.

Same as the No Action Alternative on up to 921 additional acres of leased federal coal in the northern mine group.

**THREATENED, ENDANGERED, AND PROPOSED SPECIES**

See Appendix G

Potential impacts related to coal removal would affect approximately 24,715 acres of federal coal in the northern mine group; impacts may overlap with other developments on adjacent lands.

Same as the No Action Alternative on up to 921 additional acres of leased federal coal in the northern mine group.

**LAND USE AND RECREATION**

Agricultural production would be lost. Oil and gas development and production would be disrupted while mining is occurring and facilities would be removed. Wildlife habitat would be reduced. Access to public lands users, particularly hunters, would be lost.

Impacts would be moderate and short term. Coal removal would affect approximately 24,715 acres of federal coal in the northern mine group.

Same as the No Action Alternative on up to 921 additional acres of leased federal coal underlying private surface would be leased in the northern mine group.

**CULTURAL RESOURCES**

Historic and prehistoric sites and isolated artifacts would be disturbed. All sites that meet the eligibility requirements for the NRHP would be avoided or mitigated through data recovery. Potential for vandalism and unauthorized collection would increase.

Impacts would be moderate and permanent. Coal removal would affect approximately 24,715 acres of federal coal in the northern mine group.

Same as the No Action Alternative on up to 921 additional acres of leased federal coal in the northern mine group.

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**TABLE 2-3**

(continued)

RESOURCE	MAGNITUDE TYPE AND DURATION OF IMPACT (Impacts are assumed to be adverse unless otherwise indicated)	
	NO ACTION ALTERNATIVE	PROPOSED ACTION AND ALTERNATIVES
<b>NATIVE AMERICAN CONCERNS</b>	No impact identified on existing mine area. Native American consultation completed for existing mine permit areas.	Same as the No Action Alternative on up to 921 additional acres of leased federal coal underlying private surface in the northern mine group. OSM completed Native American consultation on the lands within the analysis area in 2000.
<b>PALEONTOLOGICAL RESOURCES</b>		
Plant, invertebrate, and vertebrate fossil material in overburden and coal would potentially be lost. Potential for unauthorized collection and vandalism would increase. Buried fossil material would potentially be exposed for scientific examination.	Minor, long-term to permanent. Coal removal would affect approximately 24,715 acres of federal coal in the northern mine group.	Same as the No Action Alternative on up to 921 additional acres of leased federal coal in the northern mine group.
<b>VISUAL RESOURCES</b>		
During mining, a landscape altered by presence of facilities and mining operations would be visible from roads and dwellings in the area. Following reclamation, slopes would be smoother and sagebrush would be less dense.	Impacts would be moderate and short term on approximately 24,715 acres in the northern mine group during mining and reclamation. Following reclamation, impacts would be minor and long-term.	Same as the No Action Alternative on up to 921 additional acres of leased federal coal in the northern mine group.
<b>NOISE</b>		
Increased noise levels during mining could affect occupied dwellings within 1 mile and wildlife in immediate vicinity.	Impacts would be minor to moderate, short term while mining operations are conducted on approximately 24,715 acres in the northern mine group.	Same as the No Action Alternative on up to 921 additional acres of leased federal coal in the northern mine group.
<b>TRANSPORTATION FACILITIES</b>		
Use of existing transportation facilities at current levels would be extended. Oil and gas pipelines would be removed from all areas to be mined.	Impacts would be moderate and short term.	Same as the No Action Alternative on expanded area of coal removal.
<b>SOCIOECONOMICS</b>		
Cumulative mineral and energy related development could increase, which could result in new employment and housing needs. Income to the state and counties from revenues and royalties could be expected.	Although short term, benefits would be significant, some benefits would be beneficial.	Same as the No Action Alternative on expanded area of coal removal.

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## CHAPTER 3: THE AFFECTED ENVIRONMENT

### INTRODUCTION

This chapter describes the existing conditions of the physical, biological, cultural, and socioeconomic resources in the study area. The resources that are addressed here were identified during the scoping process or interdisciplinary team review as having the potential to be affected. Figure 3-1 shows the general analysis area for most environmental resources. The analysis area includes the West Hay Creek LBA tract as applied for under the Proposed Action and the action alternatives. The analysis area is also located within the current Buckskin Mine permit area. Environmental baseline studies required by WDEQ/LQD for permitting the mining of the Proposed Action, Alternative 2 (the Preferred Alternative) and Alternative 3 lands were conducted in 1999 and 2000. Annual monitoring has continued over the analysis area and 1 mile adjacent lands. All baseline studies were reviewed and approved by WDEQ/LQD as part of the Hay Creek amendment. This amendment added the lands Triton obtained in 2000 through their acquisition of the EOG Resources, Inc. coal lease exchange tract, which was assigned lease number WYW150152.

Critical elements of the human environment (BLM 1988) that could potentially be affected by the proposed actions include air quality, cultural resources, Native American religious concerns, T&E, and candidate species, hazardous or solid wastes, water quality, wetlands/riparian zones, invasive non-native species, and environmental justice. Five other critical elements (areas of critical environmental concern, prime or unique farmlands, flood plains, wild and scenic rivers, and wilderness) are not present in the analysis area and are not addressed further. In addition to the critical elements that are potentially present in the analysis area, the status and potential effects of mining on topography and physiography, geology and mineral resources, soils, water quantity, alluvial valley floors, vegetation, wildlife, land use and recreation, paleontological resources, visual resources, noise, transportation resources, and socioeconomics are discussed.

### GENERAL SETTING

The analysis area is adjacent to the northernmost operating mine within the Wyoming PRB, a part of the Northern Great Plains which includes most of northeastern Wyoming (figure 1-1 in chapter 1). Vegetation is primarily big sagebrush and sandy prairie grassland. The climate is semi-arid, with an average annual precipitation at the Buckskin Mine of about 10.5 inches. June (1.94 inches) and May (1.94 inches) are the wettest months, and January and February (0.12 inches) are the driest. Snowfall at the Gillette 9ESE station averages 58 inches per year, with most occurring in March (10.3 inches) and April (8.6 inches) (Western Regional Climate Center 2002). Potential evapotranspiration, at approximately 31 inches (NOAA 1969), exceeds annual precipitation (Martner 1986).

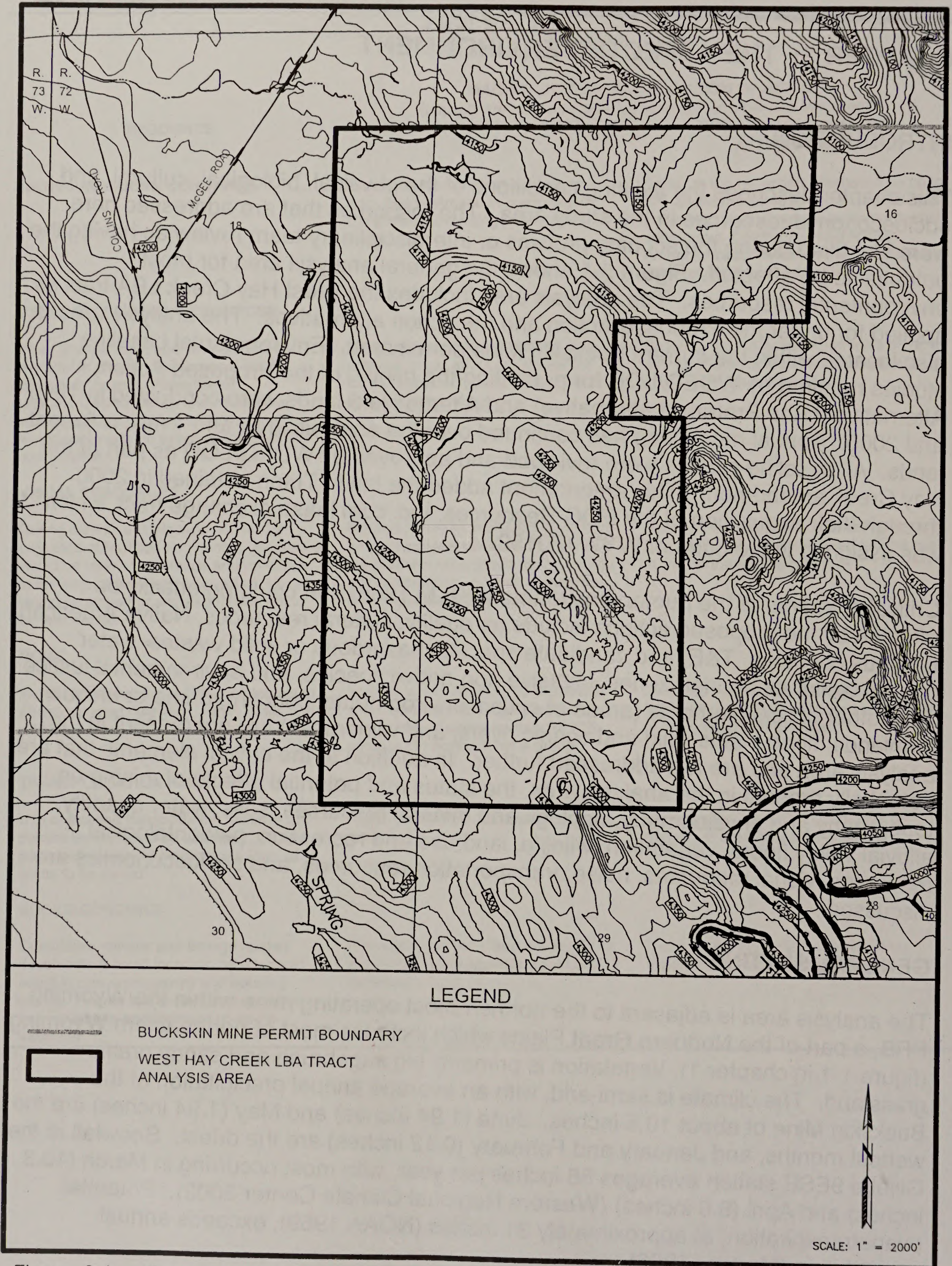


Figure 3-1. General Analysis Area.



The mean of the average hourly temperature recorded at the Buckskin Mine during the 1983-1998 time period is 44.6° F. The highest recorded hourly temperature at the mine was 102° F and the lowest was -40° F. August is the warmest month with a mean temperature of 69° F; December is the coldest (23° F). The frost-free period is 100 to 125 days.

The average annual wind speed for the period 1983 through 1998 at the Buckskin Mine (refer to figure 3-5 in the "Air Quality and Climate" section) was 10.3 mph. Wind speeds are highest in the winter and spring and are predominantly from the northwest and south-southeast. Winter gusts often reach 30 to 40 mph. During periods of strong wind, dust may affect air quality across the region.

An average of 15 air-stagnation events occur annually in the PRB and typically last two days each (BLM 1974). General information describing the area's resources was gathered from draft BLM Buffalo Field office planning documents (BLM 1996a, 1996b, 1996c, 1996d, 1996g) and a BLM coal leasing study (BLM 1996e).

## **TOPOGRAPHY AND PHYSIOGRAPHY**

The PRB is an elongated, asymmetrical structural downfold. It is bounded by the Casper Arch, Laramie Mountains, and Hartville Uplift to the south; the Miles City Arch in Montana to the north, the Big Horn Mountains on the west, and the Black Hills on the east. The Buckskin Mine is located on the gently dipping eastern limb of the structural basin. The regional dip in the area of the mine is approximately 1° to the northwest. There are local areas where the shallow strata dip at higher angles due to local folding or faulting.

The PRB landscape consists of broad plains, low hills, and tablelands. Generally, the topography changes from open hills and elevated ridges with 500 to 1,000 feet of relief in the northern part of the PRB to plains and tablelands with 300 to 500 feet of relief in the southern part. Playas are common in the basin, as are buttes and plateaus capped by clinker or sandstone. The LBA tract is in an area consisting primarily of elevated ridges broken by minor drainages with an elevation ranging from 4,100 to 4,340 feet.

Hay Creek crosses through the northern portion of the LBA tract, and the entire LBA tract is within the contributory drainage basin of Hay Creek. Hay Creek, which is a minor headwater stream in the regional drainage network of the Little Powder River, flows from west to east through the tract. Its confluence with the Little Powder River is about 3 miles east of the LBA tract.

Overall, the West Hay Creek LBA tract is similar in topography to the rest of the Buckskin Mine permit area. Slopes range from flat to about 22% and average about 7%.

## GEOLOGY

Stratigraphic units in the mine area that would be impacted if the West Hay Creek LBA tract is mined include, in descending order, recent (Quaternary age) alluvial and eolian deposits, the Eocene age Wasatch Formation (the overburden), and the Paleocene age Fort Union Formation (which contains the targeted coal beds). Surficial deposits in the analysis area include Quaternary alluvial and eolian deposits, Wasatch Formation, clinker, and weathered Wasatch and Fort Union formations. There is some surficial clinker exposed along the northern portion of the LBA tract analysis area, primarily in the SE $\frac{1}{4}$ /NE $\frac{1}{4}$  of section 17. There are thin alluvial deposits along the ephemeral stream channel of Hay Creek and other neighboring tributary channels, with deposits restricted to the lower reaches. They typically consist primarily of poorly stratified and poorly sorted, irregularly bedded unconsolidated sand, silt, and fine gravel. (The "Water Resources" section and figure 3-9 contain more information about the Hay Creek alluvial deposits.)

The Wasatch Formation forms most of the overburden on top of the recoverable coal seams in the Fort Union Formation in the general analysis area. It consists of interbedded lenticular sandstones, siltstones, shales, and thin discontinuous coals. There is no distinct boundary between the Wasatch Formation and the underlying Fort Union Formation. From a practical standpoint, however, the top of the mineable coal zone is considered as the contact between the two formations. The average overburden thickness on the LBA tract is about 204 feet. Regionally, overburden thickness generally increases to the west due to the westerly dip of the beds in this area. Overburden thickness decreases in stream valleys where it has been eroded.

The Fort Union Formation consists primarily of shales, mudstones, siltstones, lenticular sandstones, and coal. It is divided into three members: Tongue River (which contains the target coal seams), Lebo, and Tullock, in descending order (figure 3-2).

The Tongue River member consists of interbedded claystone, silty shale, carbonaceous shale and coal, with lesser amounts of fine-grained sandstone and siltstone. At the Buckskin Mine, there are two mineable coal seams. Triton personnel refer to these seams as the Anderson and Canyon. These coal seams are also referred to as the Roland and Smith at the nearby Rawhide and Eagle Butte mines.

Figure 3-2 shows the stratigraphic relationships and hydrologic characteristics of the surface and subsurface geologic units in the area of the Buckskin Mine. Figure 3-3 shows two geologic cross-sections drawn through the West Hay Creek LBA tract (one north-south and one east-west). These cross sections are representative of the geology near the tract, with the primary variables being the thickness of overburden, the parting thickness between the Anderson and Canyon coal seams, and the surface topography.

On the West Hay Creek LBA tract, the Anderson coal seam averages 40 feet thick, and the underlying Canyon seam averages 66 feet. The parting thickness between the



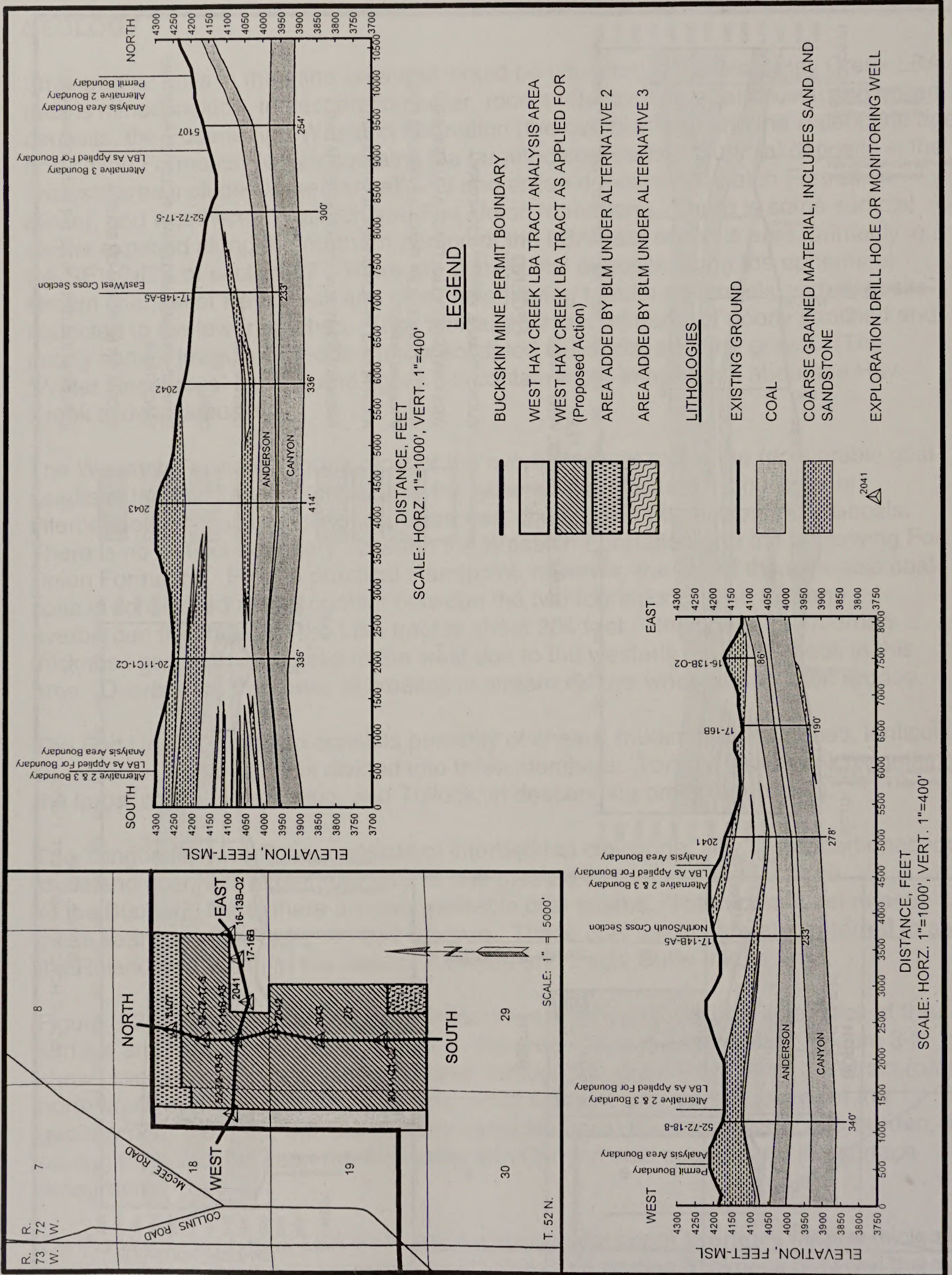


Figure 3-3. North-South and East-West Geologic Cross Sections, West Hay Creek LBA Tract.

Anderson and Canyon coal seams average about 15 feet in the tract. In the southern portion of the tract, the parting thickness averages about four feet, but it increases to the north and west. Toward the north, the parting thickness increases to about 150 feet within the Alternative 2 study area as the Anderson seam rises to within 20 feet of the ground surface, and the Canyon seam dips slightly. In the east-west direction, the Canyon seam dips to the west more uniformly than the Anderson; consequently, the parting thickness increases along the western limit of the LBA tract.

The Fort Union coal seams are subbituminous and are generally low-sulfur, low-ash coals. Typically, the coal being mined has a lower heating value north of Gillette than south of Gillette. According to the analyses (which were done on an as-received basis) of exploration drilling samples collected in the Buckskin Mine area from the adjacent Hay Creek lease, the recoverable coal reserve has an average heating value of approximately 8,140 Btu per pound and contains an average of 5.31% ash, 0.41% sulfur, and 32.09% moisture.

A geologic anomaly known as a splay deposit was encountered at the Buckskin Mine in section 28, T. 52 N., R. 72 W. during 2001. Splay deposits form when the levees bounding a river or stream channel are breached, and a portion of the river/stream flow is diverted out into the swamp. This diverted flow usually terminates some distance from the levee. The sediments of the splay sink into the peat bog allowing the repeated deposition of additional splay deposits. These events usually occur during the flood stages of the river system and may be short or long-lived in time. On occasion, a splay course may become the new course of the river system. These splays may either be syngenetic (contemporaneous) or epigenetic (post-depositional) with the peat deposition in the swamp. The geometry of the Buckskin Mine deposit suggests a syngenetic deposit with the Canyon seam. Geologic modeling indicates this feature extends from the NW $\frac{1}{4}$  of section 28 onto the LBA tract in the SW $\frac{1}{4}$  of section 20. Further drilling should better define the limits and characteristics of the splay, particularly within and adjacent to the LBA tract.

The end of the splay is characterized by numerous, narrow fingers of noncoal material interbedded with portions of the coal seam edge resulting in areas of thin or no coal deposition. In the past, this splay has frequently been misidentified as a channel or channel sandstone. Although the deposit is channel-like in appearance and geometry, the terminus features and the typical clay-silt lithology of the splay make it unlike a river/stream channel complex.

The interface edges of the splay deposit are very unstable from a rock mechanics standpoint. Differential compaction along the splay boundary has locally thinned or thickened the coal. Steep dips and slippage features such as slickensides and micro-faults are abundant in these areas. In areas where splay fingers of steep thin coals extend between thicker coals, sidewall failures might be expected.

The Lebo Shale and Tullock members of the Fort Union Formation underlie the Tongue River member (figure 3-2). They consist primarily of sandstone, siltstone, mudstone,

shale and coal. In general, the Tullock member contains more sand than the Lebo Shale member.

## **MINERAL RESOURCES**

The PRB contains large reserves of fossil fuels including oil, natural gas or methane (from conventional reservoirs and from coal beds), and coal, all of which are currently being produced. In addition, uranium, bentonite, and scoria are mined in the PRB (BLM 1996g).

### **Coal**

There are 15 coal mines lying along a north/south line that parallels Wyoming Highway 59 starting north of Gillette, Wyoming, and extending south for about 75 miles (figure 1-1 in chapter 1). These mines are located where the Wyodak coal is at its shallowest depths (nearest the outcrop). Two of these mines, the Fort Union and Coal Creek mines, are capable of producing but are not currently active. The Dave Johnston Mine, located in Converse County near Glenrock, Wyoming has shut down coal mining operations and is conducting final reclamation.

### **Oil and Gas**

Oil and gas have been produced in the PRB for more than 100 years from reservoir beds that range in age from Pennsylvanian to Oligocene (DeBruin 1996). There are approximately 500 producing oil and/or natural gas fields in the basin. The estimated mean amounts of undiscovered hydrocarbons in the basin are 1.94 billion barrels of recoverable oil and 1.60 trillion cubic feet of gas (USGS 1995). Depth to gas and oil-bearing strata is generally between 4,000 feet and 13,500 feet, but some wells are as shallow as 250 feet.

There are no active conventional oil or gas wells within the LBA tract. One pipeline owned by Western Oil Transportation Company crosses the northwest corner of the tract.

### **Coal Bed Methane**

Methane gas generation from coal beds is a natural process. Methane may be trapped in the coal by overburden pressure, by the pressure of water in the coal, or by impermeable layers immediately above the coal. Deeper coal beds have higher pressures and generally trap more gas. Under favorable geologic conditions, methane can be trapped at shallow depths in and above coal beds, and this seems to be the case in the PRB. Without the existence of conditions that act to trap the gas in shallow coals or in adjacent sandstones, the gas escapes to the atmosphere. It is likely that a lot of methane generated by the coal beds in the PRB has gradually escaped into the atmosphere because the coal is relatively shallow. However, a large amount also remains in the coal. One study estimates that there are approximately 38.2 trillion cubic

feet of CBM gas in place in coal beds that are thicker than 20 feet and deeper than 200 feet. This study estimates that there are approximately 25 trillion cubic feet of recoverable CBM reserves (Finley and Goolsby 2000).

Historically, methane has been reported flowing from shallow water wells and coal exploration holes in parts of the PRB. According to DeBruin and Jones (1989), most of the documented historical occurrences have been in the northern PRB. Olive (1957) references a water well in T. 54 N., R. 74 W. that began producing gas for domestic use in 1916.

CBM has been commercially produced in the Powder River Basin since 1989 when production began at Rawhide Butte field west of the Eagle Butte Mine. CBM occurs in the coal beds of the Fort Union and Wasatch formations throughout the PRB in Wyoming. The predominant CBM production to date has occurred from coal beds of the Wyodak-Anderson zone (USGS 2000) in seams known as the Anderson, Canyon, Wyodak, Big George, and other locally used names. These are generally equivalent to the seams being mined by the surface mines along the eastern margin of the basin, including the Buckskin Mine, the applicant for the proposed West Hay Creek LBA tract.

CBM is produced from other, deeper seams locally throughout the PRB. Deeper seams exist in the LBA area, but they are not in production. Leasing or mining the proposed LBA tract would not directly affect CBM resources production within the underlying seams. It could delay any proposed CBM development in deeper seams in order to avoid interference with mining.

CBM development requires more extensive facilities in areas where there are splits between the coal seams. Although the Anderson and Canyon coal seams in the West Hay Creek LBA tract are continuous or separated by a thin parting throughout most of the LBA tract, in the northern and western part of the tract, shale interbeds that can be more than 100 feet thick separate the two seams. Current CBM well completion practices within the Powder River Basin generally preclude completion of two seams separated by thick shales within a single wellbore. As a result, in the areas where the parting thickness increases, two wells would be required to produce essentially the same reserve that would be produced from a single well in a single contiguous seam.

Since the early 1990s, the BLM has completed numerous EAs and two EISs analyzing CBM projects. The most recent of these was the *Final Environmental Impact Statement and Draft Planning Amendment for the Powder River Basin Oil and Gas Project* (Wyoming PRB Oil and Gas EIS) (BLM 2003a). This document analyzes the impacts of drilling, completing, and operating about 39,400 new private, state, and federal CBM wells and associated ancillary facilities in the next ten years. This is in addition to the more than 12,000 CBM wells that had been drilled or were permitted for drilling when the Wyoming PRB Oil and Gas EIS was prepared. The study area for this EIS includes an almost 8,000,000-acre area covering all or parts of Campbell, Converse, Johnson, and Sheridan counties. The cumulative impacts of reasonably foreseeable conventional oil and gas development within the Wyoming portion of the PRB are also

analyzed in the EIS.

The most extensive CBM development near the West Hay Creek LBA area occurs west of the proposed tract. On April 9, 2004, WOGCC records indicated that there were 73 active CBM wells, 8 shut in CBM wells, and 4 wells that had begun drilling or were permitted to drill within T. 52 N., R. 72 W. There were six active wells, three shut-in wells, and three wells that were permitted or had started drilling within the LBA tract itself as of April 9 2004.

CBM wells were initially drilled on 40-acre spacing in the Wyoming PRB, but the WOGCC has now established 80-acre spacing patterns as the default spacing for CBM wells in the Powder River Basin. Most CBM drilling near the West Hay Creek LBA has occurred on a 40-acre pattern, either because the wells were drilled before the spacing was changed to 80 acres or under the authorization of spacing exceptions granted by WOGCC. There are 16 remaining undrilled complete or partial 40-acre lots within the study area.

The ownership of oil and gas resources in the LBA tract is discussed in "Ownership and Use of Land" section. Majestic Petroleum Operations, LLC, Redstone Resources, and Yates Petroleum Corporation are the owners of most of the CBM drilling rights on the West Hay Creek LBA tract.

### **Bentonite**

Layers of bentonite (decomposed volcanic ash) of varying thickness are present throughout the PRB. Some of the thicker layers are mined where they are near the surface, mostly around the edges of the basin. Bentonite has a large capacity to absorb water, and because of this characteristic it is used in a number of processes and products, including cat litter and drilling mud. No mineable bentonite reserves have been identified on the West Hay Creek LBA tract.

### **Uranium**

There are substantial uranium resources in southwestern Campbell and northwestern Converse counties. Uranium exploration and mining were very active in the 1950s, when numerous claims were filed in the PRB. Uranium mining decreased in the early 1980s due to decreased demand and increased foreign supply. There are currently two *in-situ* uranium recovery operations in the PRB. Production at another ended in 2000 (WGS 2003). No known uranium reserves exist on the West Hay Creek LBA tract.

### **Scoria**

Scoria or clinker has been and continues to be a major source of gravel for road construction in the area. Scoria is present on small portions of the LBA tract as applied for and under the action alternatives.



There are no active mining claims on the West Hay Creek LBA tract.

## **SOILS**

The analysis area, which includes the LBA tract, was subjected to two separate order 1-2 soils surveys in 1989 and 1999. The majority of the tract was surveyed in 1999. The area covered in the study includes the LBA tract under the Proposed Action and action alternatives, as well as the area that would be disturbed by mining the LBA under any of the action alternatives. Figure 3-4 illustrates the soil series within the analysis area.

All soil surveys were completed to an order 1-2 resolution in accordance with WDEQ/LQD Guideline No. 1, which outlines required soils information necessary for a coal mining operation. The inventories included field sampling and observations at the requisite number of individual sites, and laboratory analysis of representative collected samples.

The following is a list of the soil series that comprise the various map units delineated on the proposed affected area associated with the West Hay Creek LBA tract under the Proposed Action, including the area added under the action alternatives.

### ***Soils developing predominantly in alluvium and residuum from mixed sources***

- Forkwood-Cushman loams, 0 to 6% slopes
- Hiland-Bowbac fine sandy loam, 0 to 6% slopes
- Lawver-Teckla-Wibaux complex, moist, 0 to 10% slopes
- Spottedhorse-Lieter Complex, 0 to 6% slopes
- Theedle-Kishona-Shingle loams, 3 to 30% slopes
- Theedle-Shingle loams, 3 to 30% slopes
- Ulm-Renohill association, clay loam, 0 to 6% slopes
- Vonalf-Xema-Mittenbutte fine sandy loam, 3 to 30% slopes
- Rauzi fine sandy loam, 0 to 3% slopes
- Ustic Torripsamment, sandy, 0 to 30% slopes

### ***Soils developing predominantly in alluvial or colluvial fan deposits and fan remnants from mixed sources***

- Cambria-Kishona-Aigweid loams, 6 to 15% slopes
- Decolney-Hiland fine sandy loams, 0 to 6% slopes
- Heldt-Bidman complex, saline, 0 to 3% slopes
- Ironbutte-Fairburn-Mittenbutte complex, 6 to 40% slopes
- Platmak loam, 0 to 6 percent and 6 to 15% slopes
- Vonalee-Terro-Taluce fine sandy loam, 3 to 30% slopes



**Soils developing predominantly in alluvium and eolian deposits derived from mixed sources**

- Arwite-Elwop sandy loam, 0 to 6% slopes
- Haverdat-Boruff loams, 0 to 6% slopes
- Mollic Fluvaquent, hydric, 0 to 1% slopes
- Vonalee fine sandy loam, 0 to 6% slopes

Table 3-1 provides the extent of six depth classes of suitable soil within the LBA tract analysis area.

According to the baseline soils studies, enough suitable soil exists for salvaging within the LBA tract to redistribute suitable soils to an average depth of approximately 15 inches over all disturbed areas. This is true for the Proposed Action and the action alternatives. This depth would be redistributed on all disturbed acres. Areas of unsuitable soils include sites with high alkalinity, salinity or clay content.

The soil depths and types on the West Hay Creek LBA tract analysis area are similar to soils currently being salvaged and used for reclamation at the adjacent mine and other mines in the PRB. The site-specific soil surveys have located hydric soils and/or inclusions of hydric soils, which are one component used in identifying wetlands. Please see the "Wetlands" section for discussion of wetland surveys.

**TABLE 3-1**

**ACRES OF SOIL AVAILABLE FOR RECLAMATION  
WITHIN THE WEST HAY CREEK LBA TRACT ANALYSIS AREA**

Suitable Soil Thickness	Acres	Percent
0	19.0	1.6
1 - 6	2.5	0.2
7 - 12	484.8	41.8
13 - 18	533.5	46.0
19 - 24	120.9	10.4
Total	1,160.8	100.0

**AIR QUALITY AND CLIMATE**

Air quality of any region is controlled primarily by the magnitude and distribution of pollutant emissions and the regional climate. The transport of pollutants from specific source areas is strongly affected by local topography. Generally, local effects are superimposed on the general overall weather pattern and are most important when the large-scale wind flow is weak.

## Topography

The West Hay Creek LBA tract analysis area (figure 1-1 in chapter 1) is located in the PRB, a part of the Northern Great Plains that includes most of northeastern Wyoming. The topography is primarily rolling plains and tablelands of moderate relief (with occasional valleys, canyons and buttes). The LBA tract is in an area consisting primarily of elevated ridges broken by minor drainages with an elevation ranging from 4,100 to 4,340 feet. Slopes in the analysis area range from flat to greater than 22%.

## Climate and Meteorology

The climate in the analysis area is semi-arid, with an average annual precipitation at the Buckskin Mine of about 10.5 inches per year. Snowfall at the Gillette 9ESE Station averages 58 inches per year, with most occurring in March and April. Evaporation exceeds annual precipitation, with relatively short warm summers and longer cold winters. The average daily mean temperature is around 45°F. The highest recorded hourly temperature at the mine was 102°F and the lowest was -40°F. August is the warmest month, with a mean daily temperature of 69°F, and December is the coldest (23°F). The frost-free period is between 100 and 125 days.

The average annual wind speed for the period from 1983 through 1998 at the Buckskin Mine was 10.3 mph with local variations in speed and direction due to differences in topography. Winds are predominantly from the northwest and south-southeast and tend to be strongest in the winter and spring and calmer in the summer. Wind velocity tends to increase during the day and decrease during the night. The air quality and meteorological sampling locations and associated wind rose diagrams for the Buckskin Mine are shown in figure 3-5.

## Regulatory Framework

Air quality and pollutant emissions to the air are regulated under the federal CAA and Wyoming Air Quality Standards and Regulations (WAQSR) administered by the WDEQ/AQD. A fundamental requirement of both federal and state regulations is that ambient concentrations for specific criteria pollutants not exceed allowable levels, referred to as the ambient air quality standards (AAQS). These standards have been established by the EPA and the WDEQ at levels deemed necessary to preclude adverse impacts on human health and welfare. The National AAQS (or NAAQS) set nationwide thresholds for maximum acceptable concentrations of various pollutants. The Wyoming AAQS (or WAAQS) must be at least as stringent as NAAQS. Selected Wyoming and national ambient air standards are shown in table 3-2. The NAAQS and WAAQS set the absolute upper limits for specific air pollutant concentrations at all locations where the public has access.

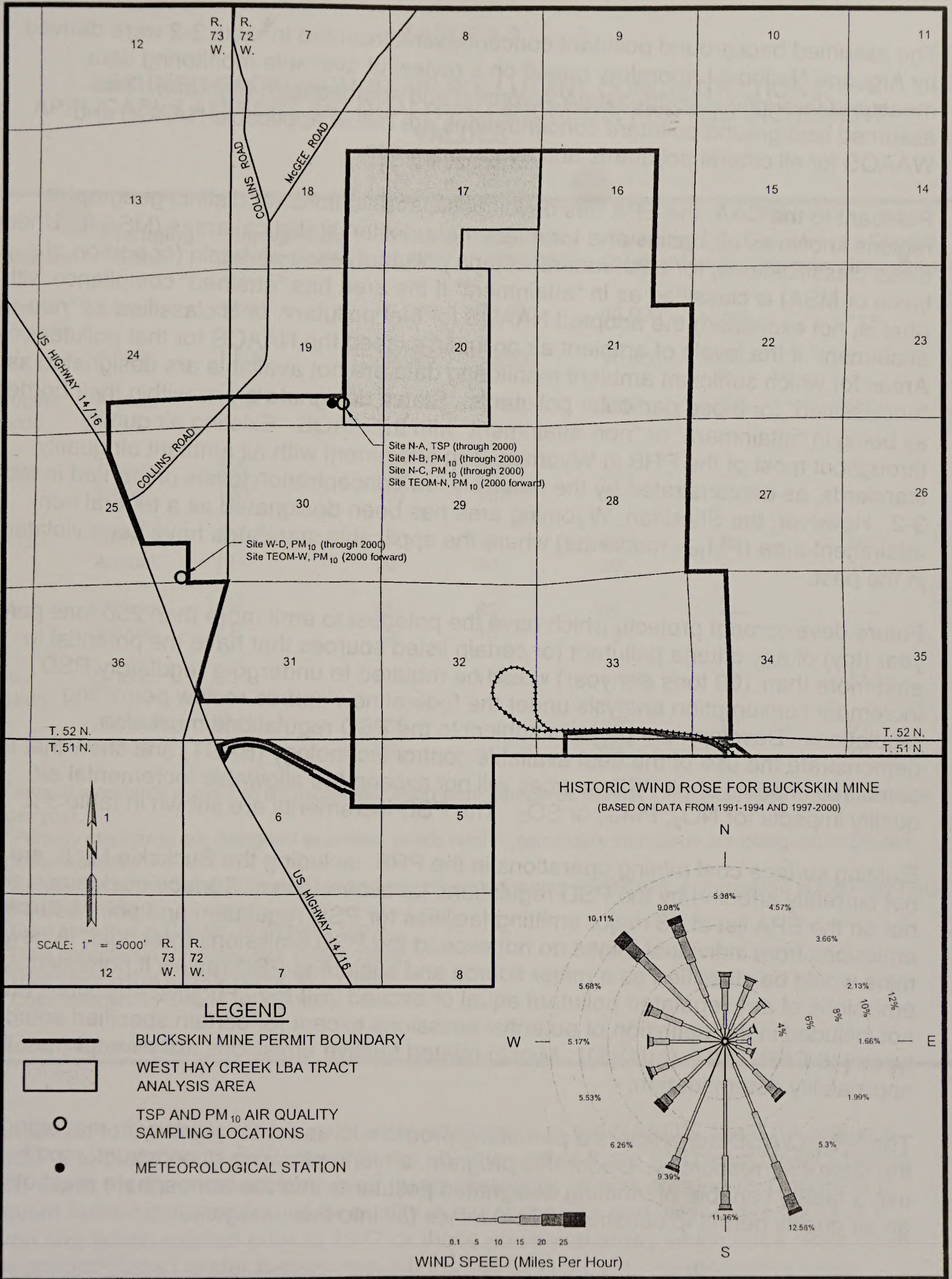


Figure 3-5. Wind Rose, Air Quality, and Meteorological Stations at the Buckskin Mine.

The assumed background pollutant concentrations included in table 3-2 were derived by Argonne National Laboratory based on a review of available monitoring data measured throughout northeastern Wyoming and southeastern Montana. The assumed background pollutant concentrations are below applicable NAAQS and WAAQS for all criteria pollutants and averaging times.

Pursuant to the CAA, the EPA has developed classifications for distinct geographic regions known as air basins and for major metropolitan statistical areas (MSAs). Under these classifications, for each federal criteria pollutant, each air basin (or portion of a basin or MSA) is classified as in "attainment" if the area has "attained" compliance with (that is, not exceeded) the adopted NAAQS for that pollutant, or is classified as "non-attainment" if the levels of ambient air pollution exceed the NAAQS for that pollutant. Areas for which sufficient ambient monitoring data are not available are designated as "unclassified" for those particular pollutants. States designate areas within their borders as being in "attainment" or "non-attainment" with the AAQS. Existing air quality throughout most of the PRB in Wyoming is in attainment with all ambient air quality standards, as demonstrated by the relatively low concentration levels presented in table 3-2. However, the Sheridan, Wyoming area has been designated as a federal non-attainment area (PM<sub>10</sub> - moderate) where the applicable standards have been violated in the past.

Future development projects which have the potential to emit more than 250 tons per year (tpy) of any criteria pollutant (or certain listed sources that have the potential to emit more than 100 tons per year) would be required to undergo a regulatory PSD increment consumption analysis under the federal new source review permitting regulations. Development projects subject to the PSD regulations must also demonstrate the use of the best available control technology (BACT) and show that the combined impacts of all PSD sources will not exceed the allowable incremental air quality impacts for NO<sub>2</sub>, PM<sub>10</sub>, or SO<sub>2</sub>. The PSD increments are shown in table 3-2.

Existing surface coal mining operations in the PRB, including the Buckskin Mine, are not currently affected by the PSD regulations for two reasons. Surface coal mines are not on the EPA list of 28 major emitting facilities for PSD regulation and point-source emissions from individual mines do not exceed the PSD emissions threshold. A new mine would be classified as a major source and subject to PSD review if potential emissions of any regulated pollutant equal or exceed 250 tpy. Fugitive emissions are not included in the definition of potential emissions except for certain specified source types [40 CFR 52.21, (b)(1)(iii)]. Mining related fugitive emissions are exempt from the applicability determination.

The WDEQ/AQD administers a permitting program to assist the agency in managing the state's air resources. Under this program, anyone planning to construct, modify, or use a facility capable of emitting designated pollutants into the atmosphere must obtain an air quality permit to construct. Coal mines fall into this category.

TABLE 3-2

ASSUMED BACKGROUND AIR POLLUTANT CONCENTRATIONS,  
 APPLICABLE AMBIENT AIR QUALITY STANDARDS, AND PSD INCREMENT  
 VALUES  
 (in µg/m<sup>3</sup>)

Pollutant	Averaging Time <sup>1</sup>	Background Concentration	Primary NAAQS <sup>2</sup>	Secondary NAAQS <sup>2</sup>	Wyoming Standards	PSD Class I Increments	PSD Class II Increments
Carbon monoxide	1-hour	3,500 <sup>3</sup>	40,000	40,000	40,000	-----	-----
	8-hour	1,500	10,000	10,000	10,000	-----	-----
Nitrogen dioxide	Annual	16.5 <sup>4</sup>	100	100	100	2.5	25
Ozone	1-hour	82 <sup>5</sup>	235	235	235	-----	-----
	8-hour	130 <sup>5</sup>	157	157	157	-----	-----
PM <sub>10</sub>	24-hour	42 <sup>7</sup>	150	150	150	8	30
	Annual	17 <sup>7</sup>	50	50	50	4	17
PM <sub>2.5</sub>	24-hour	19 <sup>7</sup>	65	65	65	-----	-----
	Annual	7.6 <sup>7</sup>	15	15	15	-----	-----
Sulfur dioxide	3-hour	8 <sup>6</sup>	-----	1,300	1,300	25	512
	24-hour	8 <sup>6</sup>	365	-----	260	5	91
	Annual	3 <sup>6</sup>	80	-----	60	2	20

<sup>1</sup>Annual standards are not to be exceeded; short-term standards are not to be exceeded more than once per year.

<sup>2</sup>Primary standards are designed to protect public health; secondary standards are designed to protect public welfare.

<sup>3</sup>Amoco Ryckman Creek collected for an 8-month period during 1978-1979, summarized in the Riley Ridge EIS (BLM 1983).

<sup>4</sup>Data collected in Gillette, WY (1996-1997).

<sup>5</sup>Data collected in Pinedale, WY (1992-1994).

<sup>6</sup>Data collected at Devil's Tower, WY (1983).

<sup>7</sup>Data collected in Gillette, WY (1999).

Source: Argonne 2002

In addition to the designations relative to attainment of the NAAQS, the CAA requires the EPA to place each airshed within the US into one of three PSD area classifications. PSD Class I is the most restrictive air quality category. It was created by Congress to prevent further deterioration of air quality in national parks and wilderness areas of a given size which existed prior to 1977 or those additional areas which have since been designated Class I under federal regulations (40 CFR 52.21). All remaining areas outside of the designated Class I boundaries were designated Class II areas, which

allow a relatively greater deterioration of air quality over that in existence in 1977, although still within the NAAQS. No Class III areas, which would allow air quality to degrade to the NAAQS, have been designated. The federal land managers have also identified certain federal assets with Class II status as "sensitive" Class II areas for which air quality and/or visibility are valued resources. The federal CAA also provides specific visibility protection of mandatory federal Class I areas. Mandatory federal Class I areas were designated by Congress on August 7, 1977 and include wilderness areas greater than 5,000 acres in size and national parks greater than 6,000 acres in size. Table 3-3 is a list of mandatory federal Class I areas, tribal Class I areas, and federal Class II areas in the region and their distance from the general analysis area. Wind Cave National Park, Badlands Wilderness Area, and the Northern Cheyenne Indian Reservation are the closest mandatory federal Class I areas. Table 3-3 also lists other areas which are more distant but were included in the cumulative air quality impact analysis discussed in chapter 4. As shown in table 3-3, the allowable incremental impacts for NO<sub>2</sub>, PM<sub>10</sub>, and SO<sub>2</sub> within PSD Class I areas are very limited. Most of the PRB in Wyoming is designated as PSD Class II with less stringent requirements. Even though the development activities being considered in this EIS would occur within areas designated PSD Class II, the potential impacts are not allowed to cause incremental effects greater than the stringent Class I thresholds to occur inside any distant PSD Class I area.

### Existing Air Quality

WDEQ detects changes in air quality through monitoring and maintains an extensive network of air quality monitors throughout the state. Particulate matter is most commonly measured as particles finer than 10 microns or PM<sub>10</sub>. The eastern side of the Powder River Basin has one of the most extensive networks of monitors for PM<sub>10</sub> in the nation due to the density of coal mines (figure 3-6). In addition, there are also monitors in Sheridan and Gillette, Wyoming, and the WDEQ installed monitors in Arvada and Wright, Wyoming in November 2002.

WDEQ uses monitoring located throughout the state to anticipate issues related to air quality. These monitoring stations are located to measure ambient air quality and not located to measure impacts from a specific source. Monitors located to measure impacts from a specific source may also be used for trends. These data are used to pro-actively arrest or reverse trends towards air quality problems. When WDEQ became aware that particulate readings were increasing due to increased coal bed methane activity and aggravated by prolonged drought, the WDEQ approached the counties, coal mines, and coal bed methane industry. A coalition involving the counties, coal companies and coal bed methane operators have made significant efforts towards minimizing dust from roads. Measures taken have ranged from the implementation of speed limits to paving heavily traveled roads.

Monitoring is also used to measure compliance. The WDEQ can take a range of enforcement actions to remedy the situation where monitoring shows a violation of any standard. Where a standard is exceeded specific to an operation, the enforcement



TABLE 3-3

APPROXIMATE DISTANCES AND DIRECTIONS FROM THE WEST HAY CREEK ANALYSIS AREA TO PSD CLASS I AND CLASS II SENSITIVE RECEPTOR AREAS

Receptor Area	Distance (miles)	Direction to Receptor
<b>Mandatory Federal PSD Class I</b>		
Badlands Wilderness Area <sup>1</sup>	160	SE
Bridger Wilderness Area	215	SW
Fitzpatrick Wilderness Areas	205	SW
Gates of the Mountains Wilderness Area	350	NW
Grand Teton National Park	260	SW
North Absaroka Wilderness Area	205	NW
Red Rock Lakes Wilderness Area	255	W
Scapegoat Wilderness Area	320	NW
Teton Wilderness Area	210	W
Theodore Roosevelt National Park (North Unit)	235	NE
Theodore Roosevelt National Park (South Unit)	210	NE
U. L Bend Wilderness Area	195	NW
Washakie Wilderness Area	180	SW
Wind Cave National Park	115	SE
Yellowstone National Park	210	W
<b>Tribal Federal PSD Class I</b>		
Fort Peck Indian Reservation	215	N
Northern Cheyenne Indian Reservation	70	NW
<b>Federal PSD Class II</b>		
Absaroka-Beartooth Wilderness Area	190	NW
Agate Fossil Beds National Monument	160	SE
Bighorn Canyon National Recreation Area	135	NW
Black Elk Wilderness Area	105	SE
Cloud Peak Wilderness Area	75	W
Crow Indian Reservation	70	NW
Devils Tower National Monument	40	NE
Fort Belknap Indian Reservation	240	NW
Fort Laramie National Historic Site	160	SE
Jewel Cave National Monument	100	SE
Mount Rushmore National Memorial	110	E
Popo Agie Wilderness Area	205	SW
Soldier Creek Wilderness Area	160	SE

<sup>1</sup>Congress designated the wilderness area portion of the Badlands National Park as a mandatory federal PSA Class I area. The remainder of the national park is a PSD Class II area.

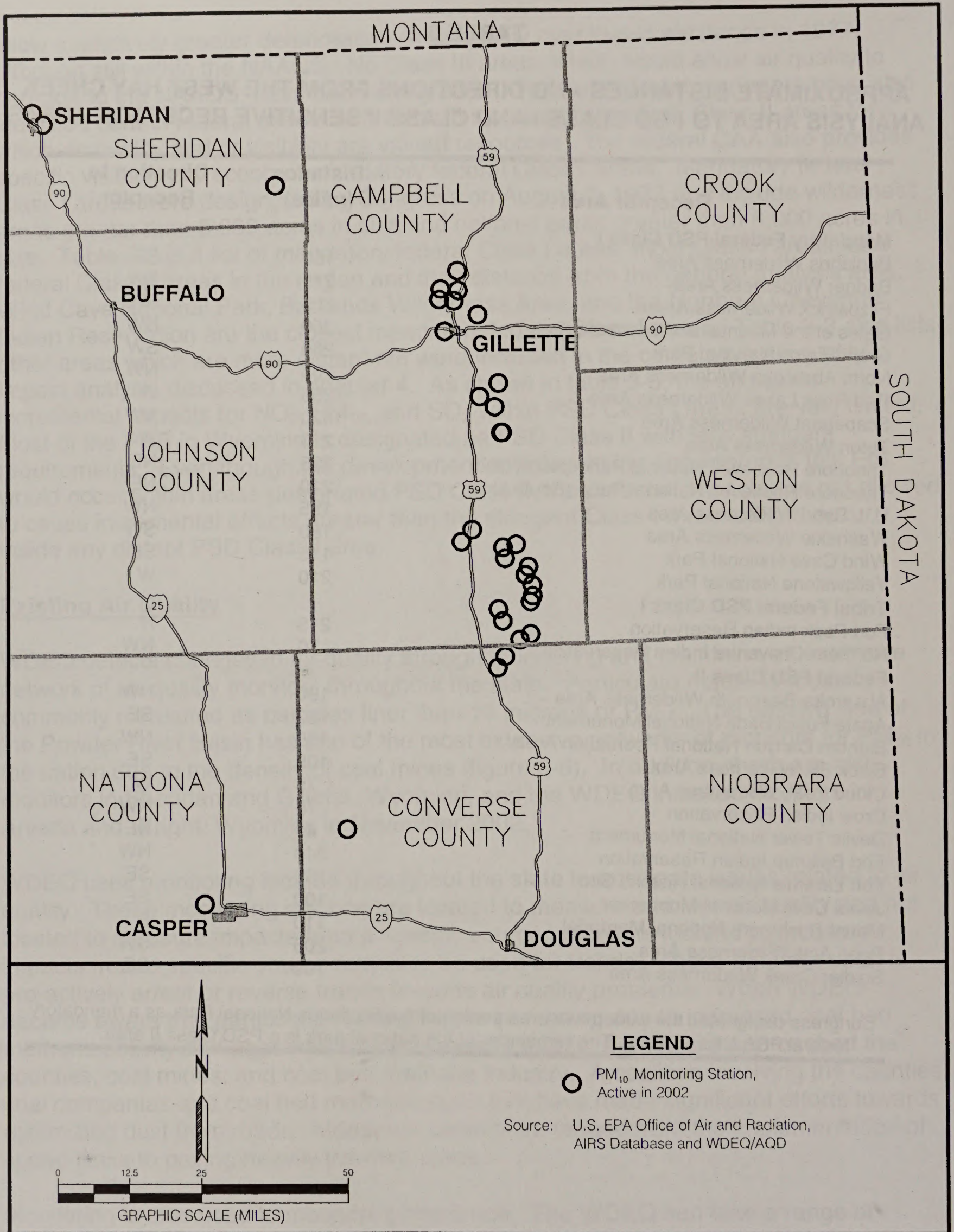


Figure 3-6. Active PM<sub>10</sub> Monitoring Stations in Northeastern Wyoming.

action is specific to the facility. For many facilities, neither the cause nor the solution is simple. The agency normally uses a negotiated settlement in those instances.

WDEQ has also located two visibility monitoring stations in the PRB. One of these sites is 32 miles north of Gillette and includes a nephelometer, a transmissometer, an aerosol monitor (IMPROVE protocol), instruments to measure meteorological parameters (temperature, RH, wind speed, wind direction), a digital camera, instruments to measure ozone, and instruments to measure nitrogen oxides (NO, NO<sub>2</sub>, NO<sub>x</sub>). The other visibility monitoring station is located 14 miles west of Buffalo and includes a nephelometer, a transmissometer, an aerosol monitor (IMPROVE protocol), instruments to measure meteorological parameters (temperature, RH, wind speed, wind direction), and a digital camera.

Other air quality monitoring in the PRB includes NO<sub>2</sub> monitoring along the east side of the PRB, Wyoming air resources monitoring system (WARMS) monitoring of sulfur and nitrogen concentrations near Buffalo, Sheridan, and Newcastle, and National Atmospheric Deposition Program (NADP) monitoring of precipitation chemistry in Newcastle.

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

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

Blasting is responsible for another type of emission from surface coal mining. Overburden blasting sometimes produces gaseous orange-colored clouds that contain NO<sub>2</sub>. Exposure to NO<sub>2</sub> may have adverse health effects, which are discussed in chapter 4. NO<sub>2</sub> is one of several products resulting from the incomplete combustion of explosives used in the blasting process. Wyoming's ambient air standards for NO<sub>2</sub> are shown in table 3-2.

Other existing air pollutant emission sources within the region include:

- Exhaust emissions (primarily CO and oxides of nitrogen [NO<sub>x</sub>]) from existing natural gas fired compressor engines used in production of natural gas and coal bed methane; gasoline and diesel vehicle tailpipe emissions of combustion

pollutants (volatile organic compounds [VOC], CO, NO<sub>x</sub>, inhalable particulate matter less than 10 microns in effective diameter [PM<sub>10</sub>], fine particulate matter less than 2.5 microns in effective diameter [PM<sub>2.5</sub>], and sulfur dioxide [SO<sub>2</sub>]);

- Dust (particulate matter) generated by vehicle travel on unpaved roads, windblown dust from neighboring areas and road sanding during the winter months;
- Transport of air pollutants from emission sources located outside the region;
- Emissions from railroad locomotives used to haul coal (primarily NO<sub>2</sub> and PM<sub>10</sub>); and,
- SO<sub>2</sub> and NO<sub>x</sub> from power plants.

### **Historical Ambient Air Quality: Particulates**

Until 1989, the federally regulated particulate matter pollutant was measured as TSP. This measurement included all suspendable dust (generally less than 100 microns in diameter). In 1989, the federally regulated particulate matter pollutant was changed from a TSP based standard to a PM<sub>10</sub> based standard. PM<sub>10</sub> is particulate matter with an aerodynamic diameter of 10 microns or less that can potentially penetrate into the lungs and cause health problems. Wyoming added PM<sub>10</sub> based standards to match the federal standards in 1989 and retained the TSP based standards as state standards until March 2000. Wyoming's ambient air standards for PM<sub>10</sub> are shown in table 3-2. Wyoming adopted a PM<sub>2.5</sub> standard in March 2000. However, the state of Wyoming will not enforce that standard until EPA has completed its review of the PM<sub>2.5</sub> standard and has determined to retain and enforce the standard as promulgated on July 18, 1997.

**Regional.** WDEQ/AQD requires the collection of information documenting the quality of the air resource at each of the PRB mines. Each mine monitored air quality for a 24-hour period every six days at multiple monitoring sites through the end of 2001. All PM<sub>10</sub> monitors are now required by WDEQ/AQD to sample air quality for a 24-hour period every three days beginning in 2002. Data for TSP dates back to 1980; data for PM<sub>10</sub> dating back to 1989. This has resulted in over 55,000 TSP and 14,000 PM<sub>10</sub> samples collected through 2002 and makes the eastern PRB one of the most densely monitored areas in the world (figure 3-6). Table 3-4 uses the annual arithmetic average of all sites to summarize these data.

As indicated in table 3-4, the long-term trend in particulate emissions remained relatively flat through 1998. TSP concentration from 1980 through 1998 averaged 33.1  $\mu\text{g}/\text{m}^3$ , ranging between 27.8  $\mu\text{g}/\text{m}^3$  and 39.4  $\mu\text{g}/\text{m}^3$ . There were increases in 1988 and 1996, which may have been the result of fires in the region during those years. PM<sub>10</sub> concentration from 1989 through 1998 averaged 15.4  $\mu\text{g}/\text{m}^3$ , ranging between 12.9 and 16.5  $\mu\text{g}/\text{m}^3$ .

TABLE 3-4

**SUMMARY OF AIR QUALITY MONITORING  
IN WYOMING'S POWDER RIVER BASIN, 1980-2000**

Year	Coal Produced (mmtpy)	Yards Moved (mmbcy)	Number of Mines Operating/ Monitoring TSP/ Monitoring PM <sub>10</sub> <sup>1</sup>	Number of Sites TSP/PM <sub>10</sub> <sup>2</sup> (µg/m <sup>3</sup> )	TSP Average (µg/m <sup>3</sup> )	PM <sub>10</sub> Average (µg/m <sup>3</sup> )
1980	58.7	105.3	10/14/0	34/0	35.5	na <sup>3</sup>
1981	71.0	133.4	11/13/0	35/0	39.4	na
1982	76.1	141.1	11/14/0	40/0	31.2	na
1983	84.9	150.9	13/14/1	41/1	32.6	11.2
1984	105.3	169.5	14/16/1	42/1	33.9	11.1
1985	113.0	203.4	16/17/0	49/0	32.3	na
1986	111.2	165.7	16/17/0	45/0	29.3	na
1987	120.7	174.6	16/17/0	43/0	31.7	na
1988	138.8	209.7	16/17/0	43/0	37.7	na
1989	147.5	215.6	15/17/3	40/3	32.1	15.9
1990	160.7	223.5	17/17/5	47/5	34.3	14.8
1991	171.4	245.9	17/17/5	46/6	32.7	16.5
1992	166.1	296.0	17/17/7	41/7	31.7	15.9
1993	188.8	389.5	17/17/8	40/11	27.8	14.5
1994	213.6	483.9	17/18/8	44/11	31.7	15.5
1995	242.6	512.7	16/18/8	41/12	29.6	12.9
1996	257.0	605.4	17/18/8	41/12	35.4	16.0
1997	259.7	622.0	16/17/10	39/15	33.3	15.9
1998	308.6	710.7	16/17/12	36/17	33.9	15.9
1999	317.1	758.0	15/17/12	36/18	55.3	21.6
2000	322.5	845.3	15/15/12	31/17	56.1	23.4
2001	354.1	927.1	12/11/12	29/29	57.5	27.2
2002	359.7	1,032.1	13/11/13	23/38	56	23.3

<sup>1</sup>Includes Buckskin, Rawhide, Eagle Butte, Dry Fork, Fort Union, Clovis Point, Wyodak, Caballo, Belle Ayr, Caballo Rojo, Cordero, Coal Creek, Jacobs Ranch, Black Thunder, North Rochelle, North Antelope, Rochelle, and Antelope mines.

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

<sup>3</sup>Not applicable because no monitoring was done for PM<sub>10</sub>.

**Sources:** 1980 through 1996 emissions and production data from April 1997 report prepared by WMA for WDEQ/AQD; 1997 through 2000 emissions data from EPA AIRData database, and production data from WDEQ/AQD.

This period (1980-1998) was associated with significant growth in the surface coal mining industry. Coal production increased from about 59 mmtpy to over 308 mmtpy (an increase of over 249 mmtpy), and associated overburden production increased from 105 mmbcy to over 710 mmbcy per year (a 605 mmbcy per year increase). From 1990 through 2002, the average annual increase in coal production was 7%, while annual overburden production increased an average of 13.9% over the same period. The larger annual increase in overburden production is probably because mines are gradually moving into deeper coals as the shallower reserves are mined out.

The relatively flat trend in particulate emissions from 1980 through 1998 is due in large part to the Wyoming air quality program that requires BACT control measures at all permitted facilities. These control measures include watering and chemical treatment of roads, limiting the amount of area disturbed, temporary revegetating disturbed areas to reduce wind erosion, and timely final reclamation.

The average annual TSP concentration increased from 33.9  $\mu\text{g}/\text{m}^3$  in 1998 to 55.3  $\mu\text{g}/\text{m}^3$  in 1999 and 57.5  $\mu\text{g}/\text{m}^3$  in 2001. The 2002 average annual TSP concentration was 56.0  $\mu\text{g}/\text{m}^3$ . The average annual  $\text{PM}_{10}$  concentration increased from 15.9  $\mu\text{g}/\text{m}^3$  in 1998 to 21.6  $\mu\text{g}/\text{m}^3$  in 1999 and 27.2  $\mu\text{g}/\text{m}^3$  through 2001. In 2002, the average annual concentration was at 23.3  $\mu\text{g}/\text{m}^3$ . There were no major fires in the region during this time. The increases in coal production over those four years (3.8% per year and 12.8 mmtpy over the four-year period) and associated overburden production (9.8% per year and 72 mmbcy over the four-year period) were not larger than the four-year increases during some of the previous 18 years, but the particulate concentration increase was much larger than in previous years.

**Site Specific.** For the Buckskin Mine monitoring locations, historical particulate matter ambient air quality data generally show the same results as described above for the PRB as a whole. TSP and monitoring locations are shown on figure 3-5. Figure 3-7 presents the average annual TSP and  $\text{PM}_{10}$  measured at sites within the West Hay Creek LBA analysis area. These data were collected for 1995 through 2001. Cumulative coal and overburden production for the Buckskin Mine for these years are also shown on figure 3-7.

As discussed above, TSP was the federally regulated pollutant until 1989 and was retained as a state regulated pollutant until 2000.  $\text{PM}_{10}$  became a federal standard in 1989 and was adopted by the state of Wyoming. There were no violations of the TSP standard at the Buckskin Mine when TSP was the federally regulated pollutant. After 1989 and until recently, TSP measurements were used as a surrogate for  $\text{PM}_{10}$  in lieu of having to replace and/or co-locate an existing TSP sampler with a new  $\text{PM}_{10}$  sampler. There were no violations of the  $\text{PM}_{10}$  standards anywhere in the PRB through the first quarter of 2001. Between April 2001 and June 2003 there were 21 monitored exceedances of the 24-hour  $\text{PM}_{10}$  standard at four mines in the Wyoming PRB. The Buckskin Mine was responsible for one of these exceedances

TSP and PM<sub>10</sub> vs. Production

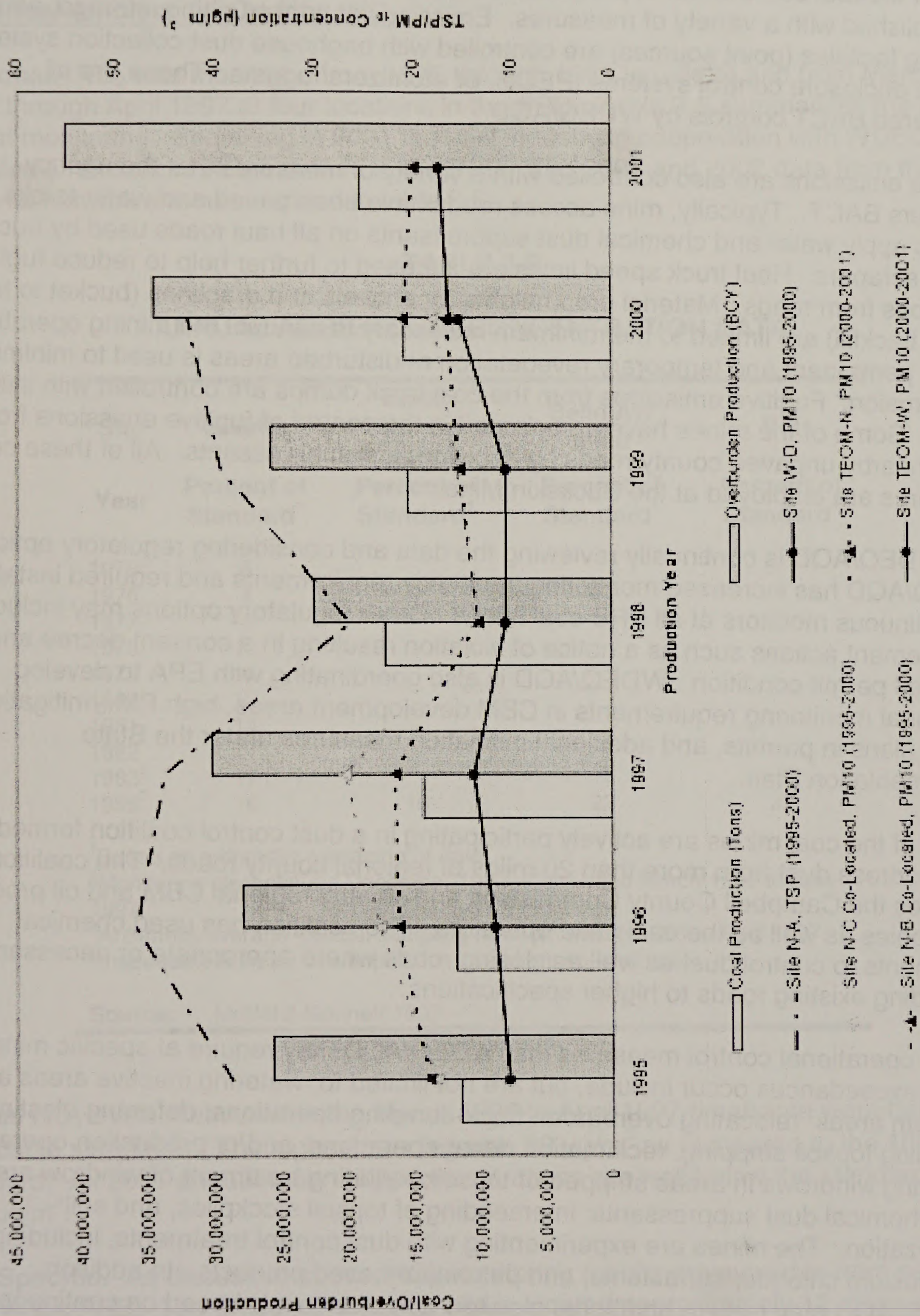


Figure 3-7. Coal Production and Overburden Removal vs. Ambient Particulates for Buckskin Mine

**Control Measures.** Control of particulate emissions at the southern PRB mines is accomplished with a variety of measures. Emissions at coal crushing, storage, and handling facilities (point sources) are controlled with baghouse dust collection systems, passive enclosure control systems (PECs), or atomizers/foggers. These are all considered BACT controls by WDEQ/AQD.

Fugitive emissions are also controlled with a variety of measures that the agency considers BACT. Typically, mine access roads have been paved and water trucks are used to apply water and chemical dust suppressants on all haul roads used by trucks and/or scrapers. Haul truck speed limits are imposed to further help to reduce fugitive emissions from roads. Material drop heights for shovels and draglines (bucket to truck bed or backfill) are limited to the minimum necessary to conduct the mining operations. Timely permanent and temporary revegetation of disturbed areas is used to minimize wind erosion. Fugitive emissions from the coal truck dumps are controlled with stilling sheds. Some of the mines have participated in the control of fugitive emissions from some nearby unpaved county roads by applying dust suppressants. All of these control measures are employed at the Buckskin Mine.

The WDEQ/AQD is continually reviewing the data and considering regulatory options. WDEQ/AQD has increased monitoring frequency requirements and required installation of continuous monitors at all PRB coal mines. Other regulatory options may include enforcement actions such as a notice of violation resulting in a consent decree and/or modified permit condition. WDEQ/AQD is also coordinating with EPA to develop additional monitoring requirements in CBM development areas, high PM<sub>10</sub> mitigation action plans in permits, and additional mitigation measures under the State Implementation Plan.

Some of the coal mines are actively participating in a dust control coalition formed to help address dust from more than 20 miles of regional county roads. The coalition includes the Campbell County Commission and several regional CBM and oil producing companies as well as the coal mine operators. The coalition has used chemical treatments to control dust as well as closing roads where appropriate or necessary and rebuilding existing roads to higher specifications.

Other operational control measures that WDEQ/AQD may require at specific mines when exceedances occur include, but are not limited to, watering inactive areas and problem areas; relocating overburden truck-dumping operations; deferring blasting; curtailing topsoil stripping, reclamation dozer operations, and/or production operations; requiring windrows in areas stripped of topsoil; requiring treatment of windrow areas with chemical dust suppressants; interseeding of topsoil stockpiles, and soil stabilization. The mines are experimenting with dust control treatments, including magnesium chloride, surfactants, and petroleum-based products. In addition, WDEQ/AQD may require additional monitoring, action levels based on continuous monitoring, expedited reporting of monitored exceedances, detailed reporting of contributing factors (meteorological conditions, control steps implemented) for monitored exceedances, and continual evaluation of activity plans when exceedances are monitored at surface coal mines.



## Historical Ambient Air Quality: NO<sub>2</sub>

**Regional.** NO<sub>2</sub> was monitored from 1975 through 1983 in Gillette and from March 1996 through April 1997 at four locations in the PRB. Table 3-5 summarizes the results of that monitoring. Beginning in 2001 the coal industry in cooperation with WDEQ/AQD installed a network of NO<sub>2</sub> monitors in the PRB. The 2001 and 2002 data from this regional network are summarized in table 3-6.

**TABLE 3-5**

### **ANNUAL AMBIENT NO<sub>2</sub> CONCENTRATION DATA**

<b>Site</b>	<b>Gillette</b>	<b>Black Thunder Mine</b>	<b>Belle Ayr Mine</b>	<b>Bill</b>
<b>Year</b>	<b>Percent of Standard<sup>1</sup></b>	<b>Percent of Standard<sup>1</sup></b>	<b>Percent of Standard<sup>1</sup></b>	<b>Percent of Standard<sup>1</sup></b>
1975	6			
1976	4			1
1977	4			5
1978	11			
1979	11			
1980	12			
1981	14			
1982	11			
1983 <sup>2</sup>	17			
1996 <sup>3</sup>	16	16	22	22

<sup>1</sup>Based on arithmetic averaging of data.

<sup>2</sup>Monitoring discontinued December 1983, reactivated March 1996 to April 1997.

<sup>3</sup>Arithmetic average - actual sampling ran from March 1996 to April 1997.

\*Inadequate number of samples for a valid annual average.

**Source:** McVehil-Monnett 1997

Annual NO<sub>2</sub> levels measured in the March 1996 to April 1997 timeframe were below applicable standards. The highest reading was 22 µg/m<sup>3</sup> as compared to the 100 µg/m<sup>3</sup> standard. All 2001 annual mean NO<sub>2</sub> concentrations are well below the standards of 100 µg/m<sup>3</sup>.

**Site Specific.** As discussed above, NO<sub>2</sub> monitoring results are available from several sites in the PRB. The Gillette monitoring site is located approximately 12 miles south of the West Hay Creek LBA tract, the Belle Ayr Mine site is located approximately 24 miles south, the Black Thunder Mine site is located approximately 53 miles south, and the Bill site is located approximately 73 miles south.

TABLE 3-6

2001 ANNUAL AMBIENT NO<sub>2</sub> CONCENTRATION DATA

Monitor	2001 Annual Mean NO <sub>2</sub> Concentration (µg/m <sup>3</sup> ) <sup>1,2</sup>	2002 Annual Mean NO <sub>2</sub> Concentration (µg/m <sup>3</sup> ) <sup>3,4</sup>
Antelope Mine	7	6
Belle Ayr Mine	14	14
Black Thunder Mine	5*	6
TBNG	6**	5

\* Data for the 3<sup>rd</sup> quarter is questionable; therefore, it was not used in determining the annual mean for the site.

\*\* Data for May through December 2001. Monitor was not operational until May 2, 2001.

<sup>1</sup>Mine Data (WDEQ/AQD 2002)

<sup>2</sup>TBNG Site (ARS 2002)

<sup>3</sup>Mine Data (WDEQ/AQD 2003a)

<sup>4</sup>TBNG Site (ARS 2003)

**Control Measures.** To date, there have not been any reported events of public exposure to blasting clouds or NO<sub>2</sub> releases at the Buckskin Mine. Buckskin has voluntarily committed to limit the size of individual shots to control emissions. As a result, the WDEQ/LQD has not required the Buckskin Mine to implement any specific measures to control or limit public exposure to NO<sub>2</sub> from blasting.

Some of the mines in the PRB have implemented programs designed to control/limit public exposure to the intermittent, short-term NO<sub>2</sub> releases associated with blasting. All mines comply with the blasting plan publication and notification requirements associated with the permits to mine issued by WDEQ/LQD.

Voluntary measures that have been instituted by some mines include:

- telephoning neighbors and workers in the general area of the mine prior to large blasts;
- monitoring weather and atmospheric conditions prior to the decision to detonate a large blast;
- minimizing blast size to the extent possible; and
- posting signs on major public roads that enter the general mine area and on all locked gates accessing the active mine area.

WDEQ has received several reports of public exposure to NO<sub>2</sub> from blasting operations at

several mines in the PRB. Measures to prevent future such incidences have been instituted at those mines when large overburden blasts are planned. These measures are required by permit and include:

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

Mine operators in the eastern PRB have also been working with blasting agent manufacturers to reduce NO<sub>x</sub> emissions by changing the size of the blasts and using different blasting agents, mixtures, and additives. Operators have tried adding substances like microspheres and rice hulls, using different blends of ANFO and slurries and gels, and using electronic detonation systems that can vary shot timing, different shot hole patterns, and plastic liners. No one single procedure or variation has proven consistently successful due to the numerous factors that are believed to contribute to the production of NO<sub>2</sub>. The most successful control measure has been reducing the size of the cast blasting shots. (Rick Chancellor 2003).

### **Air Quality Related Values - Visibility and Acidification of Lakes**

Air quality related values (AQRVs), including the potential air pollutant effects on visibility and the acidification of lakes and streams, are applied to PSD Class I and sensitive Class II areas. The land management agency responsible for the Class I area sets a level of acceptable change (LAC) for each AQRV. The AQRVs reflect the land management agency's policy and are not legally enforceable standards.

**Visibility.** Potential impacts to visibility were considered at 29 PSD Class I and sensitive Class II areas near the PRB. Table 3-3 shows the nearest distances from the sensitive receptor areas to the West Hay Creek LBA tract analysis area.

Visibility can be defined as the distance one can see and the ability to perceive color, contrast, and detail. Fine particulate matter (PM<sub>2.5</sub>) is the main cause of visibility impairment. Visual range, one of several ways to express visibility, is the furthest distance a person can see a landscape feature. Maximum visual range in the western United States would be about 140 miles.

Visibility impairment is expressed in terms of deciview (dv). The dv index was developed as a linear perceived visual change (Pitchford and Malm 1994) and is the unit of measure used in the EPA's Regional Haze Rule to achieve the national visibility goal. A change in visibility of 1.0 dv represents a "just noticeable change" by an average person under most circumstances. Increasing dv values represent proportionately larger perceived visibility impairment. Figure 3-8 shows annual averages for the 20% best, worst and middle visibility days at Badlands and Bridger wilderness areas from 1988 to 1998, respectively (IMPROVE 2002)<sup>1</sup>.

**Acidification of Lakes.** The acidification of lakes and streams is caused by atmospheric deposition of pollutants (acid rain). Lake acidification is expressed as the change in acid neutralizing capacity (ANC) measured in microequivalents per liter ( $\mu\text{eq/l}$ ), the lake's capacity to resist acidification from acid rain. Table 3-7 shows the existing ANC monitored in some mountain lakes disturbed by mining activities.

**TABLE 3-7**

**EXISTING ACID NEUTRALIZING CAPACITY IN SENSITIVE LAKES**

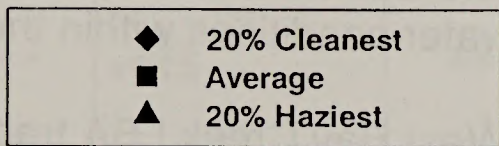
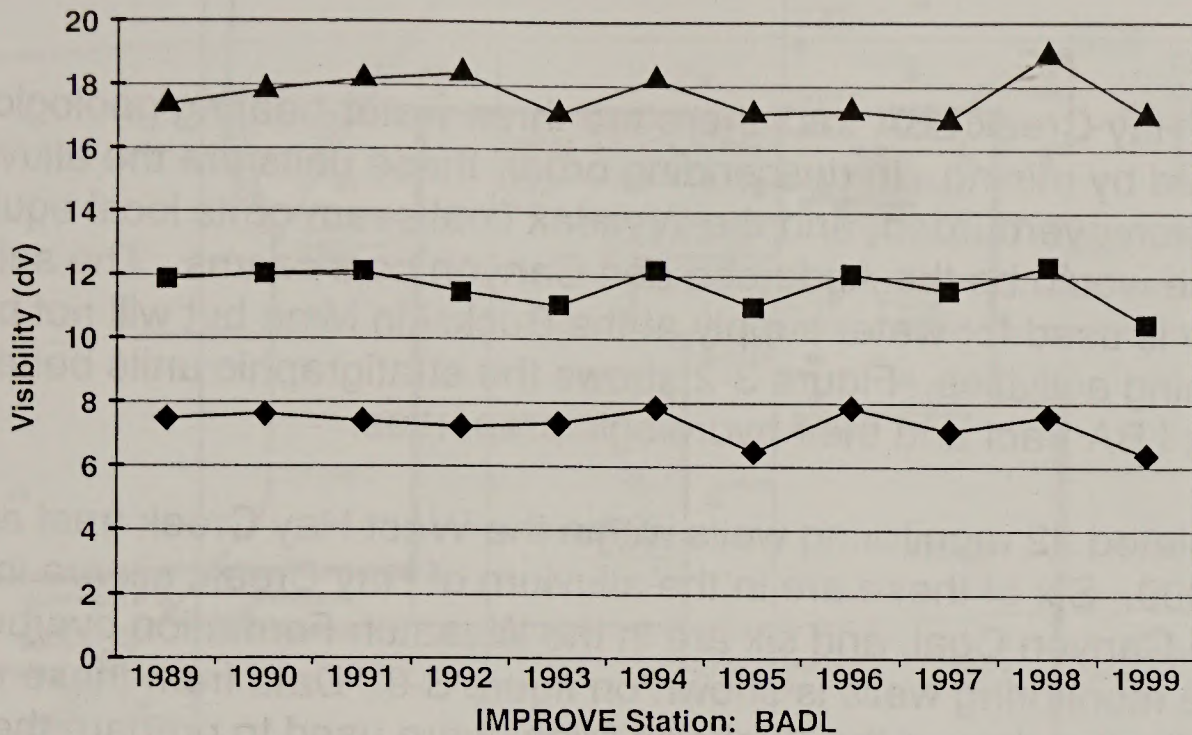
Wilderness Area	Lake	Background ANC ( $\mu\text{eq/L}$ )	Distance from Analysis Area (miles)
Bridger	Black Joe	69.0	210
	Deep	61.0	210
	Hobbs	68.0	225
	Upper Frozen	5.8 <sup>1</sup>	215
Cloud Peak	Emerald	55.3	85
	Florence	32.7	80
Fitzpatrick	Ross	61.4	215
Popo Agie	Lower	55.5	210
	Saddlebag		

<sup>1</sup> The background ANC is based on only 6 samples taken between 1997 and 2001

Source: Argonne 2002

<sup>1</sup> Summaries are based on IMPROVE aerosol data using procedures from the EPA *Draft Guidance for Tracking Progress under the Regional Haze Rule*.

Visibility in Badlands National Park



Visibility in Bridger Wilderness

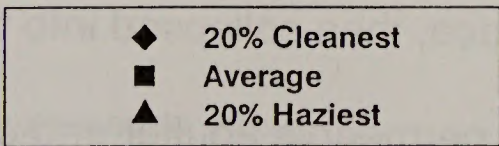
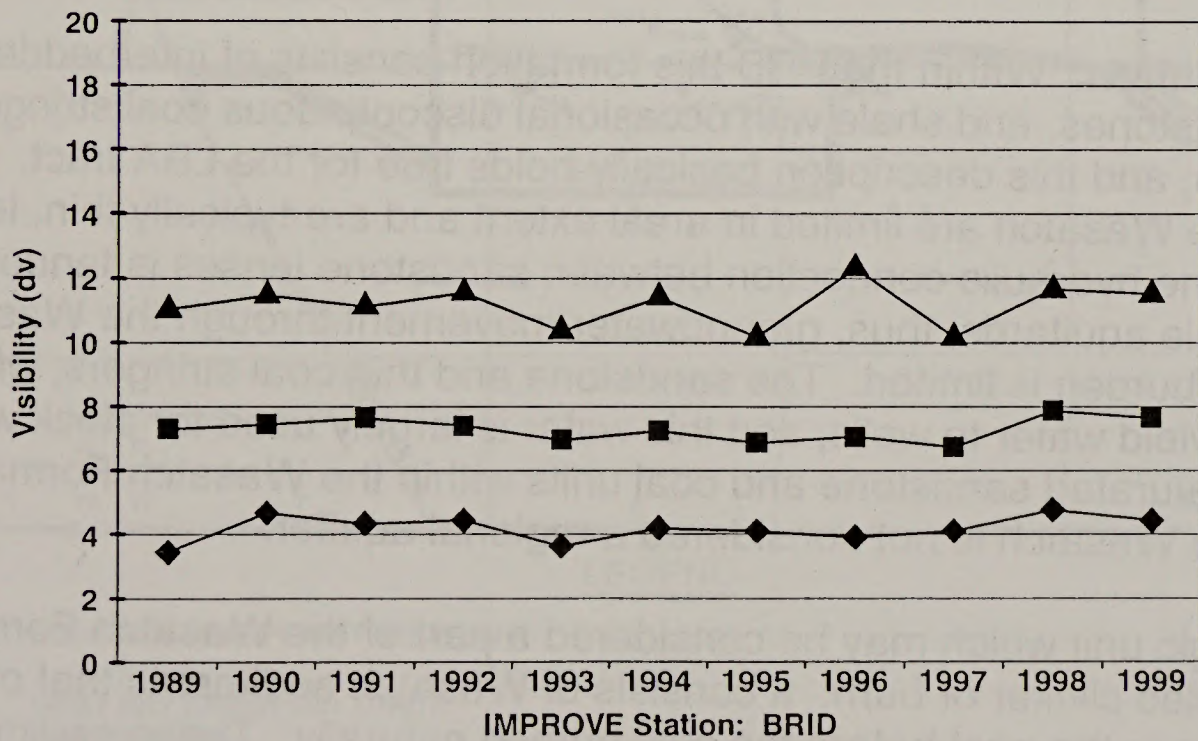


Figure 3-8. Visibility in the Badlands and Bridger Wilderness Areas.

## WATER RESOURCES

### Groundwater

Within the West Hay Creek LBA tract there are three water-bearing geologic units that could be disturbed by mining. In descending order, these units are the alluvium, Wasatch Formation overburden, and the Wyodak coal seam or its local equivalent, which in this case would be the Anderson and Canyon coal seams. The subcoal Fort Union Formation is used for water supply at the Buckskin Mine but will not be physically disturbed by mining activities. Figure 3-2 shows the stratigraphic units beneath the West Hay Creek LBA tract and their hydrologic properties.

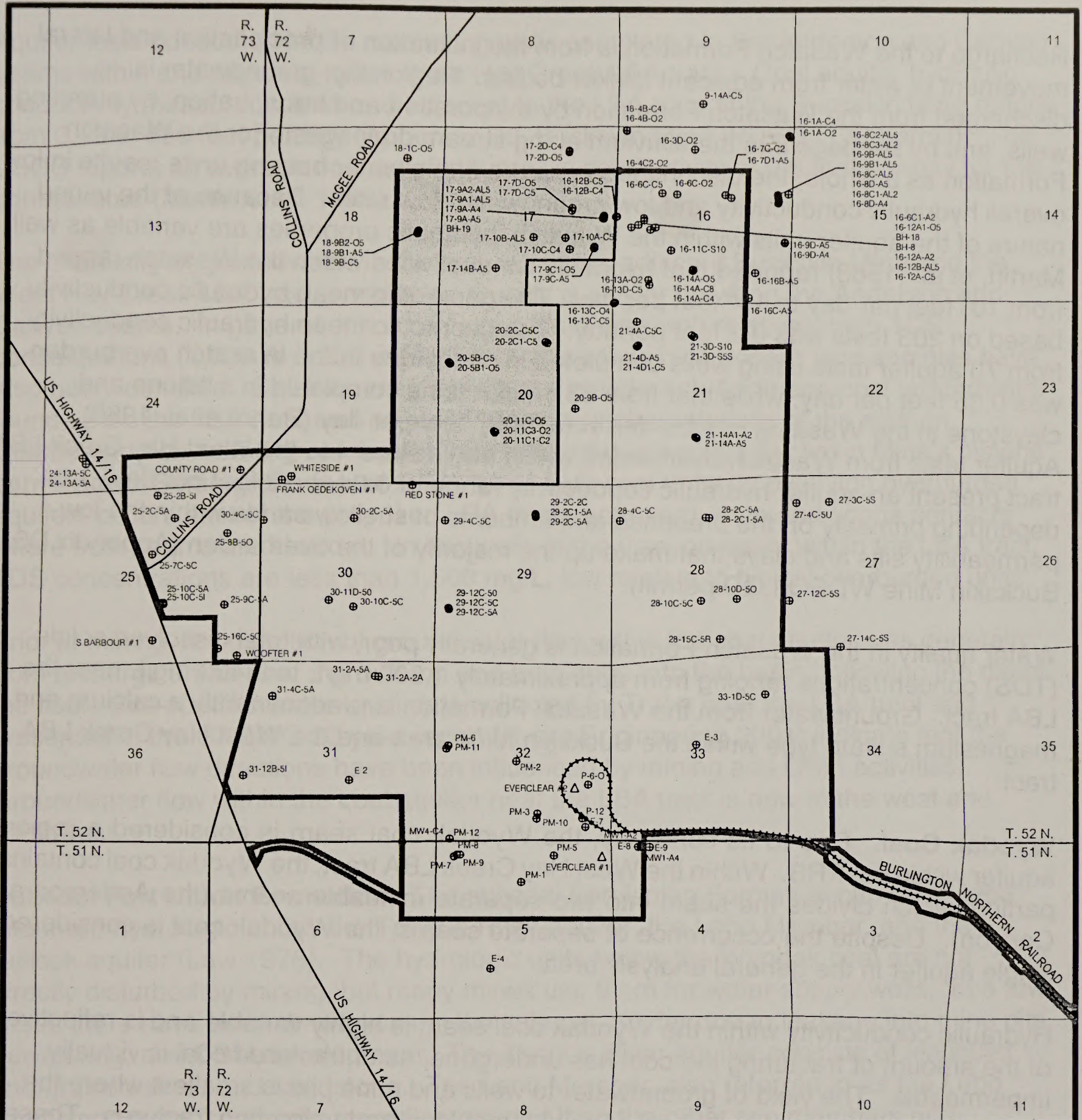
Triton has completed 22 monitoring wells within the West Hay Creek tract analysis area, most in 1999. Six of these are in the alluvium of Hay Creek, six are in Anderson Coal, four are in Canyon Coal, and six are in the Wasatch Formation overburden. The location of these monitoring wells is shown on figure 3-9. Data from these wells, as well as previously collected data at the Buckskin Mine, were used to prepare the following description of baseline groundwater conditions within the LBA tract analysis area.

**Recent Alluvium.** Within the West Hay Creek LBA tract, the surface drainages are generally dry draws and the alluvium, colluvium, and slope wash deposits associated with these draws are generally thin. In addition, these unconsolidated deposits are typically of limited lateral extent precluding any significant storage and movement of groundwater. The texture of the alluvium becomes coarser with depth.


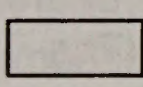


**Wasatch Formation.** Within the PRB this formation consists of interbedded sandstones, siltstones, and shale with occasional discontinuous coal stringers and clinker deposits, and this description basically holds true for the LBA tract. Saturated strata within the Wasatch are limited in areal extent and are typically thin, lenticular sandstones. The hydraulic connection between sandstone lenses is tenuous due to intervening shale aquitards; thus, groundwater movement through the Wasatch Formation overburden is limited. The sandstone and thin coal stringers, where saturated, will yield water to wells, and this water is largely used for stock watering. Because the saturated sandstone and coal units within the Wasatch Formation are not continuous, the Wasatch is not considered a regional aquifer.

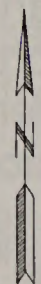
Another geologic unit which may be considered a part of the Wasatch Formation is scoria, also called clinker or burn. It consists of Wasatch sediments that overlaid the coal at one time in the past before the coal burned naturally. These sediments were baked, fused and melted in place, then collapsed into the void left by the burned coal.

Scoria deposits can be a very permeable aquifer and can extend laterally for miles in the eastern PRB. These deposits occur along the northern boundary of the LBA tract under the Proposed Action and within the action alternative tracts. The hydrologic function of scoria in the general area is to provide infiltration of precipitation and recharge to laterally contiguous overburden and Wyodak coal.



**LEGEND**

-  BUCKSKIN MINE PERMIT BOUNDARY
-  WEST HAY CREEK LBA TRACT ANALYSIS AREA
-  MONITORING WELL
-  FORT UNION FORMATION WATER SUPPLY WELL



SCALE: 1" = 5000'

Figure 3-9. Monitoring Well Locations Within and Near the West Hay Creek LBA Tract and Fort Union Formation Water Supply Well Locations at the Buckskin Mine.

Recharge to the Wasatch Formation is from the infiltration of precipitation and lateral movement of water from adjacent clinker bodies. Regionally, groundwater is discharged from the Wasatch Formation by evaporation and transpiration, by pumping wells, and by seepage into the alluvium along stream drainages. For the Wasatch Formation as a whole, the discontinuous nature of the water bearing units results in low overall hydraulic conductivity and low groundwater flow rates. Because of the varied nature of the aquifer units within the Wasatch, hydraulic properties are variable as well. Martin, et al. (1988) reported that hydraulic conductivities within the Wasatch ranged from  $10^4$  feet per day to  $10^2$  feet per day. The geometric mean hydraulic conductivity based on 203 tests was 0.2 feet per day. The geometric mean hydraulic conductivity from 70 aquifer tests using wells completed in sandstone in the Wasatch overburden was 0.35 feet per day, while that from 63 aquifer tests completed in siltstone and claystone in the Wasatch overburden was 0.007 feet per day (Rehm et al. 1980). Aquifer tests from Wasatch overburden within and adjacent to the West Hay Creek LBA tract present an aquifer hydraulic conductivity range of 0.04 to 13 feet per day, depending primarily on the presence and amounts of shallow sands within the low-permeability silts and clays that make up the majority of the overburden (Appendix D6, Buckskin Mine WDEQ/LQD permit).

Water quality in the Wasatch Formation is generally poor, with total dissolved solids (TDS) concentrations ranging from approximately 1,800 mg/L to 3,400 mg/L near the LBA tract. Groundwater from the Wasatch Formation is predominantly a calcium and magnesium sulfate type within the Buckskin Mine area and the West Hay Creek LBA tract.

**Wyodak Coal.** Due to its continuity, the Wyodak coal seam is considered a regional aquifer within the PRB. Within the West Hay Creek LBA tract, the Wyodak coal contains a parting, which divides the seam into two separate mineable seams (the Anderson and Canyon). Despite the occurrence of separate seams, the Wyodak coal is considered a single aquifer in the general analysis area.

Hydraulic conductivity within the Wyodak coal seam is highly variable and is reflective of the amount of fracturing the coal has undergone, as unfractured coal is virtually impermeable. The yield of groundwater to wells and mine pits is smallest where the permeability of the coal is derived primarily from localized unloading fractures. These fractures, which are the most common, are created by the expansion of the coal as the weight of overlying sediments is slowly removed by erosion. The highest permeability is imparted to the coal by tectonic fractures. These are through-going fractures of areal importance created during deformation of the Powder River structural basin. The presence of these fractures can be recognized by their linear expression at the ground surface, controlling the orientation of stream drainages and topographic depressions. Due to their pronounced surface expression, these tectonic fractures are often referred to as "lineaments." Coal permeability along lineaments can be increased by orders of magnitude over that in the coal fractured by unloading only.



Aquifer tests conducted in the monitoring wells completed in the Anderson and Canyon seams within and adjacent to the West Hay Creek LBA tract. Coal aquifer hydraulic conductivity measured within and adjacent to the LBA tract at the Buckskin Mine ranges from 0.13 to 950 feet per day (Appendix D6, Buckskin Mine WDEQ/LQD permit). The USGS reports an average coal aquifer hydraulic conductivity of 0.8 feet per day for the general area (Martin et al. 1988).

The chemistry of groundwater in the coal within the adjacent Buckskin Mine and the West Hay Creek LBA tract is variable. Quality is similar between the Anderson and Canyon seams. In general, it is a calcium sulfate type with relatively high TDS concentrations (1,000 to 3,900 mg/L) although sodium bicarbonate type samples have also been identified. Calcium, magnesium and sulfate-rich Anderson coal groundwater found within the LBA tract and adjacent areas is uncharacteristic of the sodium bicarbonate dominated groundwater from the same unit within Buckskin Mine's historic permit area. Some groundwater influence to both coal units by overlying overburden aquifers occurs east of the proposed LBA tract near overburden and scoria contacts where both seams are shallow. In two wells in the Canyon seam within the LBA tract, TDS concentrations are less than 1,500 mg/L; low relative to typical overburden units.

Prior to mining, the direction of groundwater flow within the coal aquifer was generally from recharge areas near the outcrop and burn zone into the basin, following the dip of the coal. Site-specific water-level data collected by Triton near the LBA tract and presented in the GAGMO 20-year report (Hydro Engineering 2001) indicate that the groundwater flow directions have been influenced by mining and CBM activities. Groundwater flow within the coal aquifer near the LBA tract is now to the west and southwest.

**Subcoal Fort Union Formation.** The subcoal Fort Union Formation can be divided into three hydrologic units: the Tongue River aquifer, the Lebo Member, and the Tullock aquifer (Law 1976). The hydrologic units below the Wyodak coal are not directly disturbed by mining, but many mines use them for water supply wells. In a few cases there have been drawdowns in the subcoal aquifer due to leakage into mine pits, dewatering, and CBM development. 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 1981). The Tullock aquifer consists of discontinuous lenses of sandstone separated by interbedded shale and siltstone. Transmissivity is the product of an aquifer's hydraulic conductivity or permeability times the thickness of the aquifer. It is commonly used when discussing the hydraulic properties of the Fort Union Formation, where wells are completed by exposing many discrete sand lenses to the well bore.

Transmissivities are generally higher in the deeper Tullock aquifer than in the Tongue River or Lebo, and many mines in the PRB have water-supply wells completed in this interval (Martin et al. 1988). The average transmissivity for this member as reported by OSM (1984) is 290 square feet per day.

Triton has completed two wells in the subcoal Fort Union Formation to supply water to the Buckskin Mine. The wells range in depth from 1,362 to 1,510 feet. Figure 3-9 shows the Buckskin Mine supply wells, designated as Everclear-1 and Everclear-2. A search of groundwater rights was conducted using Wyoming State Engineer's Office (SEO) records for the West Hay Creek LBA tract analysis area. This search identified a total of 656 permitted groundwater rights within 3 miles of the tract, of which 231 wells are owned by coal mining companies. The remaining 425 wells are presented in appendix F. The SEO data does not record the water-producing formation but typically does record the well depth. Of the 656 wells identified, only 12 wells had completion depths in excess of 1,000 feet. Wells of this completion depth could conceivably be producing from the Tullock Member of the Fort Union Formation.

The water quality of the Fort Union Formation is generally good. Water from this aquifer is typically of the sodium bicarbonate type.

**Lance and Fox Hills Formations.** Underlying the Fort Union Formation is the Lance Formation of Cretaceous age. At the base of the Lance Formation is the Fox Hills Sandstone. The Lance and Fox Hills formations are not used to supply water for the Buckskin Mine.

### Surface Water

Overall, the West Hay Creek LBA tract is similar in topography to the Buckskin Mine permit area. Slopes range from flat to about 22%. The area surrounding the West Hay Creek LBA tract consists of gently rolling topography. In general, the streams within this area are typical for the region, and their flow events are closely reflective of precipitation patterns. Flow events frequently result from snowmelt during the late winter and early spring. Although peak discharges from such events are generally small, the duration and therefore percentage of annual runoff volume can be considerable. During the spring, both rain and snow storms increase soil moisture, hence decreasing infiltration capacity. Subsequent rainstorms can result in both large runoff volumes and high peak discharges. The surface water quality varies with streamflow rate; the higher the flow rate, the lower the TDS concentration but the higher the suspended solids concentration. Surface water features within and adjacent to the West Hay Creek LBA tract are displayed in figure 3-10.

The only named stream within the LBA tract is Hay Creek, which flows from west to east through the LBA tract and joins the Little Powder River about 3 miles east of the LBA tract. Hay Creek is a minor headwater stream in the regional drainage network of the Little Powder River. Hay Creek exhibits both intermittent and ephemeral flow characteristics. It is not identified on the USGS hydrologic map of the state of Wyoming nor is it specifically listed in the Surface Water Classification List described in chapter I of the WDEQ/WQD Rules and Regulations. Under the WDEQ/WQD regulations, Hay

Creek is classified as a Class 3B stream that is protected for aquatic life (other than fish), recreation, agriculture, industrial uses, and scenic value.

Class 3B waters are tributary waters including adjacent wetlands that are not known to support fish populations or drinking water supplies and where those uses are not attainable. Class 3B waters are intermittent and ephemeral streams with sufficient hydrology to normally support and sustain communities of aquatic life including invertebrates, amphibians, or other flora and fauna that inhabit waters of the state at some stage of their life cycles.

Hay Creek is a third order stream where it leaves the Buckskin Mine's downstream permit boundary but a first order stream where it enters the permit boundary. Hay Creek's watershed at the upstream LBA tract boundary is 2.34 square miles, excluding a closed basin occupying 0.14 square miles primarily in the W½ of section 18. At its confluence with the Little Powder River, Hay Creek drains 14.96 square miles, again excluding closed basin watersheds.

Within the Buckskin Mine permit boundary, the Hay Creek channel has a horizontal length of approximately 16,580 feet based on measurements made on a 10-foot contour interval map prepared from aerial photography and extrapolating the original channel alignment through several channel impoundments. The valley length over the same reach is about 13,290 feet; hence, the ratio of the channel length to valley length (sinuosity ratio) is 1.25. This is a relatively small sinuosity characteristic of immature streams of low order. The channel elevation declines 99.5 feet over the channel length between the permit boundary crossings. This is equivalent to an average channel slope of 0.0060 feet per feet.

Within the LBA tract analysis area, there are three small impoundments on the main channel of Hay Creek: Impoundment 3, Impoundment 4, and McGee Reservoir (figure 3-10). Immediately to the south of McGee Reservoir, another small impoundment known as Mader Reservoir is located just outside of the LBA tract analysis area on a side channel of Hay Creek. All of these have estimated storage capacities of less than 2 acre-feet, with the exception of McGee Reservoir which has an estimated capacity of about 21 acre-feet.

McGee Reservoir typically fills each summer because of runoff and groundwater overflow from Impoundment 4. Pool elevations in McGee Reservoir fluctuate some five to six feet each year but storage is sufficient to support small fish (fat-head minnows and green sunfish). Mader Reservoir intercepts the water table in sandy slope wash/sheetwash sediments derived from weathering of local, surficial sandstone units. The pool elevation in Mader Reservoir fluctuates little, and it is only about one to two feet deep.

Upstream from McGee Reservoir, the Hay Creek channel is little more than a grassed swale except for a few bedrock cutbanks. Downstream from the reservoir, the channel becomes progressively more incised in slope wash deposits and is typically rectangular

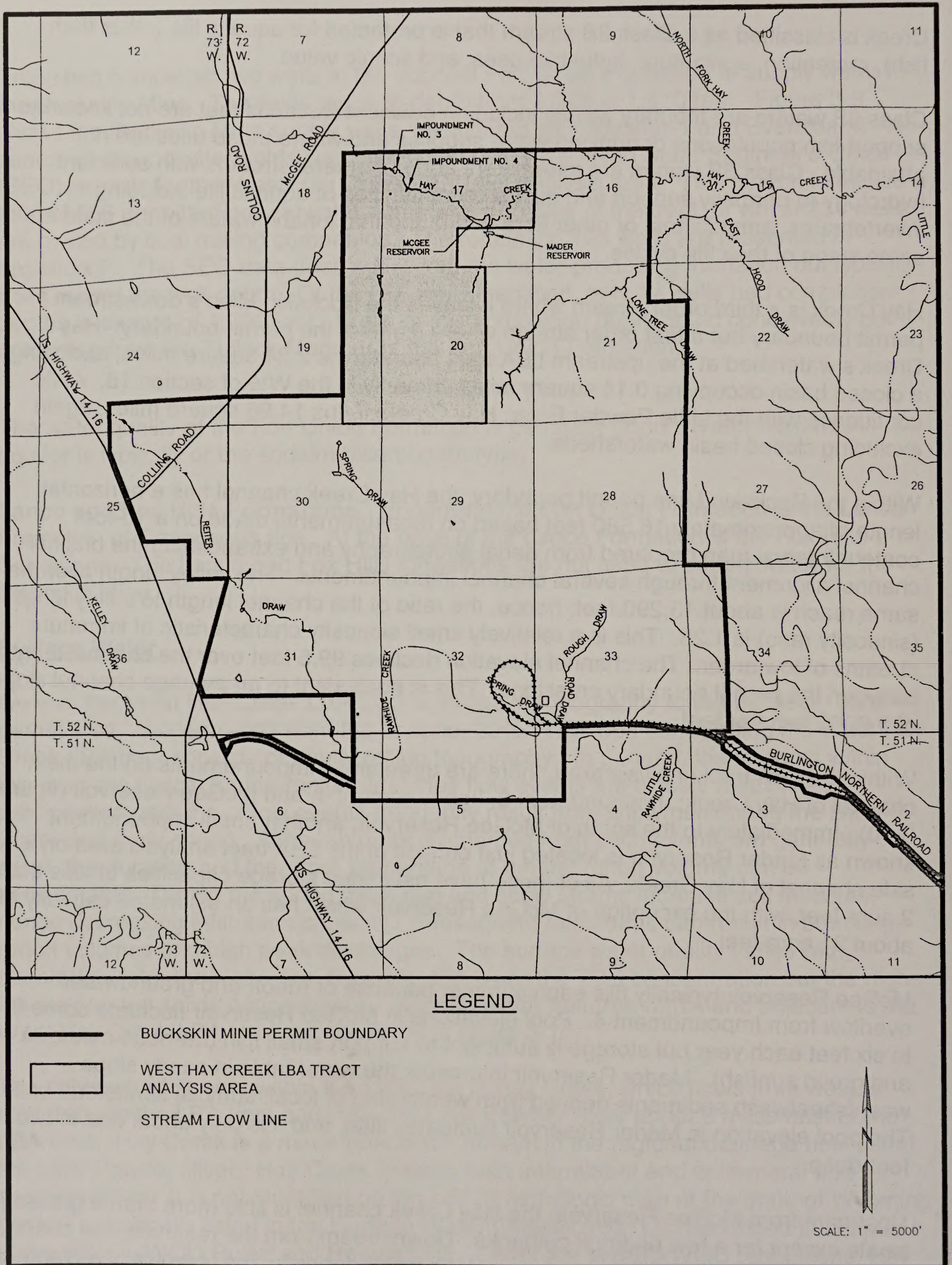


Figure 3-10. Surface Water Features Within and Adjacent to the West Hay Creek LBA Tract.

to parabolic in shape.

The Buckskin Mine monitored flows and water quality in Hay Creek during 1999 and 2000. Several seeps and springs associated with the Hay Creek drainage within the Buckskin Mine permit area were also monitored. Most local surface waters are a calcium sulfate-type that exceeds WDEQ domestic use standards for sulfate and TDS depending on flow rate and sample location. Several of the upstream samples are sodium bicarbonate type and are believed to be influenced by CBM pumping activities. Surface water quality is usually unsuitable for domestic use, marginal for irrigation, and suitable for stock and wildlife.

### **Water Rights**

Records at the Wyoming State Engineer's Office were searched for groundwater rights within a 3-mile radius of the West Hay Creek LBA tract analysis area. This information is required for WDEQ permitting. SEO data from a records search conducted March 2004 indicate there are 656 permitted water wells within 3 miles of the tract, of which 36 permitted wells are within the LBA tract Preferred Alternative. Water rights, which have been abandoned or cancelled, have been excluded from the search.

Of the total number of wells within the search area, coal mining companies own 231 wells (35%). Of the remaining 425 wells within the search area, approximately 68% are permitted for stock watering, 17% are permitted for miscellaneous use, 81% are permitted for CBM development, and 9% are permitted for domestic use. Other uses amounted to less than 1%. Most of these wells have been permitted for multiple uses. Appendix F contains a listing of the 425 non-coal mine wells and associated water rights information.

SEO records were searched for surface water rights using the SEO's computer database. The search was conducted for surface-water rights within ½ mile of the LBA tract and 3 miles downstream from the permit boundary, as required for WDEQ permitting. This search area covers all of the LBA as applied for and all alternatives.

SEO records indicate 21 permitted surface water rights within the search area. Eleven of the surface water rights are held by a coal mining company, and two are held by oil and gas companies. The remaining eight other surface water rights are for irrigation, stock watering, and domestic use. Appendix F shows a listing of the 10 non-coal mine surface water rights.

### **Alluvial Valley Floors (AVFs)**

WDEQ regulations define AVFs as unconsolidated stream laid deposits where water availability is sufficient for subirrigation or flood irrigation agricultural activities. Prior to leasing and mining, AVFs must be identified because SMCRA restricts mining activities that affect AVFs that are determined to be significant to agriculture. Impacts to designated 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 disturbed during mining but must be restored as part of the reclamation process. The determination of significance to agriculture is made by WDEQ/LQD, and it is based on specific calculations related to the production of crops or forage on the AVF and the size of the existing agricultural operations on the land of which the AVF is a part.

Investigations conducted by Triton to determine the presence of AVFs within and surrounding the Buckskin Mine and analysis area determined there were no AVFs within that area. The WDEQ has concurred with that finding. The nearest declared AVF is south of the analysis area along Rawhide Creek. Portions of that AVF area have been disturbed by mining and re-established by Triton.

### Wetlands

“Waters of the US” is a collective term for all areas subject to regulation by the Corps of Engineers (COE) (section 404 of the Clean Water Act). “Waters of the US” include special aquatic sites, wetlands, and jurisdictional wetlands. Special aquatic sites are large or small geographic areas that possess special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values (40 CFR 230.3). Wetlands are a type of *special aquatic site*, which includes those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (33 CFR 328.3(a)(7)(b)). Jurisdictional wetlands are defined by 33 CFR 328.1 and .2 as “those wetlands which are within the extent of COE regulatory review.” They must contain three components: hydric soils, a dominance of hydrophytic plants, and wetland hydrology. As the result of a recent Supreme Court ruling (*Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers, January 9, 2001*) non-navigable, isolated intrastate wetlands (playas) and other waters of the US are not considered jurisdictional. Navigable, non-isolated wetlands and other waters of the US are still considered jurisdictional by the COE.

Many wetland scientists consider areas that contain only one of the three criteria listed above as functional wetlands. The FWS used this categorization in producing the National Wetland Inventory (NWI) maps. These maps were produced using aerial photo interpretation with limited field verification.

The presence of jurisdictional wetlands on a mine property does not preclude mining. Jurisdictional wetlands must be identified and special permitting procedures are required to assure that after mining there will be no net loss of wetlands. A wetland delineation must be completed according to approved procedures (COE 1987) and submitted to the COE for verification as to the amounts and types of jurisdictional wetlands present. In Wyoming, once the delineation has been verified, it becomes a part of the mine permit document. The reclamation plan is revised to incorporate at least an equal type and number of jurisdictional wetlands.

Jurisdictional wetland inventories were conducted within the analysis area in 1999 and 2000. The 2000 survey also redelineated the jurisdictional wetlands on land in the S½S½ of sections 19 and 20, T. 52 N., R. 72 W. These lands were first surveyed in 1993. The wetlands delineation was completed in accordance with the procedures and criteria contained in the *Wetland Delineation Manual*. The consolidated delineation was subsequently approved by the COE in April 2001. Buckskin Mine then obtained authorization under the COE Programmatic General Permit 99-03 in July 2001. A total of 23.86 acres of waters of the US have been identified within the LBA analysis area, of which 17.52 acres are jurisdictional wetlands (figure 3-11). Identified jurisdictional wetlands include Riverine - emergent marsh (9.82 acres) and Riverine - wet meadow (7.7 acres). The additional 6.34 acres of waters of the US, which did not qualify as jurisdictional wetlands, include impoundment - stockponds, intermittent/perennial pool (4.20 acres), and riverine - natural ponds (2.14 acres). In addition, approximately 1,811 linear feet of nonwetland waters of the US have been inventoried within the LBA analysis area.

## VEGETATION

A vegetation baseline study was completed by Triton on the lands contained within the West Hay Creek LBA tract as applied for under the Proposed Action and the action alternatives in 1999. The baseline study area is located within the northwest portion of the current Buckskin Mine permit area. The vegetation communities in this area were delineated, mapped, and sampled in accordance with the current WDEQ/LQD requirements. The results of the baseline studies, including the Proposed Action lands, were reviewed and approved by WDEQ/LQD as part of an earlier permit amendment. Sampling was conducted on a large enough area to include sufficient room for overburden layback and other mining needs to recover the coal under the Proposed Action, the Preferred Alternative, and Alternative 3 tracts.

A total of eight vegetation types have been identified and mapped within the analyses area. Table 3-8 presents the acreage and percent of the area encompassed by each vegetation type. Figure 3-12 shows the eight vegetation communities, previously disturbed areas, and areas covered by surface water. The vegetation types include lowland prairie, mixed grass prairie, sand prairie, big sagebrush, silver sagebrush, riparian bottomland, agricultural pasture, and agricultural cropland. In addition to the eight vegetation communities, there is also a plains cottonwood tree shelterbelt containing 37 trees located within the analysis area.

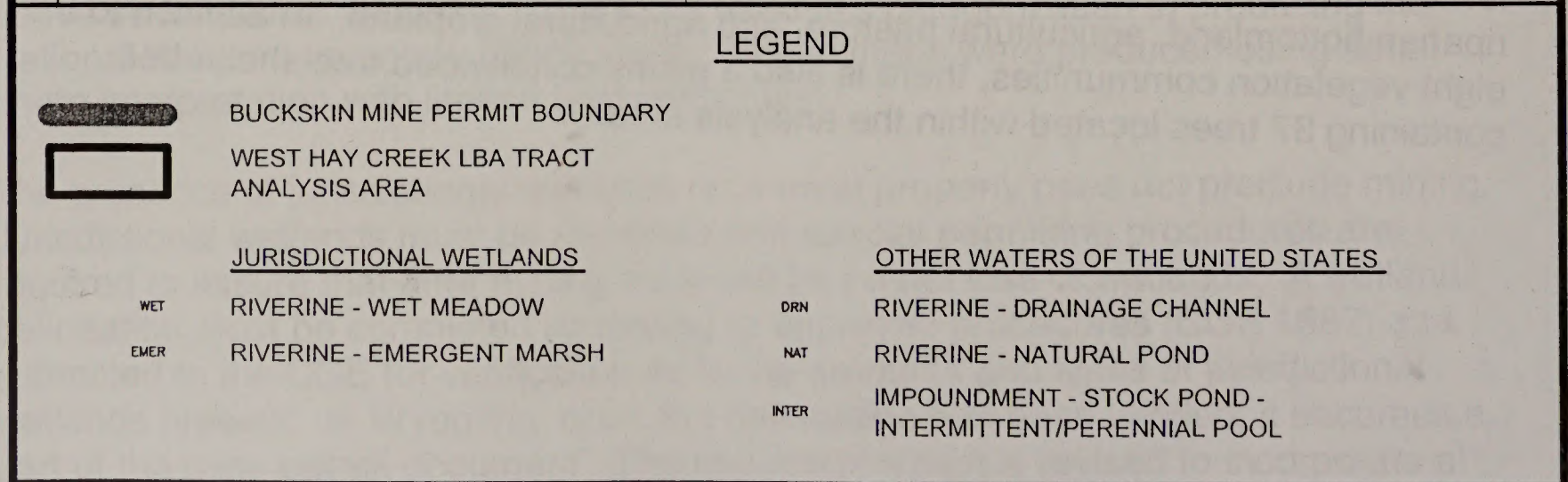
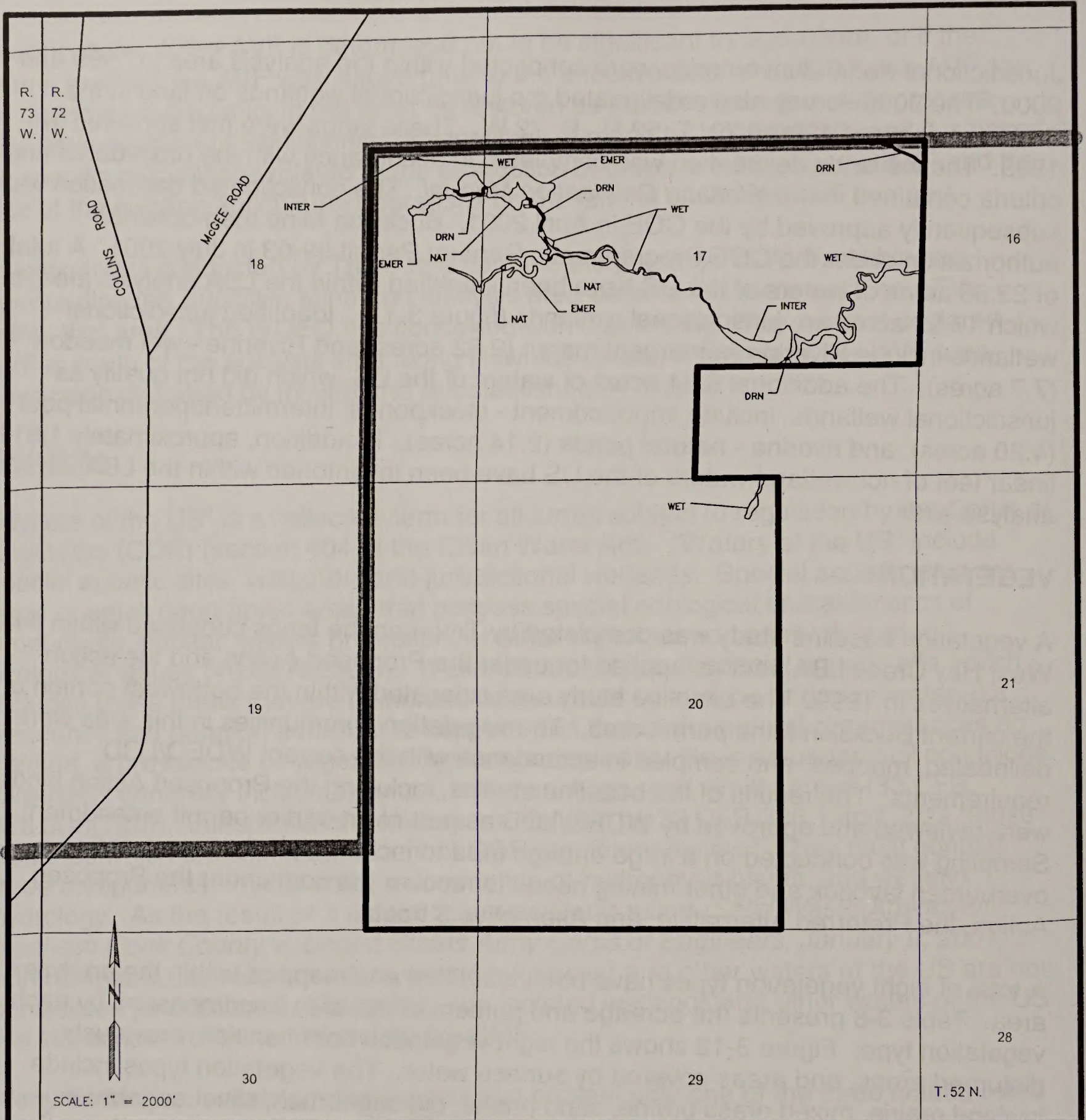


Figure 3-11. Wetlands Within the West Hay Creek LBA Tract Analysis Area.



TABLE 3-8

## VEGETATION TYPES WITHIN THE ANALYSIS AREA

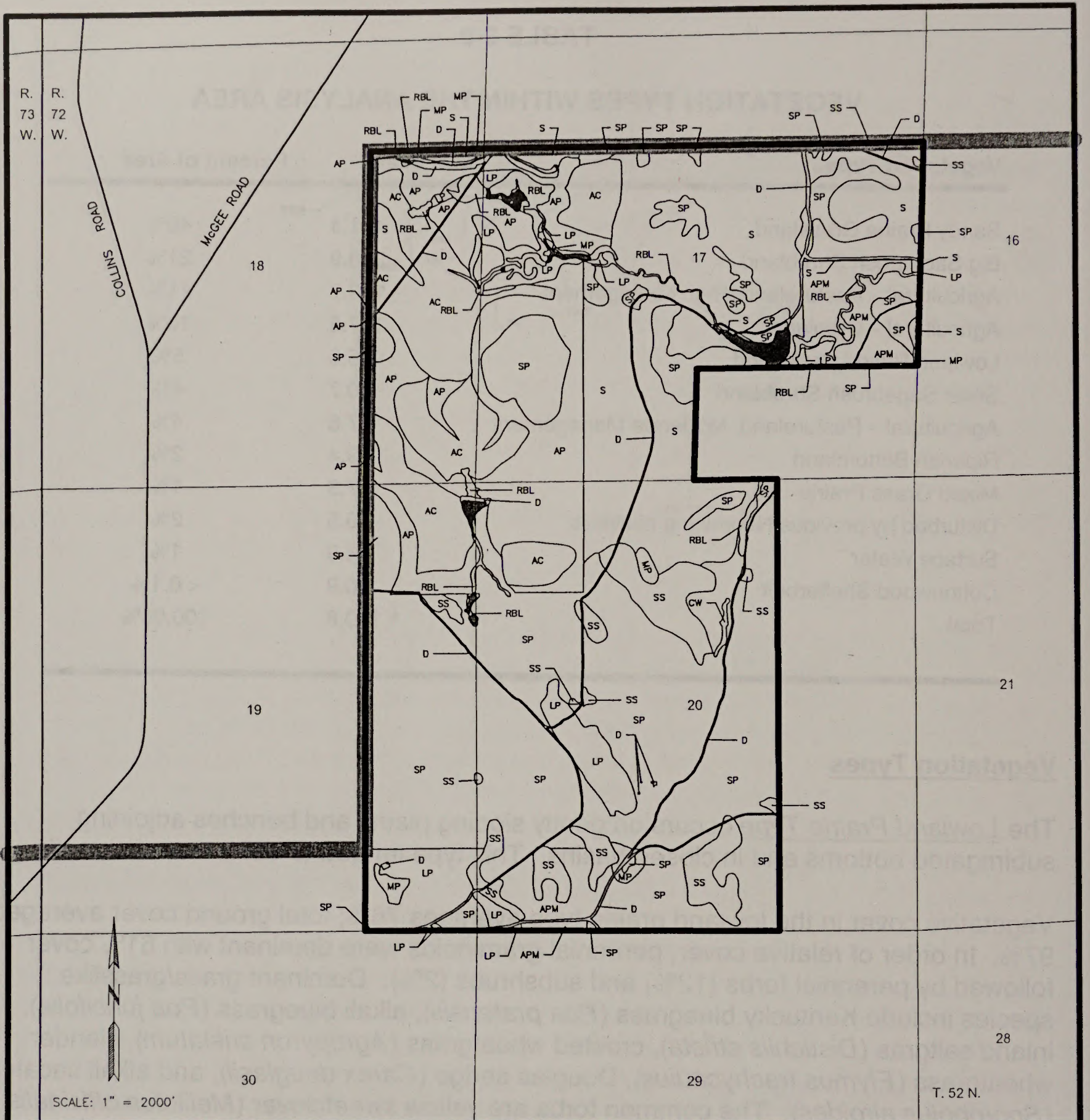
Vegetation Type	Acres	Percent of Area
Sandy Prairie Grassland	461.4	40%
Big Sagebrush Shrubland	238.9	21%
Agricultural - Pastureland, High Management	129.7	11%
Agricultural - Cropland	117.3	10%
Lowland Prairie Grassland	55.0	5%
Silver Sagebrush Shrubland	50.7	4%
Agricultural - Pastureland, Moderate Management	47.8	4%
Riparian Bottomland	19.4	2%
Mixed Grass Prairie	7.3	1%
Disturbed by previous Nonmining activities	25.5	2%
Surface Water	6.9	1%
Cottonwood Shelterbelt	0.9	< 0.1%
Total	1,160.8	100.00%

Vegetation Types

The Lowland Prairie Type occurs on gently sloping plains and benches adjoining subirrigated bottoms and in closed basins. This type tended to occur on saline soils.

Vegetative cover in the lowland prairie type averages 76%; total ground cover averaged 97%. In order of relative cover, perennial graminoids were dominant with 61% cover followed by perennial forbs (12%) and subshrubs (2%). Dominant grass/grasslike species include Kentucky bluegrass (*Poa pratensis*), alkali bluegrass (*Poa juncifolia*), inland saltgrass (*Distichlis stricta*), crested wheatgrass (*Agropyron cristatum*), slender wheatgrass (*Elymus trachycaulus*), Douglas sedge (*Carex douglasii*), and alkali sacaton (*Sporobolus airoides*). The common forbs are yellow sweetclover (*Melilotus officinalis*), western ragweed (*Ambrosia psilostachya*), wild licorice (*Glycyrrhiza lepidota*), prostrate verbena (*Verbena bracteata*), wavyleaf thistle (*Cirsium undulatum*), western yarrow (*Achillea lanulosa*), and blue lettuce (*Lactuca oblongifolia*). Shrubs and subshrubs are not dominant components. Common shrubs and subshrubs include rubber rabbitbrush (*Chrysothamnus nauseosus*), cudweed sagewort (*Artemisia ludoviciana*), fringed sagewort (*Artemisia frigida*), and broom snakeweed (*Gutierrezia sarothrae*).

Total perennial/biennial herbaceous production averages 1,849 pounds per acre. Perennial grasses (77% relative production) and perennial forbs (12% relative production) provided most production.




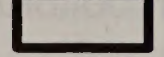
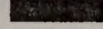
<u>LEGEND</u>	
	BUCKSKIN MINE PERMIT BOUNDARY
	WEST HAY CREEK LBA TRACT ANALYSIS AREA
<u>VEGETATION COMMUNITIES</u>	
AC	AGRICULTURAL CROPLAND
AP	AGRICULTURAL PASTURE - HIGH MANAGEMENT
APM	AGRICULTURAL PASTURE - MODERATE MANAGEMENT
D	DISTURBED BY PREVIOUS NON-MINING ACTIVITIES
LP	LOWLAND PRAIRIE GRASSLAND
MP	MIXED GRASS PRAIRIE GRASSLAND
SP	SANDY PRAIRIE GRASSLAND
CW	COTTONWOOD SHELTER BELT
RBL	RIPARIAN BOTTOM LAND
S	BIG SAGEBRUSH SHRUB LAND
SS	SILVER SAGEBRUSH SHRUB LAND
	SURFACE WATER

Figure 3-12. Vegetation Communities Within the West Hay Creek LBA Tract Analysis Area.

Shrub density averaged 53 plants per acre. Silver sagebrush was the predominant shrub (85% of all shrubs). Subshrub density averages 16 plants per acre (50% broom snakeweed and 50% fringed sagewort).

The Mixed Grass Prairie Type occupies rolling hills and ridges where soils are moderately deep to deep. This type occurs most frequently on loams, sandy clay loams, fine sandy loams, and sandy loams and is likely to occur on the Bidman, Cambria, Kishona, Lawver, Teckla, Wibaux, and Hiland soil series.

Vegetative cover averages 60%; total ground cover averages 88%. In order of relative cover, perennial graminoids are dominant with 62% followed by perennial forbs (10%), shrubs (1.3%) and subshrubs (1%). Dominant grass/grasslike species in the mixed grass prairie include needle-and-thread (*Stipa comata*), prairie junegrass (*Koeleria macrantha*), and western wheatgrass (*Agropyron smithii*). Dominant forbs include western ragweed (*Ambrosia psilostachya*), Sawatch knotweed (*Polygonum sawatchense*), scarlet globemallow (*Sphaeralcea coccinea*), Hood's phlox (*Phlox hoodii*), prairie coneflower (*Ratibida columnifera*), and prairie evening primrose (*Oenothera albicaulus*). Common shrubs and subshrubs are big sagebrush, silver sagebrush, four-wing saltbush (*Atriplex canescens*), broom snakeweed (*Gutierrezia sarothrae*), and fringed sagewort (*Artemisia frigida*).

Total perennial/biennial herbaceous production average 934 pounds per acre. Perennial grasses (78% relative production), perennial forbs (10% relative production), forbs (10%), provided the most production, with shrubs (1.3%), and subshrubs (1%) providing a minor component of production.

Shrub density averages 700 plants per acre, 63% of which are Wyoming big sagebrush, 35% of which are silver sagebrush, and 2% of which are four-wing saltbush. Subshrub density averages 571 plants per acre (26% broom snakeweed, 64% fringed sagewort, and 3% four-wing saltbush).

The Sandy Prairie Type occurs on rolling hills and plains and is associated with windblown areas. This type commonly occupies areas with deep to moderately deep fine sandy loams and sandy loams. Thus, it is likely to occur in Terro, Vonalee, and Vonalf soils.

Vegetative cover averages 57%; total ground cover averages 84%. In terms of relative cover, perennial graminoids are dominant at 65% followed by perennial forbs (11%) and shrubs (3%). Dominant grass/grasslike species include needle-and-thread (*Stipa comata*), prairie sandreed (*Calamovilfa longifolia*), prairie junegrass (*Koeleria macrantha*), threadleaf sedge (*Carex filifolia*), sand bluestem (*Andropogon hallii*) and crested wheatgrass (*Agropyron cristatum*). The common forbs are western ragweed (*Ambrosia psilostachya*), hairy golden aster (*Heterotheca villosa*), scarlet guara (*Gaura coccinea*), wild licorice (*Glycyrrhiza lepidota*), and low pussytoes (*Antennaria dimorpha*). Common subshrubs and shrubs are prickly phlox (*Leptodactylon pungens*), silver sagebrush (*Artemisia cana*), and Wyoming big sagebrush (*Artemisia tridentata wyo.*).

Total perennial/biennial herbaceous production averages 1,224 pounds per acre and is mainly perennial grasses (78% relative production) and perennial forbs (11% relative production).

Shrub density averages 789 plants per acre--silver sagebrush (48%), Wyoming big sagebrush (20%) and four-wing saltbush (12%) are predominant. Subshrub density averages 1,085 plants per acre with fringed sagewort (90%) and yucca (7%).

The Big Sagebrush Type occurs on a variety of topographic locations including gentle slopes, and rolling hills within the analysis area. It commonly occurs on shallow clay loams (such as Theedle and Shingle series) and deep loams (such as Forkwood and Cushman series) and occasionally occurs on sandy loams. Thus, it could occur throughout the analysis area although it was unlikely to occur on sandy windblown deposits.

Vegetative cover in the big sagebrush type averages 63%; total ground cover averages 90%. In order of relative cover, perennial graminoids contribute 42% followed by shrubs (19%), subshrubs (6%), and perennial forbs with 4%. Dominant grass/grasslike species include needle-and-thread (*Stipa comata*), prairie junegrass (*Koeleria macrantha*), Kentucky bluegrass (*Poa pratensis*), western wheatgrass (*Agropyron smithii*), native bluegrass (*Poa secunda secunda*), and green needlegrass (*Stipa viridula*). Common forbs include Hood's phlox (*Phlox hoodii*), silverleaf scurfpea (*Psoralea argophylla*) scarlet gaura (*Gaura coccinea*), and western yarrow (*Achillea lanulosa*). Common shrubs and subshrubs are Wyoming big sagebrush (*Artemisia tridentata wyo.*), broom snakeweed (*Gutierrezia sarothrae*), and fringed sagewort (*Artemisia frigida*).

Total perennial/biennial herbaceous production averages 1,041 pounds per acre, most of which was provided by perennial grasses (75% relative production), annual grasses (19% relative production), and perennial forbs (4% relative production).

Shrub density averages 5,186 plants per acre (88% big sagebrush and 11% silver sagebrush). Subshrub density averages 3,000 plants per acre (64% broom snakeweed, 34% fringed sagewort, and 2% winterfat).

The Silver Sagebrush Type occurs on gentle to moderately sloping plains and rolling hills as well as ephemeral drainage bottoms and adjacent terraces. This type is found on a variety of soil textures in the Lawver, Teckla, Wibaux and Vonalee series.

Vegetative cover averages 70%; total ground cover averages 95%. Dominant species are needle-and-thread (*Stipa comata*), native bluegrass (*Poa secunda secunda*), Kentucky bluegrass (*Poa pratensis*), threadleaf sedge (*Carex filifolia*), western wheatgrass (*Agropyron smithii*), and prairie sandreed (*Calamovilfa longifolia*). Western ragweed (*Ambrosia psilostachya*), Silverleaf scurfpea (*Psoralea argophylla*), scarlet globemallow (*Sphaeralcea coccinea*) are common forbs. The most common shrubs

and subshrub are silver sagebrush (*Artemisia cana*), four-wing saltbush (*Atriplex canescens*), Wyoming big sagebrush, and cudweed sagewort (*Artemisia ludoviciana*).

Total perennial/biennial herbaceous production averages 1,086 pounds per acre as follows: perennial grasses (56% relative production), annual grasses (33% relative production) and perennial forbs (9% relative production).

Shrub density averages 3,988 plants per acre. Silver sagebrush is the dominant shrub at 90%, followed by four-wing saltbush (6%) and Wyoming Big sagebrush (4%). Subshrub density averages 248 plants per acre dominated by fringed sagewort (89%) and broom snakeweed (11%).

The Riparian Bottomland Type is limited in distribution and occurs primarily along Hay Creek. Atypical instances are also located on hillsides associated with groundwater seeps and reservoirs. The riparian bottomland type can be subdivided into two sub-communities: riparian bottomland-meadow and riparian bottomland-marsh. Riparian bottomland-meadow is the predominant subcommunity. The riparian bottomland-marsh type is limited to the perimeters of stock ponds and creek pools. Substrates are characteristically deep and poorly drained and include Boruff series and mollic fluvaquents.

Vegetative cover averages 96%; total ground cover averages 99%. In order of relative cover, perennial/grasslike species provide 85% followed by perennial forbs with 9%. Dominant species are cordgrass (*Spartina pectinata*), common spikeweed (*Eleocharis palustris*), American bullrush (*Scirpus pungens poly.*), thickspike wheatgrass (*Elymus lanceolatus lan.*), Canada bluegrass (*Poa compressa*), clustered field sedge (*Carex praegracilis*), and softstem bulrush (*Scirpus validus*). Common forbs include tufted white prairie aster (*Aster ericoides pansus*), maximilian sunflower (*Helianthus maximiliani*), wild licorice (*Glycyrrhiza lepidota*), and showy milkweed (*Asclepias speciosus*). Wood's rose (*rosa woodsii*) is the most common shrub.

Total perennial/biennial herbaceous production averages 3,103 pounds per acre, most of which was provided by perennial grasses and grasslike species (95% relative production) followed by perennial forbs (3% relative production). Annual grass production was insignificant at less than 1%.

Agricultural - Pastureland Type. All agricultural pastures within the analysis area are under either moderate or high management levels. Based on the level of management, total vegetation cover ranges from 50% to 78%. Total ground cover ranges from 84% to 95%. Perennial grasses and grasslike species provide 91% relative cover.

Dominant grasses and grasslike species include crested wheatgrass (*Agropyron cristatum*), Kentucky bluegrass (*Poa pratensis*), Canada bluegrass (*Poa compressa*), Russian wildrye (*Elymus junceus*), bulbous bluegrass (*Poa bulbosa*) and thickspike wheatgrass (*Elymus lanceolatus lanceolatus*). Yellow sweetclover (*Melilotus officinalis*) is the most common forb. Shrubs and subshrubs were not present in the transect

samples.

Herbaceous productivity for the pasture community is based on countywide hay production values for various soil series present in the analysis area as provided by the Natural Resources Conservation Service. Under average annual rainfall conditions, estimated forage production may range from 1,200 to 3,000 pounds per acre.

Agricultural - Cropland Type. The western portion of the analysis area contains a large amount of croplands. Various small grains were on these lands for quite some time. No vegetation studies were conducted for these croplands.

### **Threatened, Endangered, and Candidate Plant Species**

No federally listed threatened, endangered, or candidate plant species are known to occur within the analysis area. The analysis area was surveyed in 1999 for threatened, endangered and candidate species using the *Wyoming Rare Plant Field Guide* (Thorne 1994) as their reference. Ute ladies'-tresses surveys were conducted by Habitat Management, Inc., who met with FWS personnel on August, 30, 1999 to review currently acceptable Ute ladies'-tresses survey methods and practices. The FWS memorandum published November 23, 1992 entitled "Interim Survey Requirements for *Spiranthes diluvialis*" was also used as a guide in conducting the survey. All individuals who conducted the survey have received written recognition from the FWS Colorado Field Office as being qualified to conduct Ute ladies'-tresses surveys and are on the FWS's list of qualified consultants (appendix G).

### **WILDLIFE RESOURCES**

Background information on wildlife near the West Hay Creek tract was gathered from several sources including: Buckskin Mine WDEQ/LQD permit and annual reports, Wyoming Game and Fish Department (WGFD) and FWS records and personnel contacts with WGFD and FWS biologists.

Site-specific data for the entire proposed lease area were obtained from sources including the WDEQ/LQD permit and annual reports for the Buckskin Mine. Baseline and monitoring surveys cover large perimeters around the permit area. Consequently, the LBA tract has been surveyed during annual wildlife monitoring for the Buckskin Mine. Thunderbird Wildlife Consulting, Inc. (TWC), formerly Powder River Eagle Studies (PRES) have conducted annual wildlife monitoring surveys at Buckskin Mine from 1984 through 2003. Their current monitoring plan complies with Appendix B of the WDEQ/LQD Coal Rules and Regulations. The study area has included most of the LBA analysis area throughout TWC's monitoring timeframe. Baseline wildlife monitoring was conducted on the analysis area concurrent with the Belco Exchange lands (February 1999 through February 2000). Thus, extensive wildlife data are available for the analysis area. The data presented herein is from TWC's baseline and annual monitoring data.

The LBA tract and adjacent area consists primarily of uplands. The topography is level to rolling, with some areas sloping to steeply sloping. Sagebrush-grassland and grassland are the principal native habitat types in the south and eastern portions of the analysis area. Agricultural pasturelands and croplands dominate the northwest quarter of the analysis area. Bottomland habitat is along Hay Creek (ephemeral stream) in the northern portion of the analysis area. No designated critical, crucial, or unique habitats are present. Several stockponds and natural pools exist on the analysis area. The only trees in the analysis area are 37 cottonwoods in a shelterbelt located near the center of section 20, T. 52 N., R. 72 W. Hay Creek and other unnamed channels on the LBA tract are ephemeral.

## **Big Game**

Pronghorn (*Antilocapra Americana*) and mule deer (*Odocoileus hemionus*) are the only big game species that regularly occur on or near the analysis area. Rare sightings of white-tailed deer (*Odocoileus virginianus*) have been recorded.

The WGFD has classified the entire area as yearlong pronghorn range. The Buckskin Mine is at the north end of a larger multi-mine survey area (including Buckskin Mine, Eagle Butte Mine, and Rawhide Mine) that has been surveyed each winter since 1993. Pronghorn densities in the Buckskin area have consistently been lower than those of the multi-mine area.

It is likely that the analysis area is a fringe area of pronghorn use (Triton 2000). Long-term (1987-1998) winter pronghorn density in the Buckskin area has ranged from 2 to 14 animals per square mile (/mi<sup>2</sup>) but has generally been greater than 8 animals/mi<sup>2</sup>. August 1999 pronghorn density on a 36-mi<sup>2</sup> survey area, which included the analysis area, was a minimum of 5.6 animals/mi<sup>2</sup>. Records show that the pronghorn reproductive ratio in the Buckskin area often reaches 90 or more fawns per 100 does. This exceeds the WGFD data for northern Campbell County, which indicated a ratio of 57 fawns per 100 does (BLM 2001a).

The analysis area is located within the WGFD's Gillette antelope herd located north of Interstate 90 and is in hunt area 17. The 2001 postseason population estimate is about 12,000 antelope, slightly above the herd objective of 11,000. This is the first time since 1996 that the herd has been at or slightly above objective levels. Drought conditions the past two years has tended to slow herd growth through lower than average fawn survival four of the past five years. The long term average for pre-season fawn ratios is approximately 75 fawns to 100 does. However, this herd has not produced an average fawn ratio for 8 years. Historically, the major management problem with this herd has been the ability to achieve an adequate harvest. Most of the antelope are on private land. This is also the case in the LBA tract area. There are no public lands within the analysis area, and public hunting access is limited. It is unlikely that enough licenses can be sold in the future to achieve the harvest needed to keep this population at its objective (Oedekoven 2002).

The analysis area is located within the Powder River mule deer herd and deer hunt area 18. The herd is currently estimated at 44,000 (postseason 2001), which is approximately 16% below its objective of 52,000 deer. As with antelope, access to private land is limited.

WGFD has classified the majority of the analysis area as yearlong mule deer habitat with a portion of the southeast classified as winter/yearlong. The area is not considered whitetail deer habitat (Oedekoven 2002).

Deer were not numerous in the analysis area during the 1999-2000 baseline study. Only five mule deer were identified in the analysis area during the winter aerial survey. Ground and aerial survey data indicate that deer use was negligible in 1999. Annual monitoring results for the entire Buckskin Mine survey area has shown that the area supports low to moderate numbers of mule deer with the highest numbers generally observed in winter and spring (Triton 2000). Ground counts suggest that mule deer numbers have declined somewhat from the mid-1990s (Triton 2001). Mule deer were recorded in a wide variety of habitat types from 1995 through 2001 but more were generally observed in either mine reclaimed grassland or sagebrush grassland (Triton 2001). Crucial or critical mule deer habitat does not occur on or adjacent to the analysis area (Triton 2000).

### Other Mammals

A variety of small and medium-sized mammal species occur near the analyses area. These include predators and furbearers, such as coyote (*Canis latrans*), red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), and feral cats. Prey species include rodents such as mice, pocket gophers, voles, chipmunks, and lagomorphs (jackrabbits and cottontails). Surveys for prairie dog towns were conducted on the analysis area and adjacent lands. No prairie dog towns were identified within the analysis area. The closest prairie dog town to the LBA tract is located in the SE $\frac{1}{4}$  of section 9 and the SW $\frac{1}{4}$  of section 10, T. 52 N., R. 72 W. There is also another prairie dog town located in section 4, T. 52 N., R. 72 W. approximately 1.75 miles north of the analysis area. Both of these towns are shown on figure 3-13. These mammal species are cyclically common and widespread throughout the region. These prey species are important for raptors and other predators.

### Raptors

Numerous raptor species have been observed on or adjacent to the West Hay Creek LBA tract. These species include the golden eagle (*Aquila chrysaetos*), bald eagle (*Haliaeetus leucocephalus*), northern harrier (*Circus cyaneus*), Swainson's hawk (*Buteo swainsoni*), red-tailed hawk (*Buteo jamaicensis*), ferruginous hawk (*Buteo regalis*), rough-legged hawk (*Buteo lagopus*), prairie falcon (*Falco peregrinus*), American kestrel (*Falco sparverius*), turkey vulture (*Carthartes aura*), great horned owl (*Bubo virginianus*), short-eared owl (*Asio flammeus*) and burrowing owl (*Athene cunicularia*). Although numerous raptor species have been observed in the area, none have nested



on the site due to limited suitable habitat (cliffs and tall trees). Figure 3-13 shows the locations of raptor nest sites identified since monitoring began for Buckskin Mine in an area that includes the West Hay Creek LBA tract. The figure shows 13 intact nest sites. As of June 2002, all of the nest sites were still intact; there were three active nests, all of which were used by red-tailed hawk pairs. Two nests previously used by great horned owls in 1999 through 2001 were not used in 2001. The golden eagle nest site was not used from 1999 through 2002.

### Game Birds

Three species of upland game birds were observed during the 1999 baseline study: the sage grouse (*Centrocercus urophasianus*), sharp-tailed grouse (*Pedioecetes phasianellus*), and gray partridge (*Perdix perdix*).

The FWS has received several petitions to list the greater sage grouse under the Endangered Species Act because of range-wide population declines and, in a press release issued on April 15, 2004, the agency announced that it has determined that enough biological information exists to warrant a more in-depth examination of the status of the greater sage grouse. According to the press release, this decision, known as a "90-day Finding," triggers a more thorough review of the available biological information. The causes for the sage grouse range-wide decline are not completely understood and may be influenced by local conditions. However, habitat loss and degradation, as well as loss of population connectivity are important factors (Braun 1998, Wisdom et al. 2002).

The greater sage grouse is found at elevations ranging from 4,000 to 9,000 feet. Greater sage grouse are dependent on sagebrush for food and protection from predators. In the summer, the grouse depend on the grass and plants that grow under the sagebrush to provide nesting material and high protein insects that are critical to sage grouse chicks in their first month of life. In winter, more than 99% of the species' diet is sagebrush leaves and buds. Population and habitat analyses suggest that wintering habitat can be as limiting as mating and breeding habitats. Anecdotal information from several sources in Wyoming suggests that sage grouse populations are negatively affected by construction (energy development) activities, especially those that degrade important sagebrush habitat, even when mitigative measures are implemented (Braun 1998, Lyon 2000). There is some evidence that grouse populations do repopulate areas developed for resource extraction after reclamation for the species (Braun 1987). However, there is no evidence that populations attain their previous levels. Reestablishment of sage grouse in a reclaimed area may take 20 to 30 years, or longer (Braun 1998).

The sage grouse is the most commonly encountered upland game bird species in the analysis area. No sage grouse leks were identified within the analysis area. One abandoned lek is present in the NE $\frac{1}{4}$ SW $\frac{1}{4}$  of section 16, T. 52 N, .R. 72 W. (a state section). The abandoned lek is located approximately 1/2-mile east of the analysis area, within the existing Buckskin Mine permit area (figure 3-13). This lek was active

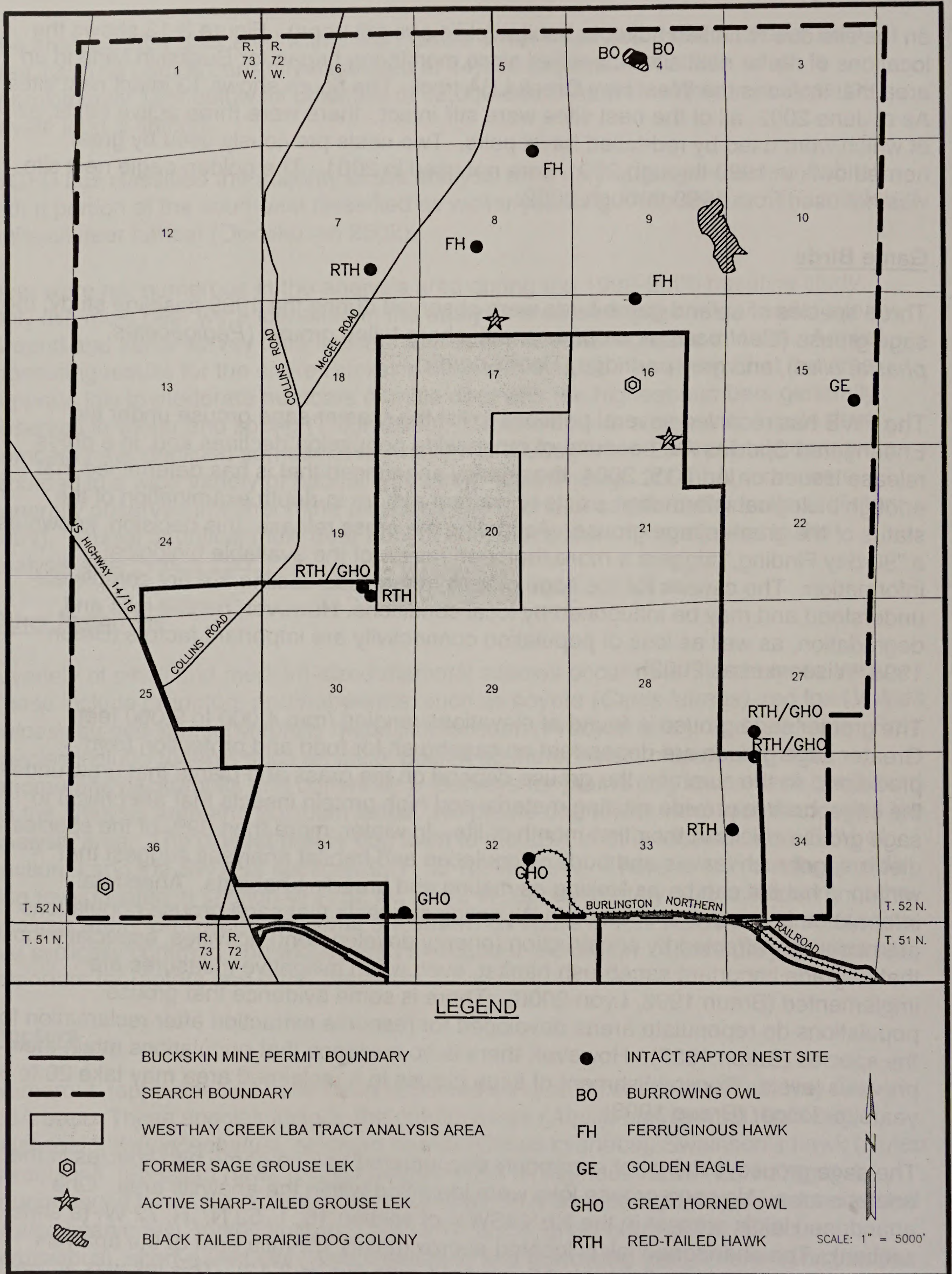


Figure 3-13. Raptor Nest Sites, Grouse Leks, and Prairie Dog Colonies Within and Adjacent to the West Hay Creek Analysis Area (Status as of 06-05-02).

from 1989 through 1992. The lek was active again in 2001, but no activity was observed from 1993 through 2000, or in 2002 and 2003. No broods were recorded during formal brood surveys, but two broods were observed in July on adjacent lands east of the LBA tract. Wintering habitat is limited in the analysis area, and no sage grouse or sage grouse sign was found during the winter baseline surveys.

Two active sharp-tailed grouse leks were identified in 2002 on lands adjacent to the LBA tract. As shown on figure 3-13, one lek is within ¼ mile of the analyses area (Triton 2002).

Gray partridge, an introduced species, is most commonly observed in the vicinity of seeded grass/haylands and small grain croplands. Three observations, all outside of the analysis area, were recorded during the 1999 baseline study (Triton 2000).

Mourning doves (*Zenaida macroura*) were on or near the analysis area during spring and summer surveys. This species is a relatively common breeding bird in Campbell County. Occasional turkey (*Meleagris gallopavo*) and pheasant (*Phasianus colchicus*) observations have been recorded during wildlife monitoring activities at the Buckskin Mine. Therefore, both species could possibly be recorded within the 2-mile perimeter of the analysis area (Triton 2000).

### **Migratory Birds of Management Concern**

Table 3-9 provides a list of the 40 migratory bird species of management concern in Wyoming that the FWS uses for reviews concerning existing and proposed coal mine leased land (FWS 2002). This listing was taken directly from the Wyoming Bird Conservation Plan (Cеровski et al. 2000). The regional status and expected occurrence, historical observations, and breeding records on and near the West Hay Creek LBA tract for each listed species are included in table 3-9.

The following listed species were observed during the 1999 through 2002 surveys or are expected to occur in or adjacent to the analysis area. The ferruginous hawk (*Buteo regalis*) is classified as common and an historical breeder. Only one observation of a ferruginous hawk was recorded during the entire baseline study. However, they are assumed to have nested in the analyses area because nests characteristic of the ferruginous hawk were found within 1 mile north of the analyses area. Such ground nests can persist for many years. No nesting activity was observed during the 1999 baseline study or 2000 through 2002 annual surveys. Suitable nesting habitat for the short-eared owl (*Asio flammeus*) such as hayfields and tall weeds is present though no nests were located during the baseline survey. It was classified as uncommon and infrequently observed. The Swainson's hawk (*Buteo swainsoni*) was classified as common but a rare breeder to the area. The bald eagle (*Haliaeetus leucocephalus*) is seasonally common and most frequently observed in the winter (Triton 2000, 2002).

Sage grouse (*Centrocercus urophasianus*), recently added to the Level 1 list, is common to the area and is classified as an occasional breeder. See additional discussion above.

The grasshopper sparrow (*Ammodramus savannarum*) and lark bunting (*Calamospiza melanochorys*) were observed several times within the grassland habitat. Based on 1999 through 2002 data, lark buntings are common breeders and the grasshopper sparrow is an occasional breeder within the area. The vesper sparrow (*Pooecetes gramineus*) and the lark sparrow (*Chondestes grammacus*) were classified as common to the area. The McCowan's longspur (*Calcarius mccownii*) and the less common chestnut-collared longspur (*Calcarius ornatus*) were also infrequently or rarely observed and classified as potential breeders within the grassland habitat type. Lark buntings were also common to the sagebrush-grasslands and bottomlands. Though not found in the grasslands, the Brewer's sparrow (*Spizella brewerii*) is a very common species and breeder in the sagebrush-grasslands within the analysis area.

The upland sandpiper (*Bartramia longicauda*) was classified as infrequently observed and as a potential breeder within the analysis area.

The burrowing owl (*Athene cunicularia*) is uncommon and classified as an infrequent breeder within the analyses area. The loggerhead shrike (*Lanius ludovicianus*) and long-billed curlew (*Numenius americanus*) were classified as uncommon and infrequently observed (Triton 2002).

<b>TABLE 3-9</b>			
<b>REGIONAL STATUS OF 40 MIGRATORY BIRDS OF MANAGEMENT CONCERN IN WYOMING FOR COAL MINES AND EXPECTED AND ACTUAL OCCURRENCE ON AND WITHIN ½ MILE OF THE WEST HAY CREEK LBA TRACT</b>			
<b>Species</b>	<b>Seasonal Status/ Breeding Records in Northeastern WY<sup>1</sup></b>	<b>Expected Occurrence in Vicinity of West Hay Creek<sup>2</sup></b>	<b>Occurrence and Historical Breeding Status at West Hay Creek</b>
<b>LEVEL I</b>			
Mountain plover <i>Charadrius montanus</i>	summer/observed	rare	never recorded
Sage grouse* <i>Centrocercus urophasianus</i>	resident/breeder	common	occasional breeder
Baird's sparrow <i>Ammodramus bairdii</i>	never recorded	rare	never recorded
Ferruginous hawk* <i>Buteo regalis</i>	resident/breeder	common	historical breeder
Brewer's sparrow* <i>Spizella breweri</i>	summer/breeder	common	regular breeder
Sage sparrow <i>Amphispiza belli</i>	summer/observed	uncommon	never recorded

**TABLE 3-9 (cont)**

Species	Seasonal Status/ Breeding Records in Northeastern WY <sup>1</sup>	Expected Occurrence in Vicinity of West Hay Creek <sup>2</sup>	Occurrence and Historical Breeding Status at West Hay Creek
<b>LEVEL I (continued)</b>			
McCown's longspur* <i>Calcarius mccownii</i>	summer/breeder	uncommon	infrequently observed
Swainson's hawk* <i>Buteo swainsoni</i>	summer/breeder	common	rare breeder
Long-billed curlew* <i>Numenius americanus</i>	summer/breeder	uncommon	infrequent spring migrant
Short-eared owl* <i>Asio flammeus</i>	resident/breeder	uncommon	infrequently observed
Peregrine falcon <i>Falco peregrinus</i>	resident/observed	rare	never recorded
Burrowing owl* <i>Athene cunicularia</i>	summer/breeder	uncommon	Infrequent breeder
Bald eagle* <i>Haliaeetus leucocephalus</i>	resident/observed	seasonally common	frequent in winter
Upland sandpiper* <i>Bartramia longicauda</i>	summer/breeder	uncommon	infrequently observed
<b>LEVEL II</b>			
Cassins's Kingbird <i>Tyrannus vociferans</i>	summer/breeder	uncommon	never recorded
Lark bunting* <i>Calamospiza melanocorys</i>	summer/breeder	common	common breeder
Dickcissel <i>Spiza americana</i>	summer/observed	rare	never recorded
Chestnut-collared longspur* <i>Calcarius ornatus</i>	summer/breeder	uncommon	rarely recorded
Black-chinned Hummingbird <i>Archilochus alexandri</i>	never recorded	not expected	never recorded
Pygmy nuthatch <i>Sitta pygmaea</i>	resident/observed	not expected	never recorded
Marsh wren <i>Cistothorus palustris</i>	summer/observed	uncommon	never recorded
Western bluebird <i>Sialia mexicana</i>	summer/observed	uncommon	never recorded
Sage thrasher* <i>Oreoscoptes montanus</i>	summer/breeder	common	rarely observed
Grasshopper sparrow* <i>Ammodramus savannarum</i>	summer/breeder	common	occasional breeder
Bobolink <i>Dolichonyx oryzivorus</i>	summer/observed	uncommon	never recorded
Common loon <i>Gavia immer</i>	summer/observed	not expected	never recorded
Black-billed cuckoo <i>Coccyzus erythrophthalmus</i>	summer/breeder	uncommon	never recorded

TABLE 3-9 (cont)

Species	Seasonal Status/ Breeding Records in Northeastern WY <sup>1</sup>	Expected Occurrence in Vicinity of West Hay Creek <sup>2</sup>	Occurrence and Historical Breeding Status at West Hay Creek
LEVEL II (continued)			
Red-headed woodpecker <i>Melanerpes erythrocephalus</i>	summer/observed	uncommon	never recorded
Yellow-billed cuckoo <i>Coccyzus americanus</i>	never recorded	uncommon	never recorded
Eastern screech-owl <i>Otus asio</i>	never recorded	uncommon	never recorded
Western screech-owl <i>Otus kennicottii</i>	never recorded	uncommon	never recorded
Western scrub-jay <i>Apheloma californica</i>	never recorded	uncommon	never recorded
Loggerhead shrike* <i>Lanius ludovicianus</i>	summer/breeder	uncommon	infrequently observed
Vesper sparrow* <i>Pooecetes gramineus</i>	summer/breeder	common	common breeder
Lark sparrow* <i>Chondestes grammacus</i>	summer/breeder	common	occasional breeder
Ash-throated flycatcher <i>Myiarchus cinerascens</i>	never recorded	abundance unknown	never recorded
Bushtit <i>Psaltriparus minimus</i>	never recorded	uncommon	never recorded
Merlin* <i>Falco columbarius</i>	resident/breeder	uncommon	rarely observed
Sprague's pipit <i>Anthus spragueii</i>	migrant/observed	uncommon	never recorded
Barn owl <i>Tyto alba</i>	summer/breeder	abundance unknown	never recorded

<sup>1</sup>Compiled from Luce et al. (1999), for lat-long block that encompasses northern Campbell County.

<sup>2</sup>Expected occurrence on or within ½ mile of Buckskin Mine was based on range, history of occurrence, and habitat availability.

\*Species highlighted with asterisks were recorded on or within ½ mile of Buckskin Mine during baseline or monitoring studies at least once before or during May 2002.

Source: Luce, B., A. Cerovski, B. Oakleaf, J. Priday, and L. Van Fleet. 1999. Atlas of Birds, Mammals, Reptiles, and Amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne, Wyoming.

Suitable habitat for the mountain plover occurs in the analysis area, particularly in the sandy prairie grassland areas; however, mountain plovers have not been recorded in the area.

Additional migratory bird species of management concern in Wyoming are not expected to occur on the analysis area, although marginal potential habitat for some species was identified within the 1999 survey area. These include the barn owl (*Tyto alba*), Sprague's pipit (*Anthus spragueii*), dickcissel (*Spiza americana*), and Baird's sparrow (*Ammodramus baridii*). Of these species, PRES only observed one dickcissel during their years of monitoring the mines in northern Campbell County. Other species listed on table 3-9 have been rarely or never recorded in the analyses area.

## Other Species

Wildlife surveys completed specifically in the analyses area and surveys completed for the adjacent mines have documented numerous other wildlife species that inhabit the area. All of these species were generally common inhabitants of the area and none were of specific concern to state or federal agencies. Lists of species recorded at the Buckskin Mine and within the analyses area are in the mine's permit document available at WDEQ/LQD.

Under current natural conditions, the LBA tract provides limited waterfowl and shorebird habitat. This habitat is mainly available during spring migration as ponds and ephemeral streams. Many of these water features generally get quite low or dry up during the summer. However, persistent ponds do remain on the upper reaches of Hay Creek within the analyses area. Broods from the American wigeon (*Anas Americana*), blue-winged teal (*Anas discors*), mallard (*Anas platyrhynchos*), northern pintail (*Anas acuta*), and northern shoveler (*Anas clypeata*) were observed during the 1999 baseline study. CBM activity also provides additional water to some small stock ponds adjacent to the analyses area

Fish species are not normally found on the LBA tract. Pool elevations in McGee Reservoir fluctuate some five to six feet each year but storage is sufficient to support small fish (fat-head minnows and green sunfish). Due to the ephemeral drainages within the analyses area, fish surveys were not required during the baseline study by the WGFD or WDEQ/LQD. All wildlife baseline study procedures were reviewed with Mr. Vern Stelter of the WGFD. PRES submitted the final study plan to Mr. Stelter in a letter dated May 14, 1999. Tom Collins, Coordinator with the WGFD, accepted the scope of work as "both complete and appropriate" in his letter dated May 18, 1999 to PRES. In addition, Buckskin Mine received a letter from WGFD Deputy Directory Gregg Arthur dated December 23, 2003 recommending approval of the temporary diversion of Hay Creek. His letter of recommendation also addressed the adequacy of the biological information available for Hay Creek and the fact that the post-mining reclamation plan was already in place.

Appendix G contains a discussion of threatened, endangered and proposed animal species.

## **OWNERSHIP AND USE OF LAND**

Triton Coal Company, LLC owns the surface on the West Hay Creek LBA tract analysis area, including the LBA area as applied for and areas added under the action alternatives (figure 3-14). The principal land use within the tract is domestic grazing and wildlife habitat (Triton 2002). Secondary land uses are agricultural cropland and hayland. Areas of disturbance within the West Hay Creek LBA tract include plugged and abandoned oil and gas well sites, CBM wells and associated utilities/easement corridors, ranch access roads, and mine monitoring access roads.

All of the coal estate included in the LBA tract is federally owned. Figure 3-15 shows that the oil and gas estate within the analyses area is both federally and privately owned. All of the federally owned oil and gas estate is leased. Table 3-10 provides a list of the lessees of record for the federally owned oil and gas estate.

The Supreme Court has ruled that CBM rights belong to the owner of the oil and gas rights (98-830). Therefore, the oil and gas lessees have the right to develop the CBM in the coal as well as the right to develop conventional oil and gas on the tract.

There are no conventional oil or gas wells in the analyses area. According to the WOGCC database, there were nine CBM wells located on the LBA tract that were producing or capable of producing and three additional locations had been permitted to drill or had started drilling as of April 9, 2004. Extensive CBM development has occurred west of the tract.

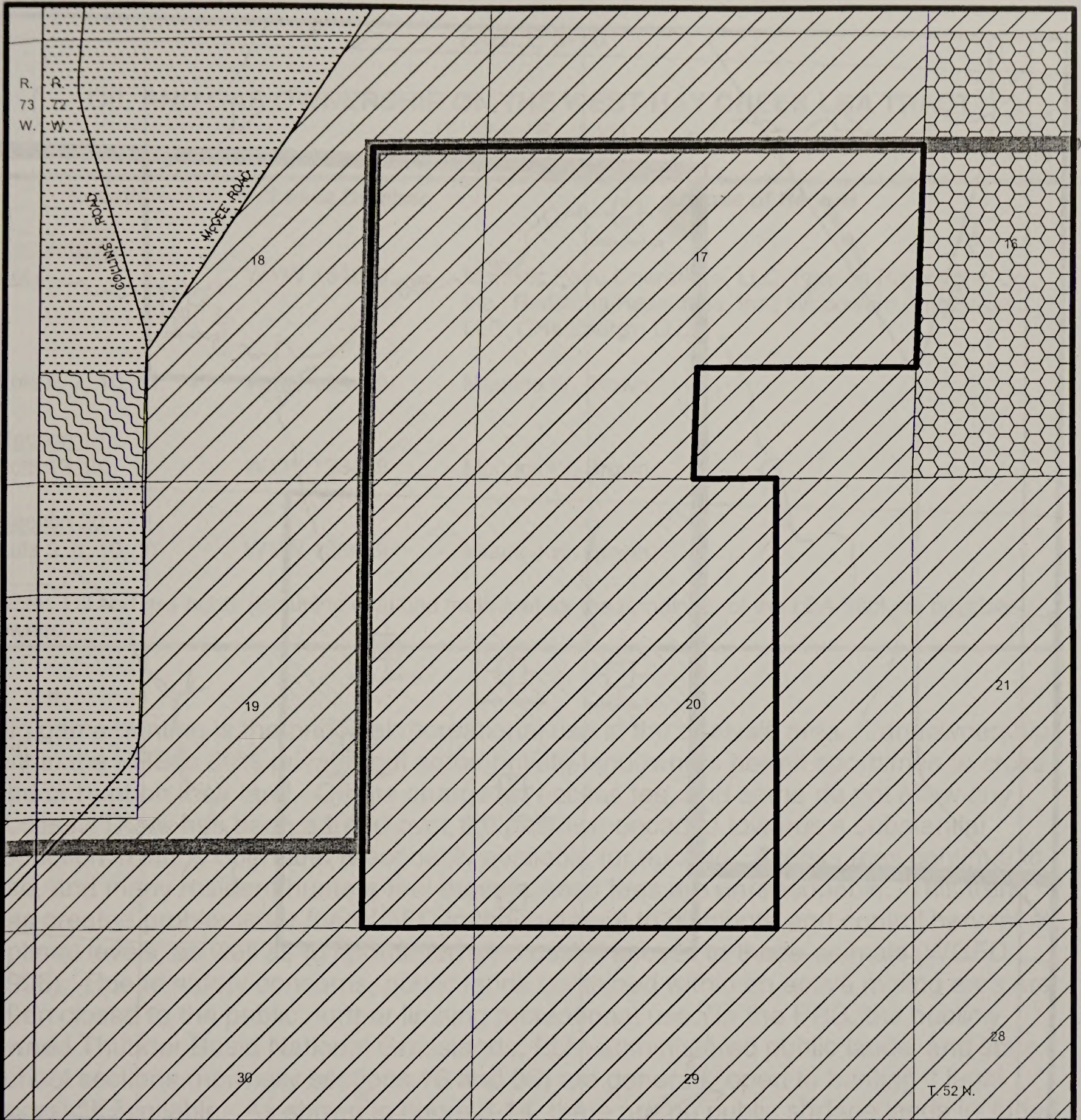
CBM wells were initially drilled on 40-acre spacing patterns in the Wyoming PRB, but the WOGCC has established 80-acre spacing patterns as the default spacing for CBM wells in the Powder River Basin. Most CBM drilling near the West Hay Creek LBA tract has occurred on a 40-acre pattern, either because the wells were drilled before the spacing was changed to 80 acres or under the authorization of spacing exceptions granted by WOGCC. There are 16 remaining undrilled complete or partial 40-acre lots within the study area.

Certain ancillary facilities are needed to support oil and gas production. These support facilities may include well access roads, well pads, production equipment at the wellhead (which may be located on the surface and/or underground), well production casing (which extends from the surface to the zone of production), underground pipelines (which gather the oil, gas and/or water produced by the individual wells and carry it to a larger transmission pipeline or collection facility), facilities for treating, discharging, disposing of, containing, or injecting produced water, central metering facilities, electrical power utilities, gas compressor stations, and high-pressure transmission pipelines for delivering the gas to market.

Coal mining is a dominant land use in the area surrounding the LBA tract. The Buckskin Mine is within a group of five operating surface coal mines located in northern Campbell County (figure 1-1 in chapter 1). Coal production at these five mines increased by about 17% between 1993 (about 44 million tons) and 2001 (about 51 million tons). Since 1992, one maintenance coal lease was issued and one lease exchange was completed within this mine group. Applications have been submitted for two maintenance tracts in this same group, including the LBA being evaluated in this EIS (tables 1-1 and 1-2).

Campbell County has no applicable countywide land use plans, and the LBA tract has no designated zoning classification. The *City of Gillette/Campbell County Comprehensive Planning Program* (City of Gillette 1978) provides general land use goals and policies for state and federal coal leases in the county.

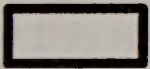




LEGEND

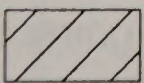


BUCKSKIN MINE PERMIT BOUNDARY



WEST HAY CREEK LBA TRACT  
ANALYSIS AREA

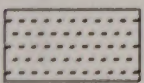
SURFACE OWNERSHIP



TRITON COAL COMPANY, LLC.



STATE OF WYOMING



BYRON F. & MARJORIE OEDEKOVEN



CECLE L. & LAVERNE COOK



SCALE: 1" = 2000'

Figure 3-14. Surface Ownership on the West Hay Creek LBA Tract.

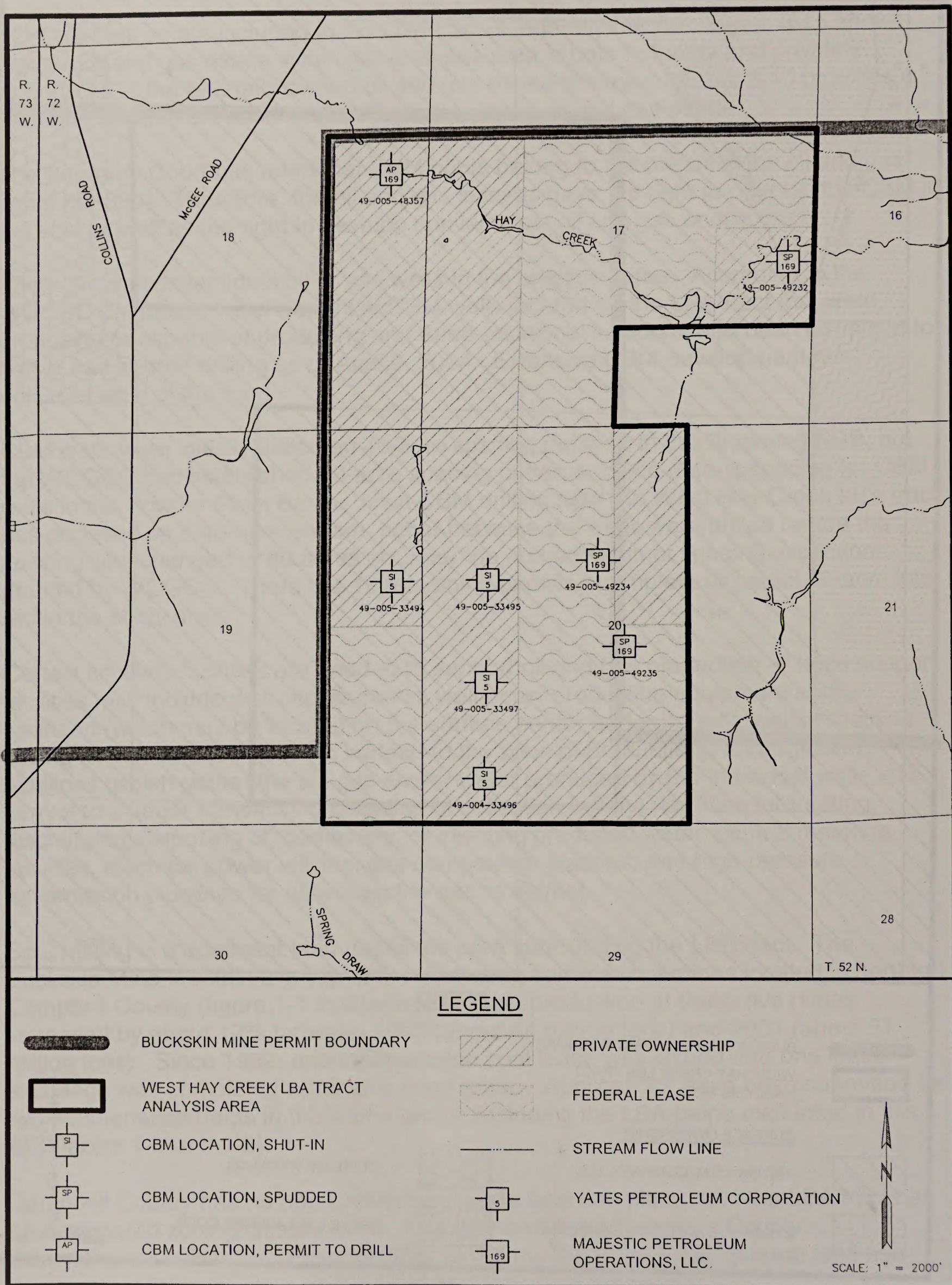


Figure 3-15. Oil and Gas Ownership on the West Hay Creek LBA Analysis Area.

**TABLE 3-10**

**OIL AND GAS OWNERSHIP ON THE WEST HAY CREEK LBA TRACT**  
(T. 52 N., R. 72 W)

Location	Lease Number	Lessee of Record
<u>Section 17</u> Lot 8	WYW 134209	Majestic Petro Operations, LLC; Preston Reynolds & Co., Inc.; Redstone Resources, Inc.; Woodward Enterprises, LLC, CH4 Energy, LLC
Lots 6, 7, 10, 11, 14	WYW 138419	Maurice W. Brown
<u>Section 19</u> Lots 13, 20	WYW 138419	Maurice W. Brown
<u>Section 20</u> Lots 3, 6, 10, 11	WYW 138419	Maurice W. Brown

Note: Oil and gas rights (including coal bed methane) for the remainder of the LBA tract are privately owned.

Big game hunting is the principal recreational use in the analysis area. Landownership within the PRB is 80% private, but some private landowners permit sportsmen to cross and/or hunt on their land. Others charge an access fee, and some do not allow any access. There has been a trend over the past two decades towards a substantial reduction in lands open and reasonably available for hunting. Access fees continue to rise, and many resident hunters feel these access fees are unreasonable. This trend has created problems for the WGFD in their attempt to distribute and control harvest at optimal levels, as well as to sportsmen who desire access to these animals (WGFD 1996). Due to safety concerns, public lands contained within an active mining area are often closed to the public, further limiting recreational use. In the PRB, the publicly owned Thunder Basin National Grasslands, BLM-administered public lands, and state school sections (normally sections 16 and 36) are generally open to hunting if legal access is available. As shown in figure 3-14, there are no public surface lands included in the West Hay Creek LBA tract.

The surface estate of all of the lands within the LBA tract under the Proposed Action and the alternative configurations is privately owned, and recreational use is allowed only with landowner permission. Sport hunting in varying degrees occurs on the LBA tract. Pronghorn and mule deer occur on and adjacent to the LBA tract. Sage grouse, mourning dove, waterfowl, rabbit, and coyote are hunted in the vicinity, and some coyote and red fox trapping may occur.

## CULTURAL RESOURCES

Cultural resources, protected under the National Historic Preservation Act of 1966, are the nonrenewable remains of past human activity. The PRB appears to have been inhabited by aboriginal hunting and gathering people for more than 11,000 years. Throughout the prehistoric past, highly mobile hunters and gatherers who exploited a wide variety of resources used the area.

The general chronology for aboriginal occupation (dated as years before present [B.P.]) is:

- the Paleoindian period (11,000-7,500 years B.P.),
- the Archaic period (7,500-1,800 years B.P.),
- the Prehistoric period (1,800-400 years B.P.),
- the Protohistoric period (400-200 years B.P.), and
- the Historic period (200-120 years B.P.).

The Paleoindian period includes a series of cultural complexes identified by distinctive large projectile points (spear points) often associated with the remains of large, now-extinct mammals (mammoth, bison, camel, etc.). The Archaic period is characterized by a range of smaller side-notched, stemmed, or corner-notched projectile points and by more generalized subsistence pursuits including gathering plants. This lifeway continued to the late Prehistoric period, which is marked by a technological change from dart projectiles to the bow and arrow and by the appearance of ceramics. During the Archaic and late Prehistoric periods, the PRB was occupied by small bands of hunters and gatherers whose movements were determined largely by seasonal and environmental changes that influenced the occurrence of subsistence resources (BLM 1979).

Protohistoric and early Historic sites are found in the PRB, including rare historic trade goods, sites, and routes associated with early trappers and military expeditions, and early ranching attempts dating to the 1880s. A few small coal mining sites also exist.

A Class III cultural resources survey is a professionally conducted, intensive inventory of a target area, designed to locate all cultural properties that have surface and exposed profile indications. Cultural properties are recorded and sufficient information collected on them to allow evaluation for possible inclusion in the National Register of Historic Places (NRHP). That determination is made by the managing federal agency in consultation with State Historic Preservation Office (SHPO). Consultation with SHPO must be completed before the MLA mining plan is approved. Until consultation with SHPO has occurred and agreement regarding NRHP eligibility has been reached, all sites should be protected from disturbance.

Once a Class III survey is completed, site-specific testing or limited excavation is used, 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 developed for those sites that are eligible for the NRHP and are within the area of potential effect. Treatment plans are implemented before mining and can include such mitigating 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.

TRC Mariah Associates of Laramie, Wyoming subjected the West Hay Creek LBA analysis area to a Class III cultural resource inventory and assessment in 1999. The analysis area covered all lands proposed for coal lease and a buffer zone that would include all disturbances for the Proposed Action, the Preferred Alternative, and Alternative 3 assuming the area is mined as a maintenance tract for the existing adjacent mine. The goal of the inventory was to locate and evaluate for the NRHP all cultural resources 50 years and older within the study area. WDEQ, OSM, and the Wyoming SHPO reviewed and approved the survey results. Previous cultural resource inventories were conducted in and adjacent to the analysis area in association with oil and gas development and previous mine permitting activities. Table 3-11 summarizes the distribution of cultural sites identified during the inventory by type.

**TABLE 3-11**

**RESULTS OF THE CLASS III CULTURAL RESOURCE INVENTORY OF THE WEST HAY CREEK LBA TRACT ANALYSIS AREA**

<b>Prehistoric Sites</b>	
Lithic scatter or possible open camp	48CA857, 858, 859, 1615, 3377, 3379, 3380, 3385, and 3387
Isolated finds	13 lithic items
<b>Historic Sites</b>	
Homestead	48CA1836
Earthen dams/ structures	48CA3376
Stone alignment	48CA3386

Three historical sites were identified within the analysis area. Site 48CA1836 is a homestead that was originally recorded in 1982. The site consists of the remains of the main house, three bunkhouses, four sheds, one corral and one dugout depression. Site 48CA3376 consists of three earthen dams and their reservoirs, one three-sided rock foundation, and a detached separate roof. The third site, 48CA3386, is a linear rock alignment. No other artifacts were found in association with the site. None of the sites met the criteria for eligibility to the NRHP.

Nine prehistoric sites were identified in the analysis area. All of the nine sites potentially located within the Proposed Action and alternative areas are lithic scatters. Two of four previously recorded sites could not be located again in 1999. One site met

the eligibility criteria for the NRHP. The survey results have been reviewed and approved by WDEQ, OSM, and the Wyoming SHPO. A data recovery plan has been developed and will be implemented.

### **Native American Concerns**

Native American heritage sites are classified as prehistoric or historic. Some may be being used as offering sites and fasting or vision quest sites, and selected rock art sites. Other sites of cultural interest and importance may include rock art sites, stone circles and various rock features, fortifications or battle sites, burials, as well as locations that are sacred or part of the oral history and heritage that have no man-made features. To date, no Native American sacred sites in the general analysis area have been documented. However, the position of the area between mountains considered sacred by various Native American cultures (the Big Horn Mountains to the west, the Black Hills, and Devils Tower to the east) creates the possibility of existing locations which may have special religious or heritage significance to Native American groups.

Native American tribes were consulted at a general level in 1995-1996 as part of an effort to update the BLM Buffalo RMP. Tribes that have been potentially identified as having concerns about actions in the PRB include: the Crow, Northern Cheyenne, Shoshone, Arapaho, Oglala Lakota, Rosebud Sioux, Flandreau Santee Sioux, Santee Sioux, Crow Creek Sioux, Lower Brule Sioux, Standing Rock Sioux, and Cheyenne River Sioux. OSM completed the Native American consultation in 2000 on lands within the analysis area. No comments were received. OSM then notified the SHPO that the one site of concern, 48CA860, was not a traditional cultural property.

### **PALEONTOLOGICAL RESOURCES**

The formations exposed on the surface of the PRB are the sedimentary Eocene Wasatch and Paleocene Fort Union formations, which are both known to contain fossil remains. Some paleontological surveys have been conducted in the PRB. Vertebrate fossils that have been described from the Wasatch Formation include mammals such as early horses, tapiroids, condylarths, primates, insectivores, marsupials, creodonts, carnivores and multituberculates; reptiles such as crocodilians, alligators, lizards, and turtles; birds, eggs, amphibians, fish, plants, and nonmarine invertebrates such as mollusks and ostracods. The Fort Union also contains fossils of plants, reptiles, fish, amphibians, and mammals.

A paleontological survey was conducted within and adjacent to the West Hay Creek LBA tract in 1999 to determine the potential for recovery of significant fossils prior to disturbance. Fragmentary crocodile scutes and invertebrate gastropod and bivalve shell fragments were located in section 21, T. 52 N., R. 72 W. Petrified wood was also abundant on the hill slopes in that area. No vertebrate or invertebrate fossils or plant material was collected, as all of it was fragmentary and considered to be of limited scientific significance.

## VISUAL RESOURCES

Visual sensitivity levels are determined by people's concern for what they see and the frequency of travel through an area. Common throughout the analysis area are landscapes that include rolling sagebrush and short-grass prairie. Existing surface mines form a somewhat continuous band on the east side of US Highway 14-16 north of Gillette. Other man-made intrusions include ranching activities (fences, homesteads, and livestock), oil and gas development (pumpjacks, pipeline right of ways, CBM well shelters, and CBM compressor stations), transportation facilities (roads and railroads) and electric power transmission lines. The natural scenic quality in the immediate lease area is relatively low because of this development and the existing surface coal mining operations.

The Buckskin and Rawhide Mine facilities and some mining activities are visible from US 14-16 and Collins and McGee county roads. This is also true for portions of the LBA tract.

For management purposes, BLM evaluated the visual resources on lands under its jurisdiction in the 1985 Buffalo RMP. The inventoried lands were classified into visual resource management (VRM) classes as follows:

- Class I - Natural ecologic changes and very limited management activity is allowed. Any contrast (activity) within this class must not attract attention.
- Class II - Changes in any of the basic elements (form, line, color, texture) caused by an activity should not be evident in the landscape.
- Class III - Contrasts to the basic elements caused by an activity are evident but should remain subordinate to the existing landscape.
- Class IV - Activity attracts attention and is a dominant feature of the landscape in terms of scale.
- Class V - This classification is applied to areas where the natural character of the landscape has been disturbed up to a point where rehabilitation is needed to bring it up to the level of one of the other four classifications.

The lands in the West Hay Creek LBA tract are generally classified as VRM Class IV. The existing mining activity is visible from several sites on the LBA tract.

## NOISE

Existing noise sources in the area include adjacent coal mining activities, traffic on Wyoming 59, US 14-16, and the Collins and McGee county roads, rail traffic, ranching activities, and wind. No site-specific noise level data are available for the area. Because the Buckskin Mine is adjacent to the proposed LBA, a median noise level is

estimated to be 40 to 60 dBA for day, evening, and nighttime, with the noise level increasing with proximity to active mining at the Buckskin Mine. Mining activities are characterized by noise levels of 85 to 95 dBA at 50 feet from actual mining operations and activities (BLM 1992b). Figure 3-16 presents noise levels associated with some commonly heard sounds.

The nearest occupied dwelling to the LBA tract is located approximately ½ mile north of the northwestern corner of the LBA tract analysis area, in the SW¼SE¼ of section 7, T. 52 N., R. 72 W. Occupied dwellings and publicly accessible roads near the West Hay Creek LBA Tract are shown in Figure 3-17.

## **TRANSPORTATION FACILITIES**

Transportation resources near the West Hay Creek LBA tract include US 14-16, Wyoming 59, and the Collins and McGee county roads. US 14-16 is about 2 miles west of the LBA tract area, and Wyoming 59 lies approximately 3 miles east. Both highways are paved two-lane roads that run generally north-south. The county roads are improved two-lane roads that also run roughly north-south. The Collins County Road is about 1 mile west of the LBA tract area; and the McGee County Road branches east of Collins Road about 3,000 feet from the northeast corner of the analysis area. Several unnamed two-track roads either cross the area or are adjacent to it. Access to the LBA tract is on unnamed two-track roads off McGee Road via Collins Road and US 14-16.

The nearest railroad facilities are the Burlington Northern/Santa Fe Railroad spurs accessing the Buckskin Mine 1.5 miles south of the proposed LBA tract area, and the Rawhide Mine approximately 5 miles southeast of the proposed LBA tract area. The Buckskin Mine railroad loop is the northern terminus of a series of spur lines that serve the surface coal mines north of Gillette. Oil and gas pipelines, power lines, and associated rights of way (ROWs) are found in the analysis area. However, no telephone lines are located within the proposed tracts.

Figure 3-17 shows the location of transportation facilities within and adjacent to the West Hay Creek LBA tract. Since the West Hay Creek LBA tract as applied for would be an extension of the existing Buckskin Mine operations, the existing coal transportation facilities and infrastructure would be used during mining of the LBA tract.

## **SOCIOECONOMICS**

The social and economic study area for the proposed project involves primarily Campbell County and the cities of Gillette and Wright. The community of Gillette would most likely attract the majority of any new residents due to its current population level and the availability of services and shopping amenities.

A comprehensive socioeconomic profile of the Buffalo Field Office area (formerly the Buffalo Resource Area, which includes all of Campbell County) was prepared for the BLM under contract with the Department of Agricultural Economics, College of



HOW IT FEELS	EQUIVALENT SOUNDS	DECIBELS	EQUIVALENT SOUNDS	HOW IT SOUNDS	
Danger to hearing ↑ ↓	50 hp siren (100 ft)	130	Jackhammer	135 dB(A) Approx. 64 times as loud as 75dB(A)	
	Jet engine (75 ft)		Chainsaw	125 dB(A) Approx. 32 times as loud as 75dB(A)	
	Pain to ears	Turbo-fan jet at takeoff power (100ft)	120	Fire cracker (15 ft.)	115 dB(A) Approx. 16 times as loud as 75dB(A)
	Uncomfortably loud	Scraper-loader	110	Rock and roll band	105 dB(A) Approx. 8 times as loud as 75dB(A)
		Jet fly over (1000 ft)	100	Unmuffled motor bike (2-3 ft.)	95 dB(A) Approx. 4 times as loud as 75dB(A)
	Discomfort threshold	Noisy newspaper press	90	Car horn	85 dB(A) Approx. 2 times as loud as 75dB(A)
	Very loud	Air compressor (20 ft)	80	Unmuffled cycle (25 ft.)	75dB(A)
	Conversation stops	Power lawnmower Steady flow of freeway traffic	70	Garbage trucks and city buses	75 dB(A)
	Intolerable for phone use	10-HP outboard motor	60	Diesel truck (25 ft.)	55 dB(A) Approx. 1/4 as loud as 75dB(A)
	Extra auditory physiological effects	Automatic dishwasher	50	Garbage disposal	45 dB(A) Approx. 1/8 as loud as 75dB(A)
Vacuum cleaner		40	Food blender	35 dB(A) Approx. 1/16 as loud as 75dB(A)	
Quiet	Window air conditioner outside at 2 ft.	30	Muffled jet ski (50 ft.)		
	Window air conditioner in room	20	Passenger car 65 mph (25 ft)		
Sleep Interference	Occasional private auto at 100 ft.	10	Busy downtown area		
	Quiet home during evening		Normal conversation		
	Bird calls		In a quiet house at midnight		
Very quiet	Library				
	Soft whisper 5 ft.				
	Leaves rustling				

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

Figure 3-16. Relationship Between A-Scale Decibel Readings and Sounds of Daily Life.

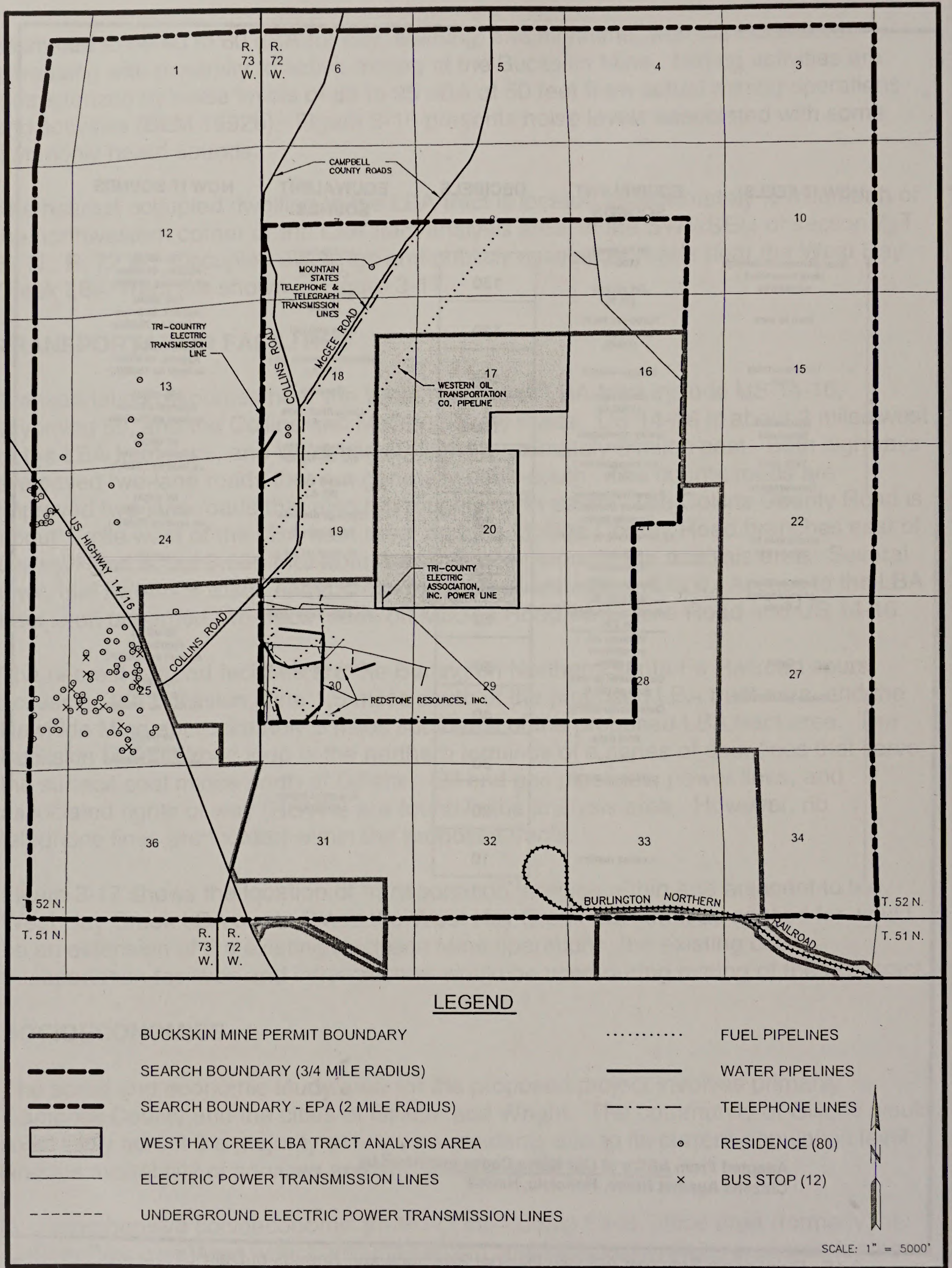


Figure 3-17. Transportation Facilities Within and Adjacent to the West Hay Creek LBA Tract Analysis Area.

Agriculture, through the University of Wyoming's Cooperative Extension Service (University of Wyoming 1994). The portion of the following discussion that deals with Campbell County is from this report. Additional data came from the Wyoming Department of Commerce, Wyoming Division of Economic Analysis, Wyoming Department of Employment, Wyoming Economic Development Office, and personal communications with local community development staff.

## **Population**

According to 2000 census data, Campbell County had a population of 33,698, with Gillette accounting for 19,646 of the county's residents and Wright with 1,347. The estimated July 2002 Campbell County population was 36,110, which represents a greater than 3% percent annual growth rate in recent years and makes Campbell County the fastest growing county in the state (Wyoming Department of Administration and Information 2003a).

The estimated December 2003 population of Gillette was 24,235. Between 1990 and 2003, it is estimated that Gillette grew by 4,950 persons. This represents a 25.7% increase in estimated population over a 13 years period, and an average annual growth rate of 1.97% per year (Gillette Department of Community Development 2004). Wright had an average growth rate of 0.9% during the time period from 1990 to 2000 (US Department of Commerce 1990 and 2000).

## **Local Economy**

Coal production, as reported by the Wyoming State Inspector of Mines, showed the Wyoming's coal producers set a new yearly production record of 373.2 million tons in 2002. This was an increase of 1.2% over the 368.9 million tons produced in 2001. Coal production in Campbell County increased by 1.0% (329.5 million tons to 332.8 million tons) from 2001 to 2002. The 2002 Campbell County coal production was 89% of the state total.

In the second quarter of 2002, 29% of the total employment and 43% of the total payroll in Campbell County were attributed to mining, which also includes oil and gas employment. During the same time period in Converse County, 8% of the employment and 12% of the payroll were attributed to mining (Wyoming Department of Employment 2003).

Table 3-12 shows approximate tax revenues from coal production in Campbell County. Sales and use taxes are distributed to cities and towns within the county and to the county's general fund. Severance taxes are collected by the state for the removal or extraction of resources such as oil, natural gas, coal, and trona. The state of Wyoming retains approximately 83% of the severance tax, and the remainder is returned to the cities, towns, and counties. Ad valorem taxes, which include property taxes, are collected by the county and disbursed to schools, cities, towns, the state foundation, and various other subdivisions within the county. Mineral royalties are collected on the

amount of production and the value of that production. The current royalty rate for federal coal leases is 12.5%, with half of this revenue returned to the state. Additional sources of revenue include lease bonus bids (also split with the state) and annual rentals that are paid to the federal government. The total fiscal benefit to the state of Wyoming from coal mining in the PRB was estimated at \$1.10 per ton of coal mined in a 1994 study conducted for BLM by the University of Wyoming (University of Wyoming 1994).

**TABLE 3-12**

**CAMPBELL COUNTY ESTIMATED 2003 FISCAL REVENUES<sup>1</sup>  
FROM 2002 COAL PRODUCTION**  
(in millions)

County	Sales and Use Collections	Severance Tax Collections	Ad Valorem Tax Collections	Royalty Collections	Total Collections
Campbell	\$6.3	\$81.3	\$72.0	\$230.9	\$390.50

<sup>1</sup>Estimated tax receipts are based on information from the Wyoming Department of Revenue and from results of a survey conducted by the Wyoming Mining Association (WMA).

Nationally, the minerals industry was 1.3% of the gross national product (GNP) in 2001. In Wyoming, the minerals industry (including oil and gas) is 23% of the gross state product (GSP) in 2001, which makes it the largest sector of the Wyoming economy. Coal mining alone accounted for 5.4% of the Wyoming GSP (Wyoming Department of Administration and Information 2003).

**Employment**

Coal mining has changed a great deal since the 1970s, and new technologies have been a major contributor to these changes. The local coal mining labor force grew during the 1970s but declined during the 1980s. Since 1973, overall production has risen while employee numbers have decreased. This employment decline followed large industry capital investments in facilities and production equipment, the majority of which was aimed at increasing productivity.

The coal mining labor force in Campbell County remained relatively constant for several years but has recently increased. Coal mining employment in Campbell County increased from 3,011 to 3,580 from 1998 to 2002 (Wyoming Department of Employment, Office of the State Inspector of Mines 1998-2002).

In 2001, Campbell County had an average total labor force of 22,360 with an unemployment rate of 2.9%, compared to 3.4% in 2000. Coal mining employment

represented 16% of the total labor force in Campbell County in 2000 (Wyoming Department of Employment, Research and Planning 2001).

## **Housing**

The US Census Bureau (DOC 2003a) estimated 13,608 housing units in Campbell County in July 2002. This represents a 2.4% increase above the 13,288 housing units reported in the 2000 census and an 18% increase above the 11,538 housing units reported in the 1990 census. Campbell County residential building permits rose from 15 in 1990 to 144 in 2002 (Wyoming Housing Database Partnership 2003). According to the Wyoming Housing Database Partnership (2003), the average valuation of a single family housing unit in Campbell County in 2002 was \$139,200, which was 6.1% higher than the average 2001 valuation.

The housing vacancy rate in Gillette has been low in the past few years due to population growth associated with CBM development; however, that growth has slowed. According to the Gillette Department of Community Development (2004), the total number of dwelling units in Gillette increased by 340 units, to 9,035 in 2003, a 3.9% increase. The estimated overall residential vacancy rate for December 2003 was estimated to be 1.9%. This is an increase as compared to an overall vacancy rate of 1% in 2002, but is still a very low vacancy rate (Gillette Department of Community Development 2004).

## **Local Government Facilities and Services**

Gillette has generally maintained a steady population growth since 1987, when it totaled 17,054. Owing to the substantial revenues generated by mineral production, local government facilities and services have kept pace with growth and are adequate for the current population. The opening of the new South Campus of Campbell County High School in 1999 has helped to alleviate overcrowding at the North Campus. The combined enrollment in both campuses for the 2003-2004 school year is approximately 1,500 students with 124 teachers (Campbell County School District 2003).

## **Social Conditions**

Despite past boom and bust cycles in the area's economy, a relatively stable social setting now exists in these communities. Most residents have lived in the area for a number of years, social ties are well established, and residents take great pride in their communities. Many of the people place a high priority on maintaining informal lifestyles and small town traditions. There are some concerns that the area could be adversely affected by more than a modest growth in population. At the same time, there is substantial interest in enhancing the economic opportunities available in the area and a desire to accommodate reasonable levels of growth and development.

Wyoming's economy reached the bottom of an energy bust in 1987 and started to

recover (Wyoming Department of Administration and Information 1999). That recovery began to slow in 1996. The forecast is for slow growth through 2008; Wyoming's population is projected to increase at 0.5% per year. Nonagricultural employment is projected to increase by 22% by 2008, increasing 1.4% in 2000 and then slowing to 1.1% per year by 2006. Mining employment is projected to decline by 8.2% by 2008. In 1998, there were 17,000 jobs in the mining sector. This dropped to 15,600 in 1999, with 1,000 jobs lost in oil and gas extraction, 300 in nonmetallic minerals and 100 in coal mining (Wyoming Department of Administration and Information 2000).

### **Environmental Justice**

Environmental justice issues are concerned with actions that unequally affect a given segment of society because of physical location, perception, design, and noise. On February 11, 1994, Executive Order 12898, "Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations" was published in the *Federal Register* (59 FR 7629). The executive order requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations (defined as those living below the poverty level). The executive order makes it clear that its provisions apply fully to Native American populations and Native American tribes, specifically to effects on tribal lands, treaty rights, trust responsibilities, and the health and environment of Native American communities.

Communities within Campbell County, entities with interests in the area, and individuals with ties to the area all may have concerns about the presence of a coal mine within the general analysis area. Communities potentially impacted by the presence or absence of a coal mine are identified in this section of the EIS. Environmental justice concerns are usually directly associated with impacts on the natural and physical environment, but these impacts are likely to be interrelated with social and economic impacts as well. Native American access to cultural and religious sites may fall under the umbrella of environmental justice concerns if the sites are on tribal lands or treaty right has granted access to a specific location.

Compliance with Executive Order 12898 concerning environmental justice was accomplished through opportunities for the public to receive information on this EIS in conjunction with the consultation and coordination described in chapter 5 of this document. This EIS and contributing socioeconomic analysis provide a consideration of impacts with regard to disproportionately adverse impacts on minority and/or low-income groups, including Native Americans.

## HAZARDOUS AND SOLID WASTE

Potential sources of hazardous or solid waste on the West Hay Creek LBA tract would include spilling, leaking, or dumping hazardous substances, petroleum products, and/or solid waste associated with mineral, coal, oil and/or gas exploration and development, or agricultural or livestock activities. No such hazardous or solid wastes are known to be present on the LBA tract. Wastes produced by current mining activities at the Buckskin Mine are handled according to the procedures described in chapter 2.





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## CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

### INTRODUCTION

This chapter discloses the potential environmental consequences that may result from implementing the proposed action or alternatives to the proposed action for the West Hay Creek LBA. The effect or impact a consequence would have on the quality of the human environment is also discussed. For instance, the consequence of an action may be to greatly increase the number of roads in an area. If the number of roads in an area is increased, opportunities for road-based recreation would be increased but opportunities for primitive recreational activities and solitude would be decreased. Evaluation of the impact would depend on an individual's (or a group's) preferred use of that area.

If the West Hay Creek LBA tract is leased to the applicant as a maintenance tract under the proposed action, the preferred alternative, or alternative 3, the permit area for the adjacent Buckskin Mine would not have to be amended to include the new lease area before it could be disturbed by mining activities. Table 4-1 shows the area to be mined and disturbance area for the existing Buckskin Mine (which represents the no action alternative), and how the mine area would change under the proposed action or the action alternatives. Portions of the LBA tract that are contiguous to the existing leases will be disturbed under the current mining plans in order to recover the coal in the existing leases. The environmental consequences of implementing the proposed action or the action alternatives would be similar in nature, but selection of the proposed action would disturb the smallest area.

Surface mining and reclamation have been ongoing in the PRB for over two decades. During this time, effective mining and reclamation technologies have been developed and continue to be refined. Mining and reclamation operations are regulated under SMCRA and Wyoming statutes. WDEQ technically reviews all mine permit application packages to ensure that the mining and reclamation plans comply with all state permitting requirements and that the proposed coal mining operations comply with the performance standards of the DOI-approved Wyoming program. BLM attaches special stipulations to all coal leases (appendix D), and there are a number of federal and state permit approvals that are required in order to conduct surface mining operations (appendix A). The regulations are designed to ensure that surface coal mining impacts are mitigated. The impact assessment that follows considers all measures required by federal and state regulatory authorities as part of the proposed action and alternatives.

**TABLE 4-1**

**COMPARISON OF EXISTING AND PROPOSED DISTURBANCE**

	No Action Alternative (existing leases)	Proposed Action	Alternative 2 (BLM's Preferred Alternative)	Alternative 3
Additional lease area (acres)	---	838.1	921.18	869.3
Total lease area <sup>1</sup>	4,949	5,787.6	5,870.7	5,818.8
Increase in lease area	---	16.9%	18.6%	17.6%
Estimated total disturbance area (acres) <sup>2</sup>	5,099	5,929	5,996	5,929
Increase in estimated disturbance area	---	16%	18%	16%
Estimated recoverable coal remaining as of 1/2001 <sup>3</sup> (mmt)	434	564	574	564
Increase in estimated recoverable coal as of 1/2001	---	30%	32%	30%

Notes:

<sup>1</sup>Includes federal coal leases only; does not include state and private coal within the permit area.

<sup>2</sup>The area to be mined plus area disturbed for mine facilities, access roads, haul roads, railroad facilities, and stockpiles. For the proposed action and alternatives, disturbance is estimated based on the portion of boundary outside the current affected area boundary, plus lease acreage area, plus 20 acres for disturbance of fee coal in the N $\frac{1}{2}$ SW $\frac{1}{2}$ SE $\frac{1}{2}$  of section 17, plus a 500-foot buffer around the northern and western perimeters. The additional disturbance areas are less than the additional lease areas for the action alternatives because portions of the lease areas are included in the existing disturbance area for Buckskin Mine.

<sup>3</sup>Extractable coal tons x recovery factor. For the West Hay Creek LBA tract, extractable coal = 145 millions tons (Proposed Action), 160 million tons (Alternative 2) or 145 million tons (Alternative 3) and Triton's estimated recovery factor of 90% to 92%, based on historic operations. Table 2-1 in chapter 2 contains additional information on extractable coal and recoverable coal.

**DIRECT AND INDIRECT IMPACTS OF THE PROPOSED ACTION**

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

significance may range from negligible to substantial; impacts can be significant during mining but be reduced to insignificance following completion of reclamation.

### Topography and Physiography

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

Typically, a direct permanent impact of coal mining and reclamation is topographic moderation. After reclamation, the restored land surfaces are generally gentler, with more uniform slopes and restored basic drainage networks. The original topography of the West Hay Creek LBA tract ranges from relatively flat to gently rolling hills, with an average slope of about seven percent. As a result, the expected post-mining topography would be gentler and more uniform than the pre-mining topography. Following reclamation, the average surface elevation would be approximately 75 feet lower due to coal removal. (The removal of the coal would be partially offset by the swelling that occurs when the overburden and interburden are blasted and removed.) The land surface would be restored to the approximate original contour or to a configuration approved by WDEQ/LQD when the mining and reclamation permit for the existing mine is revised to include coal removal from the LBA tract.

Direct adverse impacts resulting from topographic moderation include a reduction in microhabitats (cutbank slopes) for some wildlife species and a reduction in habitat diversity, especially in slope-dependent shrub communities and associated habitat. A potential indirect impact may be a long-term reduction in big game carrying capacity. A direct beneficial impact of the lower and flatter terrain would be reduced water runoff, which would allow increased infiltration and result in a minor reduction in peak flows. This may help counteract the potential for increased erosion that could occur as a result of higher near-surface bulk density of the reclaimed soils. It may also increase vegetative productivity, and potentially accelerate recharge of groundwater. The approximate original drainage pattern would be restored, and stock ponds and playas would be replaced to provide livestock and wildlife watering sources. These topographic changes would not conflict with regional land use, and the postmining topography would adequately support anticipated land use.

These impacts are occurring on the existing Buckskin Mine coal leases as coal is mined and mined-out areas are reclaimed. Under the proposed action or the action alternatives, the approximate area that would be permanently topographically changed would increase as shown in table 4-1.

## Geology and Minerals

The estimated coal, overburden, and interburden thicknesses for the existing Buckskin Mine lease area are compared to the estimated coal, overburden, and interburden thickness for the West Hay Creek LBA tract as applied for, and the action alternatives in table 4-2. Results are similar between proposed action and alternatives because of the similarity in boundary configurations. These acreage figures represent the estimated area of actual coal removal under the proposed action and the action alternatives.

**TABLE 4-2**

### **COMPARISON OF COAL, OVERBURDEN, AND INTERBURDEN THICKNESSES**

	<b>No Action Alternative (existing leases)</b>	<b>Proposed Action (as applied for LBA tract)</b>	<b>Alternative 2 (BLM's Preferred Alternative)</b>	<b>Alternative 3</b>
Average Overburden Thickness (feet)	198	204	195	205
Average Coal Thickness (feet)	105	106	105	106
Average Interburden Thickness (feet)	22	15	18	15

The replaced overburden and interburden would be a relatively identical (compared to the premining layered overburden and interburden) and partly recompacted mixture averaging about 230 feet thick under the proposed action and alternatives.

Approximately 130 million additional tons of coal would be recovered under the proposed action, compared to 140 million tons under the preferred alternative or 130 million tons under alternative 3.

The geology from the base of the coal to the land surface would be permanently changed on the LBA tract under the proposed action or the alternatives. The subsurface characteristics of these lands would be radically changed by mining. The replaced overburden and interburden (backfill) would be a mixture of the geologically distinct layers of sandstone, siltstone, and shales that currently exist. The resulting physical characteristics would also be significantly altered.

Drilling and sampling programs are conducted by all mine operators to identify overburden material that may be unsuitable for reclamation (material that is not suitable for use in reestablishing vegetation or that may affect groundwater quality due to high concentrations of certain constituents such as selenium or adverse pH levels). As part

of the mine permitting process, each mine operator develops a management plan to ensure that this unsuitable material is not placed in areas where it may affect groundwater quality or revegetation success. Each mine operator also develops backfill monitoring plans as part of the mine permitting process to evaluate the quality of the replaced overburden. These plans are in place for the existing Buckskin Mine and would be developed for the West Hay Creek LBA tract if it is leased.

During mining, other minerals present on the tract could not be developed, but some could be developed after mining. There are no conventional oil and gas wells within the LBA tract. Therefore, options such as plugging during mining and reestablishing after mining or establishing a value for the remaining reserves are not an issue at this time.

Coal mining affects CBM development by removing the coal in which the CBM resource occurs. CBM resources that are not recovered before mining would be irretrievably lost when the coal is removed. Seam dewatering in advance of mining also draws down coal seam water levels and reduces the hydrostatic pressure, which may allow CBM to desorb and escape from the coal bed. As discussed in chapter 3, there were six active wells and three shut-in wells within the LBA tract itself as of April 9, 2004. Three additional wells were permitted to drill or had started drilling for CBM as of April 9, 2004. CBM could be produced from the existing wells, and other wells could be drilled during the time it takes to lease and permit the LBA tract and, on a case by case basis, until mining activity approaches each well.

For the purposes of this EIS, the BLM's Wyoming State Office, Reservoir Management Group (RMG) reviewed the existing CBM resource and production data in this area as of October 2002. A limited amount of production data was available at that time to estimate well life and reserves for existing or future CBM wells in the West Hay Creek LBA area. Several wells, including some located inside the West Hay Creek LBA tract in section 18, T. 52 N., R. 72 W., had enough production history to support production decline curve analysis. These wells were used to develop a model production decline curve which can be used for generalized production and reserve forecasts.

The model decline data suggest that typical CBM wells located in much of this area might be expected to ultimately recover approximately 132,000 mcf of producible reserves. A typical economic well life might be approximately six years. Because of the complexity of CBM occurrence and reservoir character and performance, along with the uncertain extent of seam dewatering due to mining and CBM production, these forecasts may overestimate CBM resources within the LBA tract. RMG's reservoir analyses show that mine dewatering has resulted in a "regional" lowering of the water table in the mined seam(s). Hydrostatic pressure within the coal seam has declined near the mines. Where the hydrostatic pressure has declined sufficiently, CBM gas has been allowed to desorb from these coals and escape from the reservoir(s). As a result, the CBM reservoir near the active mine is probably depleted relative to the original/undisturbed reservoir encountered farther west. Decline curve analysis based solely on the wells located in section 18, where dewatering has occurred, project recoverable reserves of approximately 54,800 mcf per well and an approximate 2.5-year

economic well life. While still economic, these reserves are substantially less than the projected reserves for other parts of the township. The lower forecasts may be most representative of the CBM reserves within the West Hay Creek LBA. Based on the reserve estimates derived from this decline curve analysis, the entire LBA parcel could be expected to contain an estimated 1, 205,732 mcf of producible reserves in twenty-three 40-acre spacing units (under the preferred alternative).

CBM resources or initial gas in place can also be estimated using volumetric methods. The RMG has prepared detailed CBM resource analyses in support of coal leasing actions and other program activities at other localities in the PRB mining area. Coal seam gas-in-place depends on a number of factors, including coal rank, coal lithology and, significantly for the purposes of these analyses, methane adsorptive capacity of the coals in question. Methane adsorption analyses describe the volume of methane that can be adsorbed by a specific sample of coal across a varying range of temperature and pressure conditions. This pressure/volume relationship can be represented by an equation and curve known as an adsorption isotherm, which can be used to predict gas content based on pressure. Although gas content can vary widely from sample to sample depending on other properties of the coal, the adsorption data provide a generalized means of predicting coalbed methane adsorptive capacity, or potential initial gas in place, based on pressure.

The RMG has developed preliminary CBM reservoir models based on these principles to estimate CBM gas content and in-place resources in the mining areas and elsewhere in the PRB. These analyses use a variety of data including methane adsorption data collected cooperatively by BLM's RMG and the USGS, coal geology from publicly available coal drill holes, and hydrologic data from groundwater monitoring wells reported to the public by the Gillette Area Groundwater Monitoring Organization (GAGMO). Only publicly available data sources were used to conduct this analysis.

Some uncertainty exists in the GAGMO water monitoring data and the estimated hydrostatic pressures in this area because specific premining water levels were not available. GAGMO estimated 1980 water levels in this area from an unspecified 1980 water level map (reference not provided) rather than actual monitoring well measurements. As a result, the initial pressures based on the 1980 water level, and the derived change from 1980 to 2000 could be in error. The GAGMO data for the year 2000 were used in this analysis, although groundwater drawdown has continued since that time.

These uncertainties notwithstanding, the data and model were used to calculate and map estimated coal gas content (in standard cubic feet per ton) across T. 52 N., R. 72 W. and the West Hay Creek LBA area. Premining (1980) and current (year 2000) calculations and maps were made to evaluate the original and current reservoir conditions and the effects over time. Average current gas content was estimated for the LBA tract from the 2000 gas content map. An estimate of CBM gas-in-place was prepared using the coal reserves (in tons) reported in the LBA application and the estimated coal gas content (standard cubic feet per ton) for the tract.

The weighted average current gas content for the LBA parcel was estimated to be 11.74 scf/ton and average initial gas content in 1980 was estimated to be 13.65 scf/ton. The proposed LBA parcel contains an estimated 145 million tons of coal in place under the proposed action (160 million tons of coal under the Preferred Alternative). Based on these values, total current CBM gas-in-place for the LBA tract is estimated to be 1,702,300 mcf under the proposed action (1,878,400 mcf under the Preferred Alternative). Initial (1980) gas in place is similarly estimated to have been 1,979,250 mcf under the proposed action (2,184,000 mcf under the Preferred Alternative. This estimate compares favorably with the recoverable reserves estimate using decline curve analysis. However, the reserves projected by both methods are estimates and are subject to a number of remaining uncertainties in assessing CBM resources.

Implicit in this analysis is the observation that coal mining and mine-related dewatering affects CBM resources and development potential. Water production from the coal seams is required to reduce hydrostatic pressure in the coal seams so that methane can desorb from the coals for production. Mine-related dewatering of the coal seams has the same effect of reducing hydrostatic pressure and methane desorption. The preliminary CBM reservoir models indicate that depletion of the hydrostatic pressures and methane resources has occurred adjacent to mining areas since not long after mining began.

Based on the methane adsorption/pressure analyses, the preliminary model shows that 10% to 20% of the original in-place CBM resources in the West Hay Creek LBA area have been depleted since 1980. This effect will be enhanced as mining proceeds toward the LBA area and will continue whether or not the LBA is leased or mined. The short productive life inferred for CBM wells in the LBA suggests that, if wells were completed and produced in the near future, substantial portions of the remaining CBM reserves could be produced before mining occurs within the LBA.

## Soils

Under the currently approved mining and reclamation plan, approximately 5,099 acres of soil resources will be disturbed in order to mine the coal in the existing leases at the Buckskin Mine (table 4-1). Disturbance related to coal mining would directly affect an additional 830 acres of soil resources on and adjacent to the LBA tract under the proposed action, around 897 acres under the preferred alternative, or up to 830 acres under alternative 3. The reclaimed soils would have different physical, biological, and chemical properties than the premining soils. They would be more uniform in type, thickness, and texture. Average topsoil thickness would be 14 to 18 inches across the entire reclaimed surface. Soil chemistry and soil nutrient distribution would be more uniform, and average topsoil quality would be improved because soil material that is not suitable to support plant growth would not be salvaged for use in reclamation. This would result in more uniform vegetative productivity on the reclaimed land. The replaced topsoil would support a stable and productive vegetation community adequate in quality and quantity to support the planned postmining land uses (wildlife habitat and rangeland).

Specific impacts to soil resources would include an increase in the near-surface bulk density of the reclaimed soil resources. As a result, the average soil infiltration rates would generally decrease, which would increase the potential for runoff and soil erosion. Topographic moderation following reclamation would potentially decrease runoff, which would tend to offset this potential increase in runoff due to decreased soil infiltration capacity. The change in soil infiltration rates would not be permanent because revegetation and natural weathering action would form new soil structure in the reclaimed soils, and infiltration rates would gradually return to premining levels. The reclaimed landscape would contain stable landforms and drainage systems that would support the postmining land uses. Reconstructed stream channels and floodplains would be designed and established to be erosionally stable.

Direct biological impacts to soil resources would include a short-term to long-term reduction in soil organic matter, microbial populations, seeds, bulbs, rhizomes, and live plant parts for soil resources that are stockpiled before placement.

Sediment control structures would be built to trap eroded soil; revegetation would reduce wind erosion. Soil or overburden materials containing potentially harmful chemical constituents (such as selenium) would be specially handled. These measures are required by state regulations and are considered part of the proposed action and alternatives.

### **Air Quality**

This section deals with how the air quality impacts related to mining the LBA tract would be expected to differ from air quality impacts associated with existing approved mining in this area. As discussed in chapter 1, BLM does not authorize mining by issuing a lease for federal coal, but mining the West Hay Creek LBA tract is considered to be a logical consequence of leasing the tract. Thus, it is actually the impacts of mining on ambient air quality that are addressed in this section. The impacts to air quality of mining the tract in conjunction with other activities in the area are addressed in the "Cumulative Impact" section in this chapter.

### **Regulatory Background**

Air pollution impacts are limited by local, state, tribal, and federal air quality regulations and standards, and implementation plans established under the federal CAA and the Clean Air Act amendment (CAAA) of 1990. In Wyoming, air pollution impacts are managed by WDEQ/AQD under the WAQSR and the EPA approved state implementation plan. Regulations applicable to surface coal mining may include NAAQS/WAAQS, PSD, NSPS, and Federal Operating Permit Program (Title V). A company initiating a project must go through the WDEQ/AQD new source review permitting process to obtain either a construction or modification permit or a permit waiver. The permitting process ensures sources comply with the standards and regulations stated above.



The Federal CAA requires the EPA to identify NAAQS to protect the public health and welfare. Currently the EPA has established NAAQS for six pollutants (also known as "criteria pollutants"). The State of Wyoming has also established ambient air quality standards (WAAQS) for those pollutants that are as stringent as or more stringent than the NAAQS, and are enforceable under WAQSR. Table 4-3 shows the NAAQS and the WAAQS. During the new source review permitting process applicants must demonstrate compliance with these standards; this can be done by modeling or other methods approved by the WDEQ/AQD administrator. The "Air Quality" section in chapter 3 contains more information.

The PSD regulation is intended to prevent deterioration of air quality in areas that are in attainment with the NAAQS. This is achieved by establishing increments, or maximum allowable increases in the ambient concentration, of PM<sub>10</sub>, NO<sub>2</sub> and SO<sub>2</sub> for Class I and Class II areas. A proposed new point source that has the potential to emit more than 250 tpy of any criteria pollutant (or a listed source that has the potential to emit 100 tpy or more) must undergo a regulatory PSD increment consumption analysis during the WDEQ-AQD permitting process as well as BACT review. Modifications to existing major PSD sources are subject to PSD regulation if the modification results in a significant net emissions increase of any regulated pollutant. The net emissions increase is figured by the modification plus permits issued after a baseline date. In the PRB, the PM<sub>10</sub> baseline year is 1997, the NO<sub>2</sub> baseline year is 1988. There are currently no coal mines within Wyoming that have been subject to PSD review in the permitting process (refer to the "Air Quality" section in chapter 3). This NEPA analysis presents the modeled impacts for the applicant mine in terms of pollutant concentration. Any comparisons with the PSD increment do not constitute a regulatory PSD analysis. The modeling results are presented strictly for informational purposes.

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

All sources being permitted within Wyoming must utilize BACT, not just sources subject to PSD review. During the new source review permitting process, a BACT analysis is performed for the proposed construction or modification. The BACT process evaluates possible control technologies for the proposed action on the basis of technical feasibility and economic reasonability. Decisions are made on a case by case basis of which technology to apply and are mandated through the permit. The "Control Measures" section contains BACT measures that have been applied at coal mines.

Major sources of air pollutants must obtain an operating permit from WDEQ/AQD Operating Permit Program (also known as Title V). A "major source" is, generally, a

TABLE 4-3

FEDERAL AND STATE AMBIENT AIR QUALITY STANDARDS FOR CRITERIA POLLUTANTS

Criteria Pollutant	Averaging Period	Wyoming Standards		Federal Standards	
		Concentration <sup>a</sup>	Primary Concentration <sup>a</sup>	Secondary Concentration <sup>b</sup>	Same as primary standards <sup>b</sup>
Ozone (O <sub>3</sub> )	1-hour	120 ppbv (235 µg/m <sup>3</sup> )	120 ppbv (235 µg/m <sup>3</sup> )	Same as primary standards	Same as primary standards
	8-hour <sup>b</sup>	80 ppbvc (157 µg/m <sup>3</sup> )	80 ppbv (157 µg/m <sup>3</sup> )	---	---
Carbon Monoxide (CO)	8-hour <sup>d</sup>	9 ppmv (10 mg/m <sup>3</sup> )	9 ppmv (10 mg/m <sup>3</sup> )	---	---
	1-hour <sup>e</sup>	35 ppmv (40 mg/m <sup>3</sup> )	35 ppmv (40 mg/m <sup>3</sup> )	---	---
Oxides of Nitrogen (NO <sub>x</sub> ) as Nitrogen Dioxide (NO <sub>2</sub> )	Annual	100 µg/m <sup>3</sup> (50 ppbv)	100 µg/m <sup>3</sup> (53 ppbv)	Same as primary standards	Same as primary standards
	Annual	60 µg/m <sup>3</sup> (20 ppbv)	80 µg/m <sup>3</sup> (30 ppbv)	---	---
Sulfur Dioxide (SO <sub>2</sub> )	24-hour <sup>d</sup>	260 µg/m <sup>3</sup> (100 ppbv)	365 µg/m <sup>3</sup> (140 ppbv)	---	---
	3-hour <sup>d</sup>	1,300 µg/m <sup>3</sup> (500 ppbv)	---	1,300 µg/m <sup>3</sup> (500 ppbv)	Same as primary standards
	24-hour <sup>d</sup>	150 µg/m <sup>3</sup>	150 µg/m <sup>3</sup>	---	---
	24-hour (based on the 99th percentile averaged over 3 years)	---	---	---	---
	Annual Arithmetic Mean	50 µg/m <sup>3</sup>	50 µg/m <sup>3</sup>	Same as primary standards	Same as primary standards
Particulate Matter ≤10 Microns in Aerodynamic Diameter (PM <sub>10</sub> )	24-hour (Based on the 98th percentile averaged over 3 years)	65 µg/m <sup>3</sup>	65 µg/m <sup>3</sup>	---	---
	Annual Arithmetic Mean (averaged over three years)	15 µg/m <sup>3</sup>	15 µg/m <sup>3</sup>	---	---
Particulate Matter ≤2.5 Microns in Aerodynamic Diameter (PM <sub>2.5</sub> )	Calendar quarter	1.5 µg/m <sup>3</sup>	1.5 µg/m <sup>3</sup>	Same as primary standards	Same as primary standards
	½ hour	Primary 70 µg/m <sup>3</sup> <sup>e</sup>	---	---	---
Lead (Pb)	½ hour	Secondary 40 µg/m <sup>3</sup> <sup>f</sup>	---	---	---
	Annual	250 µg/m <sup>3</sup>	---	---	---
Hydrogen Sulfide	30-day	500 µg/m <sup>3</sup>	---	---	---
	12 hours	3 µg/m <sup>3</sup>	---	---	---
Suspended Sulfates	24 hours	1.8 µg/m <sup>3</sup>	---	---	---
	7 days	0.5 µg/m <sup>3</sup>	---	---	---
Fluorides in Ambient Air	30 days	0.4 µg/m <sup>3</sup>	---	---	---
	Annual	---	---	---	---

<sup>a</sup> Equivalent units given in parentheses are based on a reference temperature of 25°C and a reference pressure of 760 mm mercury. Measurements of air quality are corrected to a reference temperature of 25°C and a reference pressure of 760 mm mercury (1,013.2 millibar); ppmv and ppbv in this table refer to parts per million by volume and parts per billion by volume, respectively, or micro-moles of pollutant per mole of gas.

<sup>b</sup> The 8-hour ozone standard would be implemented once an area achieves attainment for the 1-hour standard.

<sup>c</sup> The 8-hour ozone standard is met when the average of the annual fourth highest daily maximum 8-hour average ozone concentration is less than or equal to .008 ppm (80 ppbv).

<sup>d</sup> A violation occurs on the second exceedance during a calendar year.

<sup>e</sup> Not to be exceeded more than two times per year.

<sup>f</sup> Not to be exceeded more than two times in five consecutive days.

facility that emits over 100 tpy of any criteria pollutant, 25 tpy of combined hazardous air pollutants (HAPs) or 10 tpy of an individual HAP. The operating permit compiles all applicable air quality requirements for a facility and specifies compliance assurance in the form of testing, monitoring, reporting and recordkeeping requirements. Currently, the Buckskin Mine does not have a Title V operating permit.

A new mine or a modification to an existing coal mine must be permitted by WDEQ/AQD under WAQSR chapter 6, section 2 and must demonstrate that they will comply with all applicable aspects of WAQSR. The following summarizes the construction/modification permitting analysis for surface coal mines.

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

BACT must be used for all sources being permitted within Wyoming. WAQSR chapter 6, section 2(b) (v) lists BACT measures to be used (but not limited to) at large mining operations. An applicant uses these and other BACT measures in the development of their own PM<sub>10</sub> and NO<sub>2</sub> point and fugitive source inventories (see chapter 3 for a discussion of mining BACT measures). During the application review WDEQ/AQD can also require further control measures through the BACT review process.

For the modeling analyses, an applicant must put together an emission inventory of PM<sub>10</sub> from their facility and surrounding sources. For PM<sub>10</sub> both point sources and fugitive dust emissions are quantified. The emissions are based on the facility's potential to emit in the highest production year. The applicant also examines the surrounding coal facilities and their previous air quality permits to determine the worst case emission year for those facilities, based on potential to emit. They will then choose two or more years for modeling analyses. Coal mines in the PRB are also required to quantify NO<sub>2</sub> emissions from their facility. Dispersion modeling is required to demonstrate compliance with the ambient standard. Potential emissions from diesel powered mining equipment and blasting are modeled. Locomotive emissions are also quantified and included in the NO<sub>2</sub> modeling analysis.

Long term PM<sub>10</sub> modeling is conducted for the permit application to demonstrate compliance with the annual PM<sub>10</sub> standard. For both point and area sources, the Industrial Source Complex Model-Long Term version 3 (ISCLT3) is used. A background of 15µg/m<sup>3</sup> is used to represent PM<sub>10</sub> concentration in the PRB prior to operation of coal mine sources. The modeling results are added to the background and compared to the annual standard.

Short-term PM<sub>10</sub> modeling is not required by WDEQ-AQD, nor does WDEQ-AQD consider it to be an accurate representation of short term impacts. The CAAA (section 234) mandates the administrator of the EPA to analyze the accuracy of short-term modeling in regard to fugitive particulate emissions from surface coal mines. A June 26, 1996 letter from EPA Region VIII to Wyoming state representatives details the results of a study where the short term model failed to meet evaluation criteria and tended to overpredict 24-hour impacts of surface coal mines. The memorandum of agreement of January 24, 1994 between EPA Region VIII and the state of Wyoming allows WDEQ-AQD to conduct monitoring in lieu of short-term modeling for assessing coal mining-related impacts in the PRB. This regulatory procedure remains in place and in effect. Ambient particulate monitoring is required of each coal mine through conditions of their respective permits.

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

In order to demonstrate that mining operations will comply with all applicable aspects of the WAQSR, the Buckskin Mine has conducted air quality modeling analyses as required by WDEQ/AQD. WDEQ/AQD air quality permit analyses use a background PM<sub>10</sub> concentration of 15 µg/m<sup>3</sup> and 20 µg/m<sup>3</sup> for NO<sub>x</sub>. These concentrations represent estimated background ambient air quality in the area prior to operation of the coal mine sources. Potential emissions corresponding to the maximum production level from the coal mines in the area are then added to this background concentration. The resulting particulate levels are then compared to the average annual PM<sub>10</sub> standard of 50 µg/m<sup>3</sup> and the average annual NO<sub>x</sub> standard of 100 µg/m<sup>3</sup> to determine compliance with the annual NAAQS. This constitutes a demonstration of compliance with the "long-term" or annual NAAQS. In conducting an analysis of air quality impacts in the PRB for the Wyoming and Montana BLM, Argonne National Laboratory used a background concentration of 17 µg/m<sup>3</sup> for PM<sub>10</sub> and 16.5 µg/m<sup>3</sup> for NO<sub>x</sub> for the entire PRB (table 3-2). These background concentrations are based on recently monitored values in Gillette, Wyoming which include all sources operating at the time the value was measured, including existing coal mine operations located around Gillette. The Argonne analysis then inventoried and modeled impacts from sources constructed after the date of the monitored background concentration. In the case of the surface coal mines, the Argonne National Laboratory analysis modeled impacts from the projected production increases at each coal mine.

The Buckskin Mine performed dispersion modeling using the ISCLT3 program to model impacts from point and area sources.

## Existing Air Quality Issues

As discussed in chapter 3, the major types of emissions that come from surface coal mining activities are particulates from mining activities such as blasting and hauling coal and overburden, tailpipe emissions from large mining equipment, and gaseous clouds containing  $\text{NO}_2$  that are produced by overburden blasting.

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

Public exposure to surface mining operations is most likely to occur along publicly accessible roads and highways that pass through the area of the mining operations. Occupants of dwellings in the area could also be affected. Although this is a sparsely populated area, there are several occupied dwellings in the area. Roads, highways, and currently occupied dwellings in the vicinity of the West Hay Creek LBA tract are shown in figure 3-17.

Particulates include solid particles and liquid droplets that can be suspended in air. The "Air Quality" section of chapter 3 describes historical, regional, and site-specific particulate levels, including recently occurring exceedances of the 24-hour  $\text{PM}_{10}$  standard detected by monitors at several mines in the Wyoming PRB. This includes one exceedance at the Buckskin Mine, the applicant for the West Hay Creek LBA tract. Chapter 3 also discusses the control measures that WDEQ/AQD has or may require to reduce  $\text{PM}_{10}$  levels.

Particulates, especially fine particles, have been linked to numerous respiratory-related illnesses and can adversely affect individuals with pre-existing heart or lung disease. They are also a major cause of visibility impairment in many parts of the US. While individual particles cannot be seen with the naked eye, collectively they can appear as black soot, dust clouds, or gray hazes.

Gaseous  $\text{NO}_2$  is reddish-brown, heavier than air, and has a pungent odor. It is highly reactive and combines with water to form nitric acid and nitric oxide. Nitrogen dioxide gas may cause significant toxicity because of its ability to form nitric acid with water in the eye, lung, mucous membranes, and skin (EPA 2001). Acute exposure may cause death by damaging the pulmonary system. Chronic or repeated exposure to lower concentrations of  $\text{NO}_2$  may exacerbate pre-existing respiratory conditions or increase the incidence of respiratory infections. (EPA 2001).

$\text{NO}_2$  is a product of incomplete combustion at sources such as gasoline and diesel burning engines or from mine blasting activities. The incomplete combustion during blasting activities may be caused by wet conditions, incompetent or fractured geological formations, deformation of bore holes, and other factors. Generally,  $\text{NO}_x$  emissions are

more prevalent at operations that use the cast blasting technique. The combination of these factors makes it difficult to eliminate NO<sub>x</sub> production. (personal communication, Rick Chancellor, 6/16/2003).

Efforts to eliminate NO<sub>x</sub> production have included use of different blasting agents, different blends of blasting agents, different additives, different initiation systems and sequencing, borehole liners, and smaller cast blasts. Using these techniques, the mines have been able to reduce, but not eliminate, the production of NO<sub>x</sub> during blasting. The Eagle Butte Mine has almost eliminated NO<sub>x</sub> production, while the North Antelope/Rochelle Complex has had success in eliminating NO<sub>x</sub> in over 75% of their cast blasting by using borehole liners and changing their blasting agent blends (personal communication, Rick Chancellor, 6/16/2003).

Several of the mines in the Wyoming PRB have undertaken voluntary blasting restrictions to avoid NO<sub>x</sub> impact to the public. WDEQ has required several mines, including Antelope, North Antelope/Rochelle, Black Thunder, Belle Ayr, Eagle Butte, and Wyodak, to stop traffic on public roads during blasting due to concerns with fly rock and the "startle factor." Two mines in the Wyoming PRB, Black Thunder and Eagle Butte, currently have blasting restrictions in their permits to address NO<sub>x</sub>. These voluntary and required restrictions are described further in chapter 3.

The WMA, with participation from the WDEQ/LQD and WDEQ/AQD, conducted a study in August 1999 and completed in April 2000 because of the concern with the health risk that could be potentially associated with short-term exposure to NO<sub>x</sub>. The study involved collecting 15-minute average NO<sub>2</sub> concentrations in areas that are near PRB coal mining operations and that would be accessible to the public. It was designed to help evaluate potential exposure of the public to NO<sub>2</sub> emissions resulting from blasting activity at surface coal mines. Six monitor locations were selected "based on their proximity to mining activity and accessibility to the public. Roads adjacent to mining activity were felt to be areas where the public exposure would most likely occur. Locations were also chosen based on dominant wind direction, and to represent areas having the greatest chance of being impacted by several mining operations" (WMA 2000).

A brief summary of the findings follows.

- Approximately 95% of the valid data points were readings of 0 ppm (0 µg/m<sup>3</sup>) NO<sub>2</sub>.
- The maximum 15-minute average valid values observed for each of the six monitors ranged from 0 to 1.65 ppm (0-3,102 µg/m<sup>3</sup>) NO<sub>2</sub>.
- Where readings greater than 0 ppm did occur there was a strong correlation between NO<sub>2</sub> readings and temperatures. This correlation indicates that the NO<sub>2</sub> readings may have been inflated due to temperature considerations.

The Black Thunder Mine also conducted a study designed to provide information on safe setback distances for blasting activities at that mine (TBCC 2002). Monitors for that report were located close to blasts in order to collect data for a modeling project. The monitors were located within the mine permit boundary in areas that are not and would not be accessible to the public during mining. These areas are also cleared of employees during blasting activities. The measured NO<sub>x</sub> levels ranged from non-detectable to 21.4 ppm. The highest value was measured 361 feet from the blast.

There are no NAAQS for NO<sub>2</sub> for periods shorter than one year, but there is concern about the potential health risk associated with short-term exposure to NO<sub>2</sub> from blasting emissions. According to EPA "...the exact concentrations at which NO<sub>2</sub> will cause various health effects cannot be predicted with complete accuracy because the effects are a function of air concentration and time of exposure, and precise measurements have not been made in association with human toxicity. The information that is available from human exposures also suggests that there is some variation in individual response." (EPA 2001). The National Institute of Occupational Safety and Health (NIOSH), Occupational Safety and Health Administration (OSHA), and EPA have identified the following short-term exposure criteria for NO<sub>2</sub>:

- NIOSH's recommended "immediately dangerous to life and health" level is 20 ppm (37,600 µg/m<sup>3</sup>);
- EPA's "significant harm level," a one-hour average, is 2 ppm (3,760 µg/m<sup>3</sup>);
- OSHA's "short-term exposure limit," a 15-minute time-weighted average developed for workers, is 5 ppm (9,400 µg/m<sup>3</sup>, which must not be exceeded during any part of the workday, as measured instantaneously);
- NIOSH's recommendation for workers is a limit of 1 ppm (1,880 µg/m<sup>3</sup>) based on a 15-minute exposure that should not be exceeded at any time during the workday; and
- EPA recommends that concentrations not exceed 0.5 ppm (940 µg/m<sup>3</sup>) for a 10-minute exposure to protect sensitive members of the public (EPA 2003).

There are no state or federal rules that require the public or employees to stay back a certain distance from mine blasting operations in order to limit their exposure to NO<sub>2</sub>. According to WDEQ/LQD, mitigation measures that are currently being implemented in the Wyoming PRB are not dependent on a numerical standard, but are administrative controls designed to prevent NO<sub>2</sub> from reaching receptors. At this time, only the Eagle Butte Mine is required to use a set back distance that is based on a numerical exposure limit. (personal communication, Rick Chancellor, 6/16/2003). An administrative ruling by the Wyoming EQC has approved a 2,500-foot setback of blasting operations from the southern boundary of the Eagle Butte Coal Mine when prevailing winds are blowing toward the mine's downwind neighbors (*Casper Star Tribune* 2003). The Eagle Butte Mine is located north of Gillette, Wyoming, and south of the Buckskin Mine.

Impacts to the particulate annual ambient air quality standard and the NO<sub>2</sub> annual ambient air quality standard are discussed in the following sections. Regional air quality impacts are evaluated in the "Cumulative Impact" section in chapter 4 of this EIS.

## Impacts of the Proposed Action and Action Alternatives

Air quality impacts from the proposed action or action alternatives would not be expected to be substantially different. If the West Hay Creek LBA tract is not leased (the No Action alternative), post-2002 coal production is expected to be 25 mmtpy for about 12 years. As shown on table 2-1 in chapter 2, if the West Hay Creek LBA tract is leased and mined as proposed, Triton estimates that annual production at the Buckskin Mine would be 25 million tons for an additional five to six years under the proposed action and action alternatives. In 2001 the mine produced approximately 19.1 million tons; in 2002, the mine produced approximately 18.3 million tons.

WDEQ/AQD issued an air quality permit (MD-707) for the Buckskin Mine on February 15, 2002. This air quality permit authorizes a maximum coal production rate of 27.5 mmtpy. The permit is based on the results of computer modeling that predicted no violation of air quality standards and demonstrated that emissions would have no significant cumulative effect when added to emissions from neighboring sources (Triton 2002). Figure 4-1, which was prepared using the MD-707 air quality modeling analysis, illustrates the maximum modeled annual average  $PM_{10}$  concentrations in 2005, which is the predicted worst-case scenario year based on maximum particulate emissions from the Buckskin Mine and adjacent emission sources. Figure 4-1 indicates that at a coal removal rate of 27.5 mmtpy, the highest predicted annual mean  $PM_{10}$  concentration is  $36.90 \mu\text{g}/\text{m}^3$  (including  $15 \mu\text{g}/\text{m}^3$  background concentration) at the model receptor location shown. The predicted  $PM_{10}$  concentrations at all other model receptor locations are less than this value. Short-term concentrations above  $50 \mu\text{g}/\text{m}^3$  are predicted in the active pit areas. The state standard requires that annual average particulate concentrations above  $50 \mu\text{g}/\text{m}^3$  not be exceeded at a mine's permit boundary.

The MD-707 application presented an emissions inventory for all sources within the Buckskin Mine, from neighboring sources (Dry Fork Mine, Eagle Butte Mine, Rawhide Mine, Wyodak Mine, ENCOAL, and the Wyodak and Neil Simpson 1 and 2 power plants) and proposed neighboring sources (Two Elk Unit 1 power plant and ENCOAL power plant) for each year of mine life. These sources were input to the dispersion modeling analysis to determine potential air quality impacts in the vicinity. Several proposed projects discussed elsewhere in this EIS (DM&E Railroad expansion, Wygen II power plant, Two Elk Unit 2, and the Middle Bear power plant) were not included in the air quality model's emissions inventory. WDEQ/AQD approved the list of proposed sources at the time of modeling.

A surface coal mine is not a named facility under Wyoming's PSD regulations. Therefore, it is not considered a "major emitting facility" unless it has the potential to emit 250 tons or more per year of any regulated pollutant. Fugitive dust emissions are not considered in determining potential to emit. Because the maximum annual mass emission rate of  $PM_{10}$  or  $NO_x$  from all point sources at the Buckskin Mine will be less



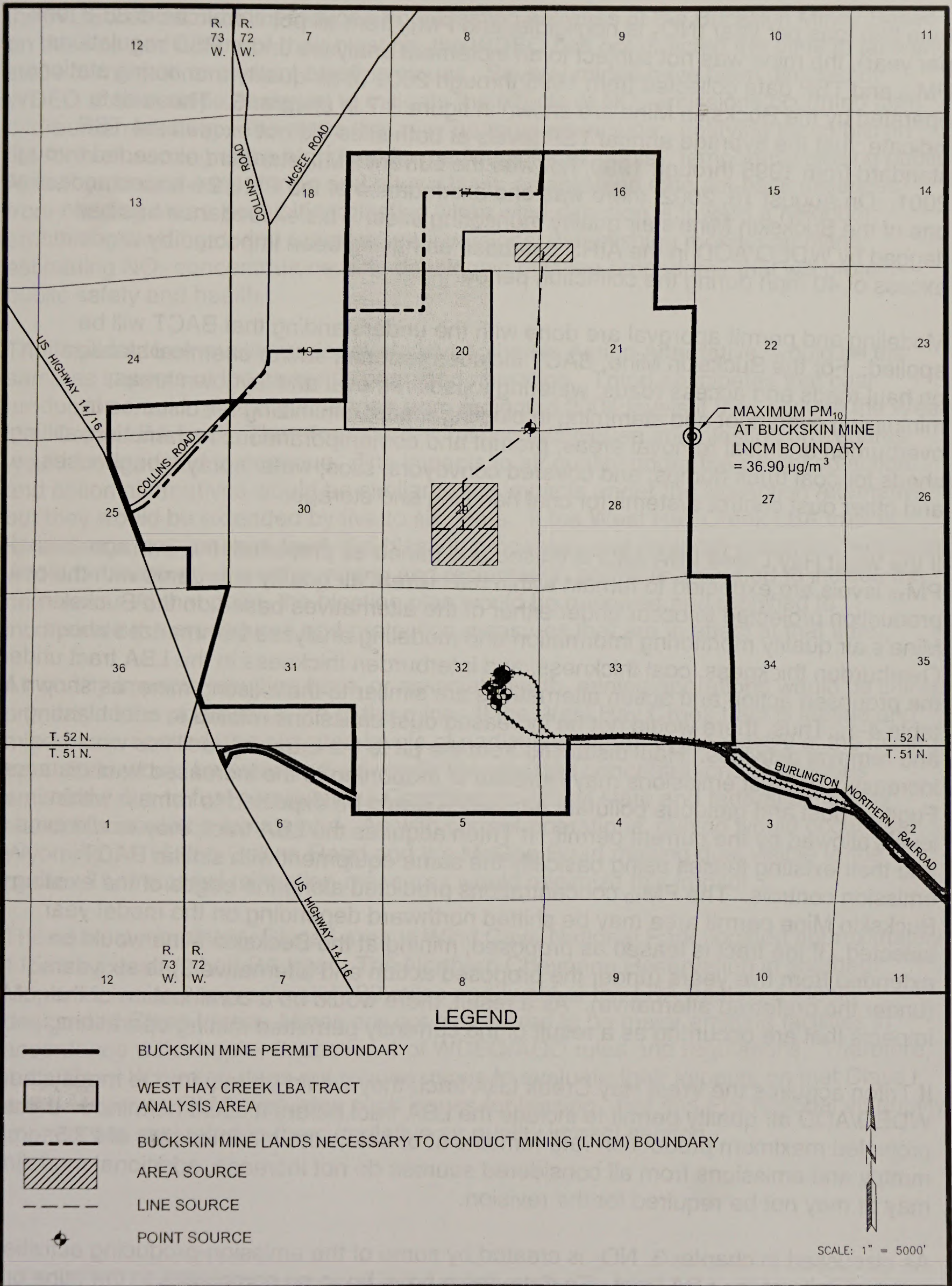


Figure 4-1. Modeled Maximum PM<sub>10</sub> Concentration at Buckskin Mine LNCM Boundary, Year 2005 Worst-Case Scenario Resulting from 27.5 Million Tons Per Year of Coal Production from Existing Leases.

than 250 tons per year ( $\text{NO}_x$  is negligible, and  $\text{PM}_{10}$  from all point sources is 88.3 tons per year), the mine was not subject to an increment analyses under PSD regulations.  $\text{PM}_{10}$  and TSP data collected from 1995 through 2001 at air quality monitoring stations operated by the Buckskin Mine are shown in figure 3-7 in chapter 3. These data indicate that the average annual TSP levels at both sites did not exceed the TSP standard from 1995 through 1999, nor was the current  $\text{PM}_{10}$  standard exceeded through 2001. On August 16, 2002, there was one exceedance of the  $\text{PM}_{10}$  24-hour standard at one of the Buckskin Mine's air quality monitoring sites. This exceedance has been flagged by WDEQ/AQD in the AIRS database as having been impacted by winds in excess of 40 mph during the collection period.

Modeling and permit approval are done with the understanding that BACT will be applied. For the Buckskin Mine, BACT includes watering and/or chemical stabilization on haul roads and access roads; watering topsoil removal and laydown areas; minimizing overshoot and stemming in blasting areas; minimizing fall distance in overburden and coal removal areas; prompt and contemporaneous reclamation; stilling sheds for coal truck dumps; and covered conveyors, silos, water sprays, baghouses, and other dust control systems for coal handling and storage.

If the West Hay Creek LBA tract is leased and mined as proposed, the average annual  $\text{PM}_{10}$  levels are expected to remain within the current air quality standards with the coal production projected to occur under either of the alternatives based on the Buckskin Mine's air quality monitoring information and modeling analyses summarized above. Overburden thickness, coal thickness, and interburden thickness in the LBA tract under the proposed action and action alternatives are similar to the existing mine, as shown in table 4-1. Thus, there would not be increased dust emissions related to coal blasting and removal activities. Haul distances from the pit to the crushing facilities would be increased, so dust emissions may increase in proportion to the increased haul distance. Fugitive dust and gaseous pollutant emissions would be expected to remain within levels allowed by the current permit. If Triton acquires the LBA tract, they would mine it and their existing leases using basically the same equipment with similar BACT emission controls. The  $\text{PM}_{10}$  concentrations predicted along the edges of the existing Buckskin Mine permit area may be shifted northward depending on the model year selected. If the tract is leased as proposed, mining at the Buckskin Mine would be extended from five years (under the proposed action and alternative 3) to six years (under the preferred alternative). As a result, there would be a continuation of the impacts that are occurring as a result of the currently permitted mining operations.

If Triton acquires the West Hay Creek LBA tract, they would be required to modify their WDEQ/AQD air quality permit to include the LBA tract before it could be mined. If the projected maximum production rate remains at or below the modeled rate of 27.5 mmtpy and emissions from all considered sources do not increase, additional modeling may or may not be required for the revision.

As discussed in chapter 3,  $\text{NO}_2$  is created by some of the emission-producing activities in the vicinity of the LBA tract. To date, there have been no complaints to the mine or

the WDEQ about clouds produced from blasting activities at the Buckskin Mine. Based on the size and nature of their blasting, the WDEQ has not directed the mine to take any steps to mitigate or prevent blasting clouds. Several mines have been directed by WDEQ to take steps designed to mitigate the effects of NO<sub>2</sub> emissions occurring from overburden blasting. The steps that may be required include: notifying the public (in the form of warning signs along public roadways for example); temporarily closing public roadways near a mine during and after a blast; establishing safe set-back distances from blasting areas; prohibiting blasting when wind direction is toward a neighbor; prohibiting blasting during temperature inversions; establishing monitoring plans; estimating NO<sub>2</sub> concentrations; and developing blasting procedures that will protect public safety and health.

The impacts to air quality under alternative 1, the No Action Alternative, would be the same as impacts of the currently permitted operation. Triton anticipates that coal production would remain unchanged from projected 2004 levels if they acquire the West Hay Creek LBA tract. Therefore, current mining techniques and blasting procedures would be expected to continue. The impacts to air quality under the proposed action and action alternatives would be similar to the impacts under the No Action Alternative, but they would be extended by five to six years. If the West Hay Creek LBA tract is leased as a maintenance tract, the blasting processes and required mitigation measures would be reviewed when the mining and reclamation permit is amended to include the new lease. At that point, the blasting plan would be reviewed and modified to incorporate the procedures and protection measures that are in effect at that time.

Air quality impacts resulting from, or associated with, mining operations would be limited primarily to the operational life of the mine. If the West Hay Creek tract is leased and mined as proposed, the elevated levels of particulate matter in the vicinity of the mining operations would be extended, as would the elevated concentrations of gaseous emissions due to fuel combustion. Compliance with all state and federal air quality standards would be maintained. As with current operations, mining would occur near Wyoming 14-16, the Collins Road and the McGee Road making dust visible to the public. The required mitigation measures would minimize this impact.

The nearest mandatory Class I area is Wind Cave National Park, located approximately 115 miles east of the LBA tract. The Northern Cheyenne Reservation in southern Montana, located approximately 80 miles northwest of the LBA tract, is a tribally-designated Class I area. Mines are not considered to be major emitting facilities in accordance with chapter 6, section 4 of WDEQ/AQD rules and regulations. Therefore, the state of Wyoming does not require mines to evaluate their impacts on that Class I area. However, BLM evaluates such issues for leasing. For this EIS regional air quality impacts are evaluated in the cumulative air quality impact section.

## Water Resources

### Groundwater

Mining the LBA tract would impact the groundwater resource quantity in two ways: 1) the coal aquifers and any overburden aquifers on the mined land would be removed and replaced with unconsolidated backfill; and, 2) water levels in the coal and overburden aquifers adjacent to the existing approved mining operations would continue to be depressed as a result of seepage and dewatering from the open cut on the LBA tract. The area subject to lower water levels would be increased roughly in proportion to the increase in area affected by mining.

In addition to these two direct impacts, there would be some co-mingling of the overburden aquifer with the coal aquifer along the margins of the mining area. Locally, this would result in an alteration of water chemistry in the coal aquifer.

Mining the LBA tract would remove shallow aquifers on an additional area ranging from 830 acres (proposed action and alternative 3), to around 897 acres (the preferred alternative) and replace the separate aquifer units with backfill material composed of an unlayered mixture of the shale, siltstone, and sand that make up the existing Wasatch Formation overburden and Fort Union Formation interburden. Impacts to the local groundwater system resulting from mining include completely dewatering the coal, overburden, and interburden within the area of coal removal, and extending drawdowns some distance away from the active mine area. The extent that drawdowns will propagate away from the mine pits is a function of the water-bearing properties of the aquifer materials. In materials with high transmissivity and low storage capacity, drawdowns will extend further from the pit face than in materials with lower transmissivity and higher storage capacity. In general, due to the geologic makeup of the Wasatch Formation overburden (discontinuous sands in a matrix of shale), overburden drawdowns do not extend great distances from the active mine pit (Hydro Engineering 1997, 1998, 1999). Of the 12 overburden wells monitored by Triton during 2003, no substantial water level changes were observed.

Because of the regional continuity and higher transmissivity within the Wyodak coal seam, drawdowns propagate much further in the coal aquifer than in the overburden. Several coal wells within the vicinity of Buckskin Mine have shown little or no changes since 1994 while several wells (16-12B-C4, 20-2C-C5C, 24-13A-5C, 25-7C-5C, and 29-4C-5C) have experienced rapid drawdowns during the same time period. The Buckskin Mine's permit document suggests that future mining is expected to encounter relatively little groundwater remaining in the coal seams, primarily as a result of CBM activities.

In 2003 Triton monitored water levels in 12 wells in overburden, 22 monitor wells in the Anderson and Canyon coal seams, six reclaimed alluvial wells, and five wells completed in the backfill. Water levels and maps showing drawdowns in the immediate vicinity of the pit are included in each year's annual report to WDEQ/LQD (Triton 2003)

Triton originally used the MODFLOW model to predict the extent of water drawdown in the Anderson and Canyon coal seams as a result of mining at the Buckskin Mine. The results of the groundwater modeling are reported in mine plan addendum MP-B of the Buckskin Mine 500-T6 permit document. However, the current mine permit describes the groundwater drawdown predicted by MODFLOW for the coal aquifers as a result of mining as having been rendered obsolete by the dewatering effects of CBM wells operating since the mid-1990s in areas within and contiguous to Buckskin Mine.

Predicted drawdowns from the MODFLOW model over the life of mine are shown on figure 4-2. These predictions are approximate and were based on extrapolation of Triton's earlier predictions by extending the drawdowns westward and northward by the dimensions of the West Hay Creek tract. More precise predictions of the extent of drawdowns may be required in order to obtain a WDEQ/LQD permit for mining, if the West Hay Creek LBA tract is leased.

Wyoming SEO records indicate a total of 656 permitted water wells located within 3 miles of the LBA tract. Many of these (231 wells) are owned by coal mining companies and are used for groundwater monitoring and water supply. Of the remaining 425 non mine-related wells within the search area, approximately 68% are permitted for stock watering, 17% are permitted for miscellaneous use, 81% are permitted for CBM development, and 9% are permitted for domestic use. Other uses amounted to less than 1%. Most of these wells have been permitted for multiple uses.

Some of these wells will likely be impacted (either directly by removal of the well or indirectly by water level drawdown) by approved mining operations occurring at Buckskin and the adjacent mines. In compliance with SMCRA and Wyoming regulations, mine operators are required to provide the owner of a water right whose water source is interrupted, discontinued, or diminished by mining with water of equivalent quantity and quality; this mitigation is part of the action alternatives. The most probable source of replacement water would be one of the aquifers underlying the coal.

Before they acquired the Belco exchange tract, Triton determined that the effects of mining their existing coal leases could impact approximately 24 wells belonging to neighboring groundwater users. These wells are listed on table MP5-1 of the Buckskin Mine permit. As of March, 2004 there were no known adverse impacts to any private groundwater well.

If the West Hay Creek LBA tract is leased, the mine operator would be required to update the list of potentially impacted wells and predict impacts to these and other water-supply wells within the five-foot drawdown contour as part of the permitting process. The operator would be required to commit to replacing these water supplies with water of equivalent quality and quantity if they are affected by mining.

The subcoal Fort Union aquifers are not removed or disturbed by coal mining, so they are not directly impacted by coal mining activity. Triton has two water supply wells

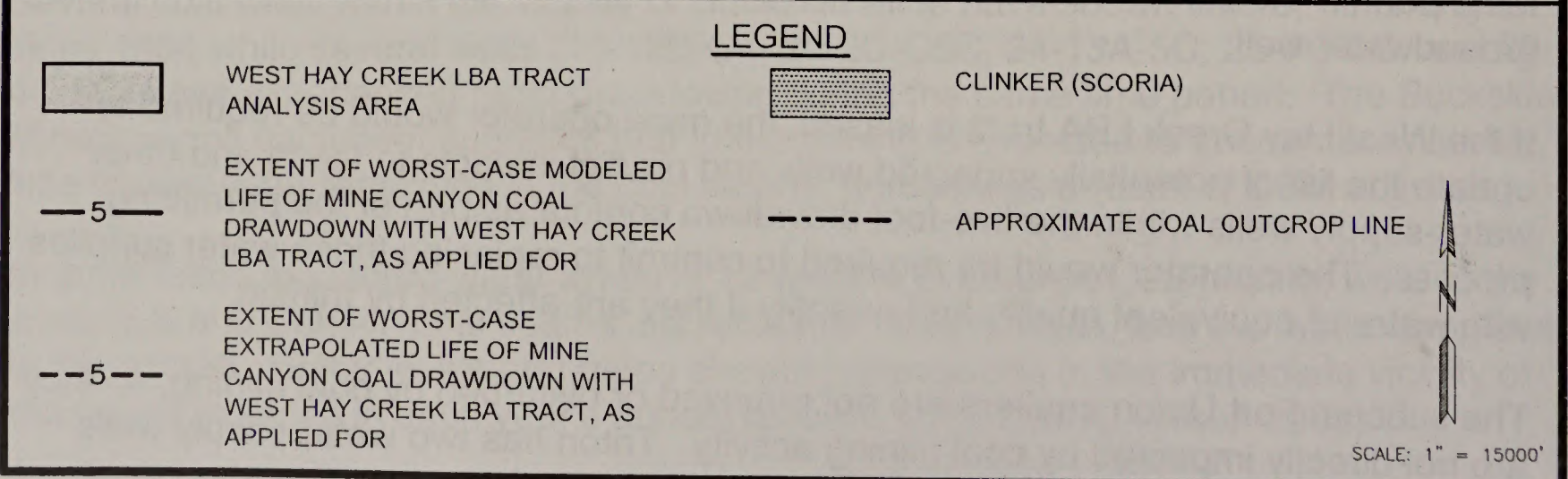
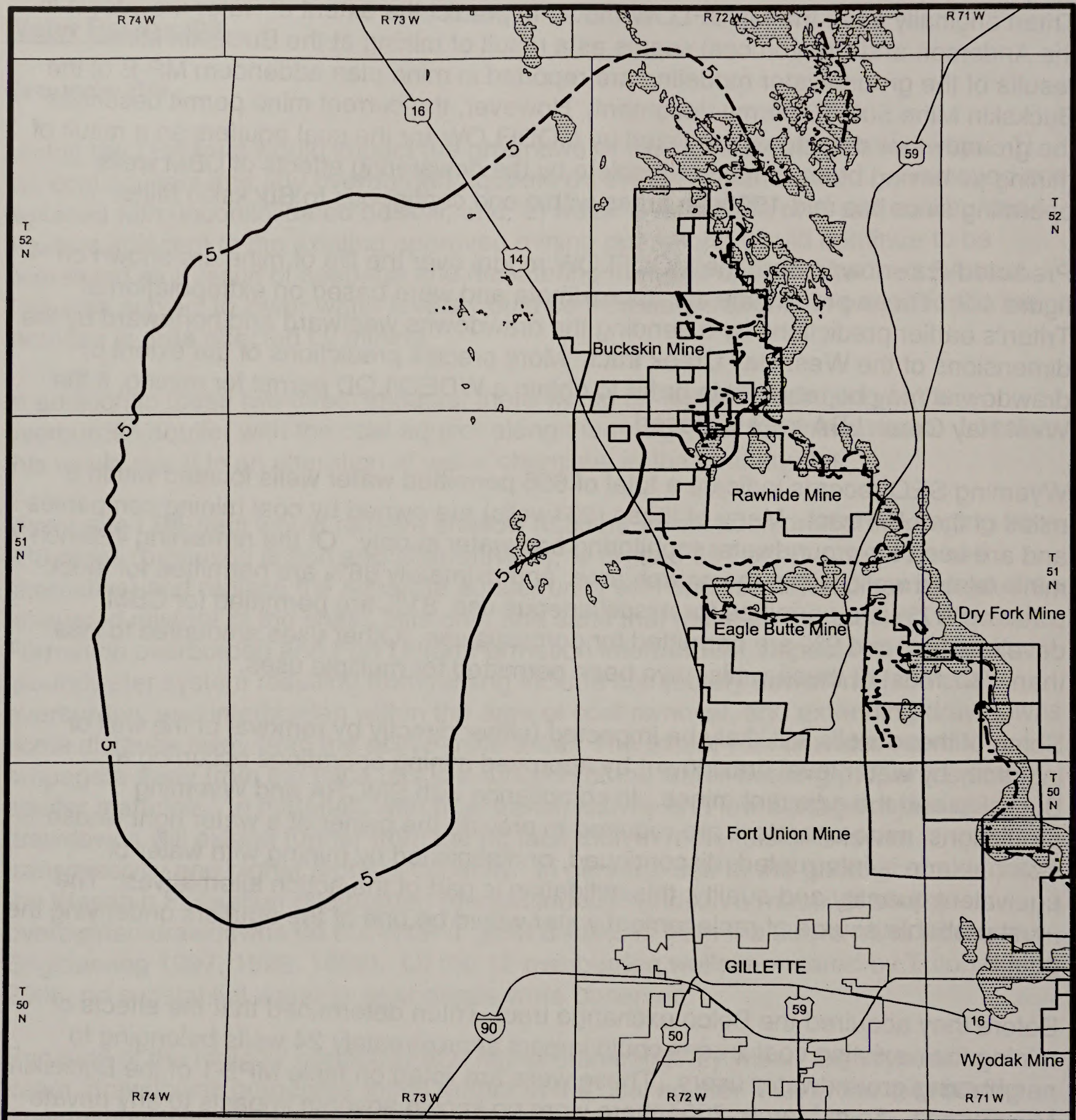


Figure 4-2. Life of Mine Drawdown Map, Resulting From Proposed Action.

completed in aquifers below the coal. If the LBA tract is leased by the applicant, water would be produced from these wells for a longer period of time, but Triton would not require additional subcoal wells to mine the LBA tract.

Mining would also impact groundwater quality; the TDS in the water resaturating the backfill is generally higher than the TDS in the groundwater before mining. This is due to the exposure of fresh overburden surfaces to groundwater that moves through the reclaimed backfill. Research conducted by the Montana Bureau of Mines and Geology on the coal fields of the northern PRB (Van Voast and Reiten 1988) indicates that, upon initial saturation, mine backfill is generally high in TDS and contains soluble salts of calcium, magnesium, and sodium sulfates. As the backfill resaturates, the soluble salts are leached by groundwater inflow. TDS concentrations tend to decrease with time, indicating that the long-term groundwater quality in mined and off-site lands would not be compromised (Van Voast and Reiten 1988).

Groundwater quality within the backfill aquifer at the West Hay Creek LBA tract would be expected to be similar to the groundwater quality measured in existing wells completed in the backfill at the Buckskin Mine. To date, 12 wells have been installed to monitor water level and water quality in the backfill at the Buckskin Mine. In 2003, the six sampled TDS concentrations in the three sampled backfill wells ranged from 1,238 mg/L to 8,730 mg/L. TDS concentrations observed in the Buckskin Mine backfill monitoring wells are generally higher than those found in the undisturbed Wasatch Formation overburden or Wyodak coal aquifers. Using data compiled from ten surface coal mines in the eastern PRB, Martin et al. (1988) concluded that backfill groundwater quality improves markedly after the backfill is leached with one pore volume of water. The same conclusions were reached by Van Voast and Reiten (1988) after analyzing data from the Decker and Colstrip Mine areas in the northern PRB. Clark (1995) conducted a study to determine if the decreases that were predicted by the laboratory studies actually occur onsite. In the area of the West Decker Mine near Decker, Montana, his study found that dissolved solids concentrations increased when water from an upgradient coal aquifer flowed into a backfill aquifer, and apparently decreased along an inferred path from a backfill aquifer to a downgradient coal aquifer. Postmining groundwater quality is expected to improve after one pore volume of water moves through the backfill. In general, the mine backfill groundwater TDS can be expected to range from 3,000 to 6,000 mg/L. Water chemistry is expected to be similar to the premining Wasatch Formation aquifer and meet Wyoming Class III standards for use as stock water.

The hydraulic properties of the backfill aquifer reported in Buckskin permit documents are within the range reported for both the Wasatch Formation overburden and Wyodak coal. At the Buckskin Mine, one backfill drawdown test has been performed, and the hydraulic conductivity was 2.67 feet per day. These results provide a preliminary indication that Buckskin Mine backfill will readily resaturate as postmining potentiometric elevations recover in the surrounding undisturbed aquifers. The backfill will be capable of supplying sufficient yields to wells constructed for stock watering uses.

Direct and indirect impacts to the groundwater system resulting from mining the LBA tract would add to the cumulative impacts that will occur due to mining existing leases, which is discussed in the cumulative impact section.

## **Surface Water**

Changes in runoff characteristics and sediment discharges would occur during mining of the LBA tract as a result of the destruction and reconstruction of drainage channels as mining progresses. Erosion rates could reach high values on the disturbed area because of vegetation removal. However, both state and federal regulations require that all surface runoff from mined lands be treated as necessary to meet effluent standards. Generally, the surface runoff sediment is deposited in ponds or other sediment-control devices inside the permit area.

Due to its location in the headwater area of Hay Creek and the existing topography, runoff within the LBA tract is not expected to be significant. During mining, hydrologic control will most likely consist of allowing runoff to accrue to the mine pit, where it will be treated and discharged according to the standards of WDEQ/WQD. Large flood control reservoirs are not anticipated for the LBA tract, but it may be necessary to build a diversion for Hay Creek.

Sediment produced by large storms (greater than the 10-year, 24-hour storm) could adversely impact downstream areas. Since the tract would be mined as an extension of the existing Buckskin Mine under the action alternatives, there would not be a large increase in the amount of area disturbed and not reclaimed at any given time. WDEQ/LQD would also require a monitoring program to assure that ponds would always have adequate space reserved for sediment accumulation.

The loss of soil structure would act to increase runoff rates on the LBA tract in reclaimed areas. The general decrease in average slope in reclaimed areas would tend to counteract the potential for an increase in runoff. Soil structure would gradually reform over time, and vegetation (after successful reclamation) would provide erosion protection from raindrop impact, retard surface flows, and control runoff at approximately premining levels.

After mining and reclamation are complete, surface water flow, quality, and sediment discharge from the LBA tract would approximate premining conditions. The impacts described above would be similar for both the proposed action and the action alternatives, and they are similar to the expected impacts for currently permitted mining.

## **Alluvial Valley Floors (AVFs)**

The West Hay Creek LBA tract has been evaluated for the presence of AVFs, and there are none. The nearest declared AVF is located on Rawhide Creek south of the LBA tract within the current Buckskin Mine WDEQ/LQD permit area. That portion of the AVF within Buckskin Mine's permit area has been mined and reclaimed in accordance with



their approved reclamation plan. Mining within the LBA tract is not expected to impact lands within the Rawhide Creek drainage. Therefore, no direct, indirect, or cumulative impacts are anticipated to off-site AVFs through mining of the LBA tract.

## **Wetlands**

As discussed in chapter 3, Buckskin Mine has completed a wetlands inventory and subsequently received COE approval of the inventory in April 2001. This inventory identified the acres of jurisdictional wetlands within the entire Buckskin Mine permit boundary, including all lands within the West Hay Creek LBA tract under the proposed action and the action alternatives. A total of 17.51 acres of jurisdictional wetlands comprised of 9.82 acres of riverine-emergent marsh and 7.69 acres of riverine-wet meadow were identified within the analysis area. Existing wetlands located in the LBA tract would be impacted by mining operations.

As a result of recent court directives, playas may no longer be identified as jurisdictional waters of the US under section 404 of the Clean Water Act. A total of 10 of these nonjurisdictional wetland features, all formed in unconsolidated sandy residuum that precludes all but the briefest periods of water storage, occupy 7.6 acres within the analysis area. Although COE may not require their replacement as a result of the recent court directive, Triton may continue establishing playa/depressional features within the reclaimed topography if the LBA tract is mined as an extension of the existing operation. If no special segregation and placement of overburden and soils is necessary, reclamation costs incurred to restore playa/depressional features are not increased. However, if special handling of materials is necessary the reclamation costs generally increase on a site-specific basis.

COE requires replacement of all impacted jurisdictional wetlands in accordance with section 404 of the Clean Water Act and determines the number of acres to be restored. COE considers the type and function of each jurisdictional wetland that will be impacted and may require restoration of additional acres if the type and function of the restored wetland will not completely replace the type and function of the original wetland. The wetland mitigation plan approved by COE becomes part of the WDEQ mining permit. WDEQ/LQD allows and sometimes requires mitigation of nonjurisdictional wetlands affected by mining, depending on the values associated with the wetland features. Replacement of nonjurisdictional and functional wetlands on privately owned surface may occur in accordance with agreements with the private landowners. Triton owns the surface of the West Hay Creek LBA tract. During the period of time after mining and before replacement of wetlands, all wetland functions would be lost. The replaced wetlands may not duplicate the exact functions and landscape features of the premine wetlands, but replacement would be in accordance with the requirements of section 404 of the Clean Water Act.

## **Vegetation**

Under the proposed action, mining the LBA tract would progressively remove the native

vegetation on about 830 additional acres on and near the LBA tract. About 897 additional acres would be disturbed under the preferred alternative, while acreage disturbed under alternative 3 would be approximately the same as the proposed action. Short-term impacts associated with this vegetation removal would include increased soil erosion and habitat loss for wildlife and livestock. Potential long-term impacts include loss of habitat for some wildlife species as a result of reduced species diversity, particularly big sagebrush, on reclaimed lands. However, grassland-dependent wildlife species and livestock would benefit from the increased grass cover and production.

Reclamation, including revegetation of these lands, would occur at the same time as mining on adjacent lands (for example, reclamation would begin once an area is mined). Estimates of the time elapsed from topsoil stripping through reseeding of any given area range from two to four years. This would be longer for areas occupied by stockpiles, haul-roads, sediment-control structures, and other mine facilities. Some roads and facilities would not be reclaimed until the end of mining. No new life-of-mine facilities would be located on the LBA tract under the proposed action or the action alternatives. Grazing and farming restrictions prior to mining and during reclamation would remove up to 100% of the LBA area from livestock grazing and agricultural crop production. This reduction in vegetative production would not seriously affect livestock and farm production in the region. Long-term productivity on the reclaimed land would return to premining levels within several years following seeding with the approved final seed mixture. Wildlife use of the area would not be restricted throughout the operations.

Re-established vegetation would be dominated by species mandated in the WDEQ-approved reclamation seed mixtures. The majority of the approved grassland and shrubland species are native to the LBA tract. The premining agricultural lands may be established as haylands, pasturelands, or croplands to replace the premining land uses. Initially, the reclaimed grassland would be dominated by grassland vegetation that would be less diverse than the premining vegetation. At least 20% of the native vegetation area would be reclaimed to native shrubs at a density of one per square meter as required by current regulations. Estimates for the time it would take to restore shrubs, including sagebrush, to premining density levels range from 20 to 100 years. This may delay the return of shrub dependent species, such as sage grouse, to the reclaimed areas. An indirect impact of this vegetative change could be decreased big game habitat carrying capacity. Following completion of reclamation (seeding with the final seed mixture) and before release of the reclamation bond (a minimum of ten years), a diverse, productive, and permanent vegetative cover would be established on the LBA tract. The decrease in plant diversity would not seriously affect the potential productivity of the reclaimed areas. The proposed postmining land use (wildlife habitat rangeland and agricultural lands) should be achieved even with the changes in vegetation composition and diversity.

On average, about 150 acres of surface disturbance per year of mining would occur on the LBA tract at the proposed rate of production regardless of which action alternative is selected. By the time mining ceases, over 75% of these disturbed lands would have been reseeded. The remaining 25% would be reseeded during the following two to

three years as the life-of-mine facilities areas are reclaimed.

The reclamation plans for the existing mine include steps to control invasion by weedy (invasive nonnative) plant species. The reclamation plans for the West Hay Creek LBA tract would also include steps to control invasion from such species. Native vegetation from surrounding areas would gradually invade and become established on the reclaimed land.

The climatic record of the western US suggests that droughts could occur periodically during the life of the mine. Such droughts would severely hamper revegetation efforts, since lack of sufficient moisture would reduce germination and could damage newly established plants. Same-aged vegetation would be more susceptible to disease than would plants of various ages. Severe thunderstorms could also adversely affect newly seeded areas. Once a stable vegetative cover is established, these events would have similar impacts as would occur on native vegetation.

Changes expected in the surface water network as a result of mining and reclamation would affect the reestablishment of vegetation patterns on the reclaimed areas to some extent. The postmining maximum slope would be 20% in accordance with WDEQ policy. The average reclaimed slope will not be known until WDEQ's technical review of the permit revision application is complete. No significant changes in average slope are predicted.

Following reclamation, the LBA tract would be primarily a variety of mixed prairie grasslands with graminoid/forb-dominated areas, shrublands, and haylands. The overall species diversity would be reduced, especially for the shrub component. After reclamation bond release (a minimum of ten years after seeding with the final seed mixture, as discussed above), management of the privately-owned surface would revert to the private surface owner, who would have the right to manipulate the reclaimed vegetation.

Jurisdictional wetlands would fall under the jurisdiction of the COE. Detailed wetland mitigation plans would be developed at the permitting stage to ensure no net loss of jurisdictional wetlands on the project area. Functional wetlands may be restored in accordance with the requirements of the surface landowner; there are no public lands included in the West Hay Creek LBA tract.

The decrease in plant diversity would not seriously affect productivity of the reclaimed areas regardless of the alternative selected. The proposed postmining land use (wildlife habitat and rangeland) would be achieved even with the changes in vegetative species composition and diversity.

### **Threatened, Endangered and Candidate Plant Species**

Appendix G contains a thorough discussion of threatened, endangered and candidate plant species.

## Wildlife

Local wildlife populations are directly and indirectly impacted by mining. These impacts are both short-term (until successful reclamation is achieved) and long-term (persisting beyond successful completion of reclamation). The direct impacts of surface coal mining on wildlife occur during mining and are therefore short-term. They include road kills by mine-related traffic, restrictions on wildlife movement created by fences, spoil piles and pits, and displacement of wildlife from active mining areas. Displaced animals may find equally suitable habitat that is not occupied by other animals, occupy suitable habitat that is already being used by other individuals, or occupy poorer quality habitat than that from which they were displaced. In the second and third situations, the animals may suffer from increased competition with other animals and are less likely to survive and reproduce. The indirect impacts are longer term and may include a reduction in big game carrying capacity and microhabitats on reclaimed land due to flatter topography, less diverse vegetative cover, and reduction in sagebrush density.

These impacts are currently occurring on the existing Buckskin leases as mining occurs. If the LBA tract is leased under the proposed action or the action alternatives, the area of mining disturbance would be extended onto the LBA tract and mining would be extended by five to six years at the Buckskin Mine.

Under the proposed action or the action alternatives, big game would be displaced from portions of the LBA tract to adjacent ranges during mining. Pronghorn would be most affected; but none of the area within 2 miles of the LBA tract has been classified as crucial or critical pronghorn habitat. Mule deer would not be substantially impacted, given their infrequent use of these lands and the availability of suitable habitat in adjacent areas. Big game displacement would be incremental, occurring over several years and allowing for gradual changes in distribution patterns. Big game residing in the adjacent areas could be impacted by increased competition with displaced animals. Noise, dust, and associated human presence would cause some localized avoidance of foraging areas adjacent to mining activities. On the existing leases, big game have continued to occupy areas adjacent to and within active mine operations, suggesting that some animals may become habituated to such disturbances.

Big game animals are highly mobile and can move to undisturbed areas. Big game movement would be more restricted due to additional fences, spoil piles, and pits related to mining. During winter storms, pronghorn may not be able to negotiate these barriers. WDEQ guidelines require fencing to be designed to permit pronghorn passage to the extent possible.

In 1999, the WGFD reviewed monitoring data collected on mine sites for big game species and the monitoring requirements for big game species on those mine sites. Their findings concluded that the monitoring had demonstrated the lack of impacts to big game on existing mine sites. No severe mine-caused mortalities have occurred, and no long-lasting impacts on big game have been noted on existing mine sites. The

WGFD recommended that big game monitoring be discontinued on all existing mine sites. New mines will be required to conduct big game monitoring if located in crucial winter range or in significant migration corridors, neither of which apply to the LBA tract.

Road kills related to mine traffic would be extended in the area by five to six years.

If the LBA tract is leased, mined, and reclaimed, alterations in the topography and vegetative cover, particularly the reduction in sagebrush density, would cause a decrease in carrying capacity and diversity. Sagebrush would gradually become reestablished on the reclaimed land, but the topographic changes would be permanent.

Medium-sized mammals (such as rabbits, coyotes, and foxes) would be temporarily displaced to other habitats by mining, potentially resulting in increased competition and mortality. However, these animals would rebound on reclaimed areas, as forage develops and small mammal prey species recolonize. Direct losses of small mammals would be higher than for other wildlife, since the mobility of small mammals is limited and many retreat into burrows when disturbed. Therefore, populations of such prey animals as voles and mice would decline during mining. However, these animals have a high reproductive potential and tend to re-invade and adapt to reclaimed areas quickly. A research project on habitat reclamation for small mammals and birds concluded that reclamation objectives to encourage the recolonization of small mammal communities are being achieved on mined lands within the PRB (Shelley 1992). The study evaluated sites at five mines.

Upland game birds known to occur within the analysis area include sage grouse, sharp-tailed grouse, and gray partridge

As discussed in Chapter 3, the FWS has received several petitions to list the greater sage grouse under the Endangered Species Act because of range-wide population declines and, in a press release issued on April 15, 2004, the agency announced that it has determined that enough biological information exists to warrant a more in-depth examination of the status of the greater sage grouse. According to the press release, this decision, known as a "90-day Finding," triggers a more thorough review of the available biological information. The causes for the sage grouse range-wide decline are not completely understood and may be influenced by local conditions. However, habitat loss and degradation, as well as loss of population connectivity are important factors (Braun 1998, Wisdom et al. 2002). Areas of suitable habitat for nesting and strutting grounds are needed to sustain sage grouse populations.

Greater sage grouse are dependent on sagebrush for food and protection from predators. Sage grouse have been found on lands within and adjacent to the LBA tract and are yearlong residents in this area. No leks have been recorded on the LBA tract during baseline surveys or annual mine surveys and there are currently no active leks in the area of the tract (Figure 3-13). No broods were recorded during formal brood surveys but breeding and brood-rearing habitat is present in the analysis area. Wintering habitat, which may be as limiting as mating and breeding habitat, is limited in

the analysis area; no sage grouse or sage grouse sign was found during the winter baseline surveys.

Should sage grouse establish a lek on the proposed lease area prior to initiation of mining operations, the lessee would be required to take mitigative steps prior to disturbing that lek. If mining activities disturb a lek, sage grouse may use an alternate lek site for breeding activities, but they may experience lower productivity on these alternate lek sites.

The Buckskin Mine will continue to implement mitigation measures during reclamation such as reestablishing shrubs, including sagebrush, on reclaimed lands and grading reclaimed lands to create swales and depressions; the mine will also continue to monitor sage grouse activity in the area before, during, and after mining. These and other measures specific to the West Hay Creek LBA Tract would be further developed in the WDEQ/LQD mining and reclamation permit approval process, if the tract is leased. However, reclamation may not restore populations to pre-activity levels. Estimates for the time it would take to restore shrubs, including sagebrush, to premining density levels range from 20 to 100 years, which may delay sage grouse repopulation in the reclaimed areas. There is some evidence that grouse do repopulate areas after reclamation for the species, but there is no evidence that populations attain their previous levels. Reestablishment of sage grouse populations in reclaimed areas may take 20 to 30 years, or longer (Braun 1998).

There are two active sharp-tailed grouse leks, identified in 2002, on lands adjacent to the West Hay Creek LBA tract which could be affected by mining operations on the tract. As shown on figure 3-13, one lek is within ¼ mile of the analyses area (Triton 2002).

Mining the LBA tract would not impact regional raptor populations; however, individual birds or pairs may be impacted. There is limited suitable nesting habitat (cliffs and tall trees) in this area but, during mining, nesting habitat is created by the excavation process (highwalls), as well as through enhancement efforts (nest platforms and boxes). Very few raptor species have been observed nesting on or near the proposed lease area (Figure 3-13). A total of five raptor species (the burrowing owl, great horned owl, ferruginous hawk, red-tailed hawk and golden eagle) have been identified nesting within 2 miles of the LBA tract. In 2002, three nest sites in this area were occupied by red-tailed hawks. Mining activity could cause raptors to abandon nests near the disturbance. The FWS recommends a species-specific buffer around all raptor nests. The FWS and the WDEQ/LQD approval would be required before mining could occur within buffer zones for future or adjacent active raptor nests. The Buckskin Mine annually monitors territorial occupancy and nest productivity. Raptor nesting activity has frequently occurred in active mining and construction areas, and Buckskin Mine has successfully executed state-of-the-art mitigation techniques to protect nest productivity. There is an approved raptor mitigation plan for the existing Buckskin Mine. This monitoring and mitigation plan, as required by the FWS and WDEQ/LQD, would be amended to include the West Hay Creek LBA tract if it is leased. The amended raptor

mitigation plans would be subject to review and approval by FWS before the amended mining plan is approved. Any nests that would be impacted by mining operations would have to be relocated in accordance with that plan. Prior to the disturbance of any raptor nest, special purpose permits would have to be secured from the FWS and WGFD. All active raptor nests within the mine permit area are protected further by buffer zones. Mine-related disturbances are not allowed to encroach in the vicinity of any active raptor nest from March until hatching, and disturbances near raptor nests containing nestlings is strictly limited to prevent danger to, or abandonment of, the young. These required mitigation measures are included in the existing mining and reclamation permit and would be included in the amended mining and reclamation plans, if the West Hay Creek LBA tract is leased. Mining near raptor territories would impact availability of raptor forage species but at the Buckskin Ranch Mine, lack of nesting habitat, not a lack of forage area, has been determined to be the most important factor limiting raptor density. After mining, the reclamation plan would reestablish the ground cover necessary for the return of a suitable prey base.

As indicated in table 3-9 in chapter 3, 17 of the migratory birds of management concern in Wyoming have historically been observed on or within ½ mile of the West Hay Creek LBA tract. Of these, one Level 1 species (those commonly identified as needing conservation action), the Brewer's sparrow, has regularly been observed breeding in the area. Level 1 species that have occasionally to rarely been observed breeding in the area include sage grouse, Swainson's hawk, and burrowing owl. Bald eagles are frequently observed in winter but do not nest in the area. Potential impacts to mountain plover, greater sage grouse and raptors, including bald eagles, as well as measures in place to mitigate impacts to these species, are included in the preceding discussions or in appendix G. The Buckskin Mine's current reclamation practices are designed to provide a mosaic of upland grass and sagebrush habitats that would potentially host most of these species. Impacts of habitat loss would be short-term for grassland species but would last longer for tree- and shrub-dependent species. Other habitat enhancement practices include restoring diverse land forms, direct topsoil replacement, and constructing brush piles, snags, and rock piles. A research project on habitat reclamation on mined lands within the PRB for small mammals and birds concluded that the diversity of song birds on reclaimed areas was slightly less than on adjacent undisturbed areas, although their overall numbers were greater (Shelley 1992). The Buckskin Mine would continue to conduct annual surveys for migratory bird species of management concern on and near the permit area. If these species are documented nesting or using the area regularly, a mitigation plan would be developed in cooperation with FWS to protect those birds and their habitat.

Waterfowl and shorebird habitat on the LBA tract is minimal, and production of these species is limited. Mining the LBA tract would have a negligible effect on migrating and breeding waterfowl. Sedimentation ponds created during mining would provide interim habitat for these fauna. WDEQ and the COE would also require mitigation of any disturbed wetlands during reclamation, which would minimize impacts. If the replaced wetlands on the West Hay Creek LBA tract do not duplicate the exact function and/or landscape features of the premine wetlands, waterfowl and shorebirds could be

beneficially or adversely affected as a result.

Under natural conditions, habitat for aquatic species is limited on the West Hay Creek LBA tract. Mining would affect a limited section of Hay Creek, an ephemeral to intermittent stream which flows from west to east through the tract. Few reptiles or amphibians have been observed during wildlife surveys at the Buckskin Mine. Habitat for the fat-head minnows and green sunfish that have been observed in McGee Reservoir would be lost during mining and reclamation. Following reclamation, aquatic habitat in the reconstructed drainage channel may not duplicate the pre-mining habitat.

The impacts discussed above would apply to all alternatives. If the West Hay Creek LBA tract is leased, the assessment of impacts to wildlife that would be caused by mining the LBA tract would be addressed as part of the review of the mine permit application by the WGFD and the WDEQ/LQD as part of the WDEQ/LQD's mining and reclamation permit approval process.

### **Threatened, Endangered, and Proposed Wildlife Species**

These are discussed in appendix G.

### **Land Use and Recreation**

The major environmental consequences of leasing and mining the West Hay Creek LBA tract on land use would be reduction of livestock grazing, loss of wildlife habitat, loss of agricultural cropland, hayland, and pastureland, and curtailment of oil and gas development on about 830 additional acres (proposed action and alternative 3) up to about 897 acres (preferred alternative) during mining. Wildlife (particularly big game) and livestock (cattle and sheep) use would be displaced while the tract is being mined and reclaimed.

Federal oil and gas ownership and federal oil and gas lessee information are presented in figure 3-15 and table 3-10 in chapter 3. If a coal lease is issued for the West Hay Creek LBA tract, all of the oil and gas production and transportation facilities on the lease would have to be removed from the surface to the base on the coal prior to mining. There are currently no wells completed in producing zones below the coal; if such wells are drilled prior to mining operations, they would be capped in accordance with the requirements for abandoning wells. The LBA tract would not be accessible for development of subcoal oil and gas resources during active mining and prior to reclamation.

BLM has issued a policy statement on conflicts between CBM and coal development (BLM 2003). That policy advocates optimizing the recovery of both coal and CBM resources to ensure that the public receives a reasonable return for the publicly owned resources. As discussed in the section on Geology and Mineral Resources, several CBM wells are currently reported as productive on the West Hay Creek LBA tract. If a coal lease is issued, Triton would have to negotiate with the oil and gas lessees on how



to resolve the conflict. Royalties would be lost to both the state and federal governments if the CBM is not recovered before mining occurs, or if coal is not recovered due to conflicts. State and federal governments can also lose bonus money when the costs of the agreements between the lessees are factored into the fair market value determinations.

All of the surface estate included in the LBA tract under any of the alternatives is privately owned, so no federal land would be removed from public access if the tract is leased.

Hunting on the LBA tract would be eliminated during mining and reclamation. Pronghorn and mule deer occur on and adjacent to the tract. Sage grouse, mourning dove, waterfowl, rabbit, and coyote also inhabit the tract.

Following reclamation, the land would be suitable for grazing, wildlife, and agricultural uses, which are the historic land uses. The reclamation standards required by SMCRA and Wyoming state law meet the standards and guidelines for healthy rangelands for public lands administered by the BLM in Wyoming. Following reclamation bond release, management of the surface estate, which is privately owned, would revert to the private surface owner.

### **Cultural Resources**

All portions of the proposed action, the preferred alternative and alternative 3 areas and buffer zone were subjected to a Class III inventory and assessment in 1999.

Table 3-11 summarizes the distribution of cultural sites by type. Data recovery plans are required for those sites recommended eligible to the NRHP following testing and consultation with the SHPO. Until consultation with SHPO has occurred and agreement regarding NRHP eligibility has been reached, all sites should be protected from disturbance.

Full consultation with SHPO must be completed before the MLA mining plan can be approved. At that time, those sites determined to be unevaluated or eligible for the NRHP through consultation would receive further protection or treatment. Impacts to eligible or unevaluated cultural resources cannot be permitted. If unevaluated sites cannot be avoided, they must be evaluated before mining occurs. If eligible sites cannot be avoided, a data recovery plan must be implemented prior to disturbance. Ineligible properties may be destroyed without further work.

The Class III inventory and assessment results covering the West Hay Creek LBA Tract have been reviewed and approved by WDEQ, OSM, and Wyoming SHPO. A data recovery plan has been developed for the one site found on the LBA tract which met the eligibility criteria for the NRHP. This data recovery plan will be carried forward in the mining and reclamation plan and implemented before the site is disturbed. The lead

federal and state agencies consult with Wyoming SHPO on the development of such plans and the manner in which they are carried out.

Cultural resources adjacent to the mine areas may be impacted as a result of increased access to the areas. There may be increased vandalism and unauthorized collecting associated with recreational activity and other pursuits outside of and adjacent to mine permit areas.

### **Native American Concerns**

No sites of Native American religious or cultural importance have been identified on the LBA tract. If such sites or localities are identified at a later date, appropriate action must be taken to address concerns related to those sites. As indicated in chapter 3, OSM completed Native American consultation on the lands within the analysis area in 2000. No comments were received.

### **Paleontological Resources**

No unique or significant paleontological resources have been identified on the LBA tract, and the likelihood of encountering those resources is small. Potential impacts to paleontological resources as a result of surface-disturbing activities include losses of plant, invertebrate, and vertebrate fossil material, unauthorized collection and vandalism. A beneficial impact of surface disturbance can be the exposure of fossil materials for scientific examination and collection, which might never occur except as a result of overburden removal, exposure of rock strata, and mineral excavation. Lease and permit conditions require that should previously unknown, potentially significant paleontological sites be discovered, work in that area shall stop and measures be taken to assess and protect the site (appendix D).

### **Visual Resources**

Mining activities on most of the West Hay Creek LBA tract would not be visible from any major travel routes and would be partly concealed by surrounding terrain. Mining of some parts of the LBA tract may be visible from US 14-16.

Mining would affect landscapes classified by BLM as Class IV. This classification would not be altered by leasing and subsequent mining of the West Hay Creek LBA tract. Landscape character would not be significantly changed following reclamation. No unique visual resources have been identified on or near the West Hay Creek LBA tract.

Reclaimed terrain would be almost indistinguishable from the surrounding undisturbed terrain. Slopes might appear smoother (less intricately dissected) than undisturbed terrain to the north and west, and sagebrush would not be as abundant for several years. Within a few years after reclamation, the mined land would not be

distinguishable from the surrounding undisturbed terrain except by someone very familiar with landforms and vegetation.

## **Noise**

Noise levels on the LBA tract would be increased considerably by mining activities (blasting, loading, hauling, and possibly in-pit crushing). Since the LBA tract would be mined as an extension of existing operations under the action alternatives, no rail car loading would take place. The Noise Control Act of 1972 indicates that a 24-hour equivalent level of less than 70 dBA prevents hearing loss and that a level below 55 dBA, in general, does not constitute an adverse impact. OSM prepared a noise impact report for the Caballo Rojo Mine (OSM 1980) which determined that the noise level from crushers and a conveyor would not exceed 45 dBA at a distance of 1,500 feet. Explosives would be used during mining to fragment the overburden and coal and facilitate their excavation. The air overpressure created by such blasting is estimated to be 123 dBA at the location of the blast. At a distance of about 2,500 feet (about 0.47 miles), the intensity of this blast would be reduced to 55 dBA. The nearest occupied dwelling is just over ½ mile from the LBA tract, which is about the same distance as the nearest occupied dwelling to the existing Buckskin Mine permit boundary.

Because of the remoteness of the site and because mining is already ongoing in the area, noise would have little off-site effect. Wildlife in the immediate vicinity of mining may be adversely affected. However, observations at other surface coal mines in the area indicate that wildlife generally adapt to increased noise associated with surface coal mining. After mining and reclamation are completed, noise would return to premining levels.

## **Transportation Facilities**

No new or reconstructed transportation facilities would be required under the proposed action or alternatives. Essentially all of the coal mined on the LBA tract would be transported by rail. Vehicular traffic to and from the mine would continue at existing or slightly higher levels for an additional 5 to 6 years, depending on which alternative is selected.

One active pipeline currently crosses the northwest corner of the LBA tract analysis area. Any relocation of pipelines would be handled according to specific agreements between the coal lessee and the pipeline owners. The Wyoming Department of Transportation routinely monitors traffic volumes on area highways, and if traffic exceeds design standards, improvements are made. Burlington Northern-Santa Fe has upgraded and will continue to upgrade their rail capacities to handle the increasing coal volume projected from the PRB with or without leasing the proposed LBA tract.

## Socioeconomics

Leasing and subsequent mining of the LBA tract would extend the life of the already permitted Buckskin Mine by 5 to 6 years, depending on which alternative is selected.

Prices for PRB coal increased in 2001 and 2002, and are projected to remain stable or decrease slightly from 2004 through 2008 (WGS 2003). Conservatively assuming a price of \$4.00 per ton, the total revenue from the sale of the recoverable coal from the LBA tract would total \$520 million for the proposed action (130 million tons of coal), up to \$560 million for the preferred alternative (140 million tons of coal), or \$520 million for alternative 3 (130 million tons of coal). Some of this money from the sale of this federal coal would be paid to federal, state, and local governments in the form of taxes and federal production royalties.

If the tract is leased, the federal government would collect a royalty at the time the coal is sold. This royalty is 12.5% of the sale price of the coal. At a coal price of \$4.00 per ton, this would amount to approximately \$98 million under the proposed action, up to \$106 million under the preferred alternative, or \$98 million under alternative 3. This money would be split equally between the state and federal governments. The federal government would also collect black lung and reclamation taxes based on the sale of the coal.

According to a study done by the University of Wyoming (UW 1994), the state of Wyoming received about \$1.10 per ton from the sale of PRB coal produced in 1991. The taxes and royalties included in this calculation were severance taxes, ad valorem taxes, sales and use taxes, and the state's share of federal royalty payments on production. Under this scenario, the estimated total direct return to the state of Wyoming from the production of this federal coal, in current dollars, would be \$143 million under the proposed action, \$154 million under the preferred alternative, or \$143 million under alternative 3. Projected state and federal revenues from the proposed action and alternatives are presented in table 2-1 in chapter 2.

The federal government also receives a bonus payment at the time the federal coal is leased. Bonus payments on the federal coal leases issued in the PRB since 1990 have ranged from 11.1¢ per ton to 70.6¢ per ton. This range of bonus payments would represent a potential bonus payment range of \$14.4 million to \$98.89 million for the estimated federal coal tonnage in the West Hay Creek LBA tract. The actual amount the federal government would receive would depend on the alternative selected and the actual bonus bid if the tract is leased. The bonus payment would be payable over five years and would be divided equally with the state of Wyoming.

If the LBA tract is leased and annual coal production is increased to 25 million tons as projected, Triton anticipates that the average number of employees at the Buckskin Mine would remain 225 over the 5 to 6 years the tract is being mined. These 225 persons represent about 1% percent of the 22,360 persons in the 2001 labor force in Campbell County (Wyoming Department of Employment, Employment Resources

Division 2002). No additional demands on the existing county or city infrastructure or services would be expected because no influx of new residents would be needed to fill new jobs. The economic stability of the community of Gillette would benefit by having the Buckskin Mine active for an additional 5 to 6 years.

Issues relating to the social, cultural, and economic well-being and health of minorities and low-income groups, including Native American tribes, are termed environmental justice issues. In reviewing the impacts of the proposed action and the action alternatives on socioeconomic resources, surface water and groundwater quality, air quality, hazardous materials, or other elements of the human environment in this chapter, it was determined that potentially adverse impacts would not disproportionately affect Native American tribes, minority groups, or low-income groups. The analysis area includes no tribal lands or Native American communities. No treaty rights or Native American trust resources are known to exist for this area.

### **Hazardous and Solid Waste**

If Triton acquires the West Hay Creek LBA tract, the wastes that would be generated in the course of mining the tract would be similar to the wastes that are currently being generated by the existing mining operation. The procedures that are used for handling hazardous and solid waste at the existing Buckskin Mine are described in chapter 2. Wastes generated by mining the LBA tract would be handled in accordance with the existing regulations using the procedures currently in use at the Buckskin Mine.

### **DIRECT AND INDIRECT IMPACTS OF THE NO ACTION ALTERNATIVE**

Under the No Action Alternative, the coal lease application would be rejected; the area contained in the application would not be offered for lease at this time. The tract could be nominated for lease in the future but, for the purposes of this analysis, the no action alternative assumes that these lands would never be mined. However, the approved mining operations for the existing Buckskin Mine would not be changed if this alternative is chosen. The impacts to topography and physiography, geology and minerals, soils, air quality, water resources, alluvial valley floors, wetlands, vegetation, wildlife, threatened, endangered and candidate species, land use and recreation, cultural resources, Native American concerns, paleontological resources, visual resources, noise, transportation, and socioeconomics described on the preceding pages and in table 2-2 would occur when coal is removed from the existing Buckskin coal leases under the No Action Alternative. These impacts would not be extended onto those portions of the LBA tract that will not be affected under the current plan.

The general nature and magnitude of cumulative impacts as summarized in table 2-3 that would occur from implementation of the proposed action or the action alternatives, would not be substantially different under the No Action Alternative. Coal removal and the associated disturbance and impacts would not occur on the 830, 897 or 830 additional acres disturbed in the proposed action, the preferred alternative, or alternative 3, respectively. Portions of the West Hay Creek LBA tract adjacent to the

existing Buckskin Mine would be disturbed to recover the coal in the existing leases. The economic benefits that would be derived from mining the LBA tract during an additional five to six years of mining would be lost.

If a decision is made not to lease this tract at this time, it could be leased and mined as a maintenance lease in the future while the existing adjacent mine is in operation. If it is not leased while the existing adjacent mine is in operation, it may or may not be leased in the future. The tract being evaluated in this EIS does not include enough coal reserves to economically justify mining by a new operation; however, the coal reserves included in the tract could potentially be combined with unleased federal coal to the north and west to create a larger tract which could be mined by a new operation in the future.

## **REGULATORY COMPLIANCE, MITIGATION, AND MONITORING**

In the case of surface coal mining, various federal and state law require mitigation and monitoring designed to ensure that reclamation standards are met following mining. The major mitigation measures and monitoring measures that are required by state or federal regulation are summarized in table 4-4. More specific information about some of these mitigation and monitoring measures and their results at the Buckskin Mine has been described in preceding sections of chapter 3 and chapter 4.

Measures that are required by regulation are considered to be part of the proposed action and the action alternatives. These requirements, mitigation plans, and monitoring plans are in place as part of the current approved mining and reclamation plan for the existing Buckskin Mine. If the West Hay Creek LBA tract is leased, these requirements, mitigation plans, and monitoring plans would be included in the mining and reclamation plan amendment required for the LBA tract. This mining and reclamation plan would have to be approved before mining could occur on the tract, regardless of who acquires the tract. The major mitigation and monitoring measures that are required by state or federal regulation are summarized in table 4-4. More specific information about some of these mitigation and monitoring measures that are in place for the existing Buckskin Mine and would be extended on the LBA tract, if it is leased, are described in chapter 3 and in earlier sections of this chapter.

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

An example of this type of issue is the concern about the release of NO<sub>x</sub> from blasting, and the resulting formation of low-lying orange clouds that can be carried outside the mine permit areas by wind. After this was identified as a potential health concern in the

area of the Wyoming PRB surface coal mines, a monitoring study designed to measure NO<sub>2</sub> concentrations in areas accessible to the public near PRB coal mining operations, which is described in the preceding Existing Air Quality Issues section, was conducted in 1999. In addition, WDEQ has directed some PRB mines to take steps designed to mitigate the effects of NO<sub>2</sub> emissions occurring from overburden blasting. The steps that may be required, which are described in the Air Quality Section of Chapter 3, include: notifying the public via warning signs along public roadways, temporarily closing public roadways near a mine during and after a blast; establishing safe set-back distances from blasting areas; prohibiting blasting when wind direction is toward a neighbor; prohibiting blasting during temperature inversions; establishing monitoring plans; estimating NO<sub>2</sub> concentrations; and developing blasting procedures that will protect public safety and health.

After reviewing the required mitigation and monitoring in the current Buckskin Mine's mining and reclamation permit and the historical monitoring results in the mine's annual reports, the BLM has not identified additional special stipulations that should be added to the BLM lease or areas where additional or increased monitoring measures are recommended.

**TABLE 4-4**

**REQUIRED MITIGATION AND MONITORING MEASURES REQUIRED FOR ALL ALTERNATIVES**

RESOURCE	REGULATORY COMPLIANCE OR MITIGATION REQUIRED BY STIPULATIONS, STATE, OR FEDERAL LAW <sup>1</sup>	MONITORING <sup>1</sup>
<b>Topography &amp; Physiography</b>	Restoring to approximate original contour or other approved topographic configuration.	LQD checks as-built vs. approved topography with each annual report.
<b>Geology &amp; Minerals</b>	Identifying and selectively placing or mixing chemically or physically unsuitable overburden materials to minimize adverse effects to vegetation or groundwater.	LQD requires monitoring in advance of mining to detect unsuitable overburden.
<b>Soil</b>	Salvaging soil suitable to support plant growth for use in reclamation; Protecting soil stockpiles from disturbance and erosional influences; Selectively placing at least four feet of suitable overburden on the graded backfill surface below replaced topsoil to meet guidelines for vegetation root zones.	Monitoring vegetation growth on reclaimed areas to determine need for soil amendments. Sampling regraded overburden for compliance with root zone criteria.
<b>Air Quality</b>	Dispersion modeling of mining plans for annual average particulate pollution impacts on ambient air; Using particulate pollution control technologies; Using work practices designed to minimize fugitive particulate emissions;	On-site air quality monitoring for PM <sub>10</sub> or TSP; Off-site ambient monitoring for PM <sub>10</sub> or TSP; On-site compliance inspections.

**REGULATORY COMPLIANCE OR  
MITIGATION REQUIRED BY  
STIPULATIONS, STATE, OR FEDERAL  
LAW<sup>1</sup>**

**RESOURCE**

**MONITORING<sup>1</sup>**

Using EPA- or state-mandated BACT, including:

- Fabric filtration or wet scrubbing of coal storage silo and conveyor vents,
- Watering or using chemical dust suppression on haul roads and exposed soils,
- Containment of truck dumps and primary crushers;
- Covering of conveyors,
- Prompt revegetation of exposed soils,
- High efficiency baghouses on the crusher, conveyor transfer, storage bin and train loadout, meeting a standard of 0.01 grains per dry standard cubic foot of exit volume,
- Watering of active work areas,
- Reclamation plan to minimize surface disturbances subject to wind erosion,
- Paving of access roads,
- Haul truck speed limits,
- Limited material drop heights for shovels and draglines.

Following voluntary and required measures to avoid exposing the public to NO<sub>2</sub> from blasting clouds, including:

- Phone notification of neighbors and workers prior to blasting,
- Monitoring weather and atmospheric conditions prior to decisions to blast,
- Timing blasts to avoid temperature inversions and to minimize inconvenience to neighbors,
- Closing public roads when appropriate to protect the public,
- Minimizing blast sizes,
- Posting signs on major public roads.

**Surface Water**

Building and maintaining sediment control ponds or other devices during mining;  
Restoring approximate original drainage patterns during reclamation;  
Restoring stock ponds and playas during reclamation.

Monitoring storage capacity in sediment ponds; monitoring quality of discharges; monitoring stream flows and water quality.

**Groundwater**

Evaluating cumulative impacts to water quantity and quality associated with proposed mining;  
Replacing existing water rights that are interrupted, discontinued, or diminished by mining with water of equivalent quantity quality.

Monitoring wells track water levels in overburden, coal, interburden, underburden, and backfill.

**Alluvial Valley**

Identifying all alluvial valley floors that would

Monitoring to determine



**REGULATORY COMPLIANCE OR  
MITIGATION REQUIRED BY  
STIPULATIONS, STATE, OR FEDERAL  
LAW<sup>1</sup>**

**MONITORING<sup>1</sup>**

**RESOURCE**

<b>Floors</b>	<p>be affected by mining; Determining significance to agriculture of all identified alluvial valley floors affected by mining (WDEQ); Protecting downstream alluvial valley floors during mining; Restoring essential hydrologic function of all alluvial valley floors affected by mining.</p>	<p>restoration of essential hydrologic functions of any declared AVF.</p>
<b>Wetlands</b>	<p>Identifying all wetlands that would be affected by mining; Identifying jurisdictional wetlands (COE); Replacing all jurisdictional wetlands that would be disturbed by mining Replacing functional wetlands as required by surface managing agency, surface land owner, or WDEQ/LQD.</p>	<p>Monitoring reclaimed wetlands using same procedures used to identify premining jurisdictional wetlands.</p>
<b>Vegetation</b>	<p>Permanently revegetate reclaimed areas according to a comprehensive revegetation plan using approved permanent reclamation seed mixtures consisting predominantly of species native to the area; Reclaiming 20% of reclaimed area with native shrubs at a density of one per square meter; Controlling erosion on reclaimed lands prior to seeding with final seed mixture using mulching, cover crops, or other approved measures; Chemically and mechanically controlling weed infestation; Direct hauling of topsoil, whenever possible; Selectively planting shrubs in riparian areas; Planting sagebrush; Creating depressions and rock piles; Using special planting procedures around rock piles; Posting reclamation bond covering the cost of reclamation.</p>	<p>Monitoring revegetation growth and diversity until release of final reclamation bond (minimum 10 years). Monitoring erosion to determine need for corrective action during establishment of vegetation. Using controlled grazing during revegetation evaluation to determine suitability for postmining land uses.</p>
<b>Wildlife</b>	<p>Restoring premining topography to the maximum extent possible; Planting a diverse mixture of grasses, forbs and shrubs in configurations beneficial to wildlife; Designing fences to permit wildlife passage; Raptor-proofing power transmission poles; Creating artificial raptor nest sites; Increasing habitat diversity by creating rock clusters and shallow depressions on reclaimed land; Cottonwood plantings along reclaimed drainages;</p>	<p>Baseline and annual wildlife monitoring surveys; Monitoring for MBHFI.</p>

RESOURCE	REGULATORY COMPLIANCE OR MITIGATION REQUIRED BY STIPULATIONS, STATE, OR FEDERAL LAW <sup>1</sup>	MONITORING <sup>1</sup>
<b>Threatened, Endangered, &amp; Proposed Species</b>	Replacing drainages, wetlands and alluvial valley floors disturbed by mining; Reducing vehicle speed limits to minimize mortality; Instructing employees not to harass or disturb wildlife; Preparing raptor mitigation plans. Avoiding bald eagle disturbance; Restoring bald eagle foraging areas disturbed by mining; Restoring mountain plover habitat disturbed by mining; Using raptor safe power lines; Surveying for Ute ladies' tresses; Surveying for mountain plover; Searching for black-footed ferrets if prairie dogs move onto tract.	Baseline and annual wildlife monitoring surveys.
<b>Cultural Resources</b>	Conducting Class I and III surveys to identify cultural properties on all state and federal lands and on private lands affected by federal undertakings; Consulting with SHPO to evaluate eligibility of cultural properties for the NRHP; Avoiding or recovering data from significant cultural properties identified by surveys, according to an approved plan; Notifying appropriate federal personnel if historic or prehistoric materials are uncovered during mining operations; Instructing employees of the importance of and regulatory obligations to protect cultural resources.	Monitoring mining activities during topsoil stripping; cessation of activities and notification of authorities if unidentified sites are encountered during topsoil removal.
<b>Land Use</b>	Suitably restoring reclaimed area for historic uses (grazing and wildlife).	Monitoring controlled grazing prior to bond release evaluation.
<b>Native American Concerns</b>	Notifying Native American tribes with known interest in this area of leasing action and request for help in identifying potentially significant religious or cultural sites.	No specific monitoring program.
<b>Paleontological Resources</b>	Notifying appropriate federal personnel if potentially significant paleontological sites are discovered during mining.	No specific monitoring program.
<b>Visual Resources</b>	Restoring landscape character during reclamation through return to approximate original contour and revegetation with native species.	No specific monitoring program.
<b>Noise</b>	Protecting employees from hearing loss.	MSHA inspections.
<b>Transportation Facilities</b>	Relocating existing pipelines, if necessary, in accordance with specific agreement between pipeline owner and coal lessee.	No specific monitoring program.

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**REGULATORY COMPLIANCE OR  
MITIGATION REQUIRED BY  
STIPULATIONS, STATE, OR FEDERAL  
LAW<sup>1</sup>**

**RESOURCE**

**MONITORING<sup>1</sup>**

**Socioeconomics**

Paying royalty and taxes as required by federal, state, and local regulations.

Surveying and reporting to document volume of coal removed.

**Hazardous & Solid Waste**

Disposing of solid waste and sewage within permit boundaries according to approved plans;  
Storing and recycling used oil;  
Maintaining of files containing Material Safety Data Sheets for all chemicals, compounds, and/or substances used during course of mining;  
Ensuring that all production, use, storage, transport, and disposal of hazardous waste is in accordance with applicable existing or hereafter promulgated federal, state, and government requirements;  
Complying with emergency reporting requirements for releases of hazardous materials as established in CERCLA, as amended;  
Preparing and implementing spill prevention control and countermeasure plans, spill response plans, inventories of hazardous chemical categories pursuant to section 312 of SARA, as amended;  
Preparing emergency response plans.

No specific monitoring other than required by these other regulations and response plans.

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**RESIDUAL IMPACTS**

Residual impacts are unavoidable impacts that cannot be mitigated and would therefore remain following mining and reclamation.

**Topography and Physiography**

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

**Geology and Minerals**

Geology from the base of the coal to the surface would be subject to significant, permanent change. CBM resources not recovered prior to mining would be permanently lost.

**Soils**

Existing soils would be mixed and redistributed, and soil-forming processes would be disturbed by mining. This would result in long-term alteration of soil characteristics.

## **Air Quality**

No residual impacts to air quality would occur following mining.

## **Water Resources**

The area where groundwater drawdowns and replacement of coal and overburden with backfill occur would be increased under the alternatives compared to what would occur without the addition of the LBA tract. The postmining backfill may take in excess of 100 years to reach equilibrium water levels and water quality. Less time would be required near the mining boundaries. Water level and water quality in the backfill would be suitable to provide water to wells for livestock use, but it would be different from premining conditions.

## **Alluvial Valley Floors**

No residual impacts to alluvial valley floors would occur following mining.

## **Wetlands**

Replaced wetlands (jurisdictional or functional) may not duplicate the exact function and landscape features of the premining wetland, but all wetland replacement plans would be approved by COE.

## **Vegetation**

Reclaimed vegetative communities may never completely match the surrounding native plant community.

## **Wildlife**

Although the LBA tract would be reclaimed to be as near original condition as possible, there would be some residual wildlife impacts. The topographic moderation would result in a permanent loss of habitat diversity and a potential decrease in slope-dependent shrub communities. This would reduce the carrying capacity of the land for shrub-dependent species. Reclamation standards may limit replacement of habitat for some species such as mountain plover. Some species, such as sage grouse, may repopulate reclaimed areas, but populations may not attain premining levels.

## **Threatened, Endangered, and Proposed Wildlife Species**

No direct residual impacts are expected to T&E, proposed, or candidate species or to BLM sensitive species. If habitats are not restored for listed, proposed, candidate, or sensitive species, such as black-tailed prairie dogs, future repopulation of reclaimed areas by those species could be delayed or potential future population levels of those

species in reclaimed areas could be affected.

### **Land Use and Recreation**

No residual impacts to land use and recreation are expected.

### **Cultural Resources**

Cultural sites that are determined to be eligible for the NRHP and that cannot be avoided would be destroyed by surface coal mining after data from those sites is recovered. Sites not eligible for the NRHP would be lost.

### **Native American Concerns**

No residual impacts to Native American concerns have been identified.

### **Paleontological Resources**

No residual impacts to significant paleontological resources are expected.

### **Visual Resources**

No residual impacts to visual resources are expected.

### **Noise**

No residual impacts to noise are expected.

### **Transportation Facilities**

No residual impacts to transportation facilities are expected.

### **Socioeconomics**

No residual impacts to socioeconomics are expected.

## **CUMULATIVE IMPACTS**

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

This section briefly summarizes the cumulative impacts that are occurring as a result of existing development in the area being mined and considers how those impacts would change if the West Hay Creek LBA tract is leased and mined and if other proposed

development in the area occurs. Projects that have proceeded beyond preliminary planning phases include:

- 1) construction and operation of the Two Elk power plant, which has been proposed east of the Black Thunder Mine;
- 2) construction of Wygen II power plant which has been proposed at the Wyodak Mine site;
- 3) construction of the proposed DM&E Railroad line; and
- 4) ongoing development of CBM resources north and west of the area of surface coal mining in this area.

Since decertification of the Powder River Federal Coal Region in 1990, the BLM's Wyoming State Office has held 15 competitive coal lease sales and issued 11 new federal coal leases containing approximately 3.178 billion tons of coal using the LBA process (table 1-1 in chapter 1). This leasing process has undergone the scrutiny of two appeals to the Interior Board of Land Appeals and one audit by the General Accounting Office.

The Wyoming BLM has pending applications for eight additional maintenance tracts for existing mines containing about 2.1 billion tons of coal (table 1-2). All of the pending applications have been reviewed and recommended for processing by the PRRCT.

BLM completed one exchange in the Wyoming portion of the PRB in 2000, authorized by Public Law 95-554. EOG Resources (formerly Belco) received a federal lease for a 106-million ton portion of the Hay Creek tract adjacent to the Buckskin Mine in exchange for the rights to a 170-million ton coal lease near Buffalo, Wyoming that is unmineable due to construction of Interstate 90 (BLM 1999b). Triton acquired this lease, which is southeast of and adjacent to the West Hay Creek LBA tract, from EOG Resources and has amended their mining and reclamation permit to include mining the federal coal included in this lease. A coal exchange proposed by Pittsburg and Midway Coal Mining Company is also currently being evaluated. Under this exchange, federal coal in Sheridan County, Wyoming would be exchanged for privately owned lands and minerals in Lincoln, Carbon, and Sheridan counties, Wyoming.

Three regional EISs evaluating surface coal development in the PRB in Wyoming were previously prepared. They are:

*Final Environmental Impact Statement, Eastern Powder River Basin of Wyoming*, BLM, October 1974;

*Final Environmental Impact Statement, Proposed Development of Coal Resources in the Eastern Powder River Basin of Wyoming*, BLM, March 1979;

*Final Powder River Regional Coal Environmental Impact Statement*, BLM, December, 1981.

A draft document for a fourth regional EIS, the *Draft Environmental Impact Statement for Round II Coal Lease Sale in the Powder River Region*, was prepared by BLM and released in January 1984, but a final document was not prepared and the actions considered in that EIS were not implemented.

Since 1989, coal production in the Powder River Basin has increased by an average of 6.8% per year. The increasing state production is primarily due to increasing sales of low-sulfur, low-cost PRB coal to electric utilities who must comply with phase I requirements of Title III of the 1990 Clean Air Act Amendments. Electric utilities account for 97% of Wyoming's coal sales. In 2002, approximately 33% of the coal mined in the United States came from the PRB.

The currently operational surface coal mines in the Wyoming PRB are shown in figure 1-1 in chapter 1. Recently active surface coal mines in Sheridan County, (the Big Horn Coal Mine, which has relinquished all federal coal leases) and southern Converse County (the Dave Johnston Mine) have ended mining operations and have reclaimed or are reclaiming areas of disturbance. The current status and ownership of the mines shown in figure 1-1 are shown in table 4-5. There have been numerous changes in mine ownership during the last decade, and this has resulted in mine consolidations and mine closings within the basin.

The mines are located just west of the outcrop of the Wyodak coal, where the coal is at the shallowest depth. The mines in Campbell and Converse counties currently produce over 96% of the coal produced in Wyoming each year. Table 4-6 summarizes predicted coal mining activity (from the 1979 and 1981 regional EISs) and actual activity that has occurred since the EISs were prepared.

BLM estimates that the surface coal mines shown in figure 1-1 and listed in Table 4-5 currently have approximately 103,615 acres of federal coal leased in Campbell and Converse counties. This represents approximately 3.4% of Campbell County, where the majority of the leases are located. Approximately 4.0% of Campbell County and less than 1.0% of Converse County are included in the mine permit areas for the existing mines. If the West Hay Creek LBA tract is leased under the preferred alternative, approximately 897 additional acres would be leased.

The coal operations shown in figure 1-1 had disturbed an estimated 62,200 acres as of 2001. Approximately 16,100 of those acres of disturbance are occupied by "permanent" mine facilities (roads, buildings, and coal handling facilities) and are unavailable for reclamation. Of the remaining 46,100 acres, which represents areas of disturbance available for reclamation, approximately 24,300 acres had been reclaimed. This information is compiled from BLM lease and WDEQ/LQD mining and reclamation permit databases.

TABLE 4-5

## STATUS OF WYOMING POWDER RIVER BASIN COAL MINES

2000 Mine	1994 Mine Owner	Coal Production		2002 Mine Owner	Coal Production		Status/Comments
		1993 Actual <sup>2</sup>	1994 Permitted		2002 Actual <sup>3</sup>	2002 Permitted <sup>4</sup>	
Buckskin	SMC (Zeigler)	11.18	24.0	Vulcan Capital Mgmt <sup>5</sup>	18.33	27.5	Active
Clovis Point	Kerr-McGee	0	4.0	Wyodak Resources	0.00	0	Leases relinquished or sold; facilities sold.
Dry Fork	Phillips/WFA	3.28	15.0	WFA	4.89	15	Active
Eagle Butte	Cyprus-Amax	16.70	29.6	RAG American	24.89	35	Active
Fort Union	Fort Union Ltd	0.06	9.3	Kennecott/Kfx	0.00	9.4	Inactive
Rawhide	Carter (Exxon)	9.86	24.0	Peabody	3.48	24	Active
Wyodak	Wyodak Resources	3.03	10.0	Wyodak Resources	4.05	12	Active
<b>NORTHERN MINE GROUP TOTALS</b>		<b>44.11</b>	<b>115.9</b>		<b>55.64</b>	<b>122.9</b>	
Belle Ayr	Cyprus-Amax	15.59	25	RAG American	17.45	45	Active
Caballo/N. Caballo	Carter (Exxon)/Western Energy	15.42	40	Peabody	25.97	40	Active/Caballo Mine + former Rocky Butte & West Rocky Butte leases
Cordero Rojo	Kennecott/Drummond	21.01	44	Kennecott	38.23	65	Active/Cordero + Caballo Rojo Mines
Coal Creek	ARCO	0.11	18	Arch	0.00	18	Inactive
<b>CENTRAL MINE GROUP TOTALS</b>		<b>52.13</b>	<b>127</b>		<b>81.65</b>	<b>168</b>	
Antelope	Kennecott	7.29	12	Kennecott	26.81	30	Active
Black Thunder	ARCO	34.32	36	Arch	65.12	100	Active
Jacobs Ranch	Kerr-McGee	18.39	25	Kennecott	31.73	50	Active
N. Antelope/Rochelle	Peabody	32.94	50	Peabody	74.79	85-105	Active/North Antelope Mine + Rochelle Mine
N. Rochelle	SMC (Zeigler)	0.02	8	Vulcan Capital Mgmt. <sup>5</sup>	23.88	35	Active/facilities constructed in 1998-99
<b>SOUTHERN MINE GROUP TOTALS</b>		<b>92.96</b>	<b>131</b>		<b>222.33</b>	<b>300-320</b>	
<b>TOTALS FOR 3 MINE GROUPS</b>		<b>189.2</b>	<b>373.9</b>		<b>359.62</b>	<b>590.9-610.9</b>	

<sup>1</sup>Actual production (million tons) on left, WDEQ/AQD permitted production (million tons) on right.

<sup>2</sup>Source: WGS 1994.

<sup>3</sup>Source: Wyoming State Inspector of Mines Annual Report for 2002.

<sup>4</sup>Source: WDEQ/AQD, permitted capacity as of October 1, 2000

<sup>5</sup> Vulcan Capital Mgmt is being purchased by Arch Coal, Inc..



TABLE 4-6

**COAL PRODUCTION AND DEVELOPMENT,  
CAMPBELL AND CONVERSE COUNTIES, WYOMING**

	Coal Production (mmt)	Number of Active Coal Mines	Number of Existing Power Plants	Number of Active Coal Enhancement Facilities	Direct Coal Employment	Average Price-NE Wyoming
1979 predictions for 1990	174.3	15	2	1	3,889	na
1981 predictions for 1990	318.4	37	3	1	11,900	na
Actual 1990	162.6	18	3	1	2,862	\$6.86
Actual 1995	246.5	19	4	1	3,177	\$5.60
Actual 2000	323.1	12	4	2	3,335	\$4.93
Actual 2002	354.1	13	5	0	3,829	\$6.28
Actual 2003	363.7	13	5	0	3,931	\$6.37
Existing coal-burning power plants:	PP&L Dave Johnson, PP&L and Black Hills Power & Light Wyodak, Black Hills Power & Light Simpson #1 and Simpson #2, Black Hills Corporation Wygen 1 (Black Hills Power & Light also has two natural gas power plants at the Wyodak site)					
Proposed new power plants	Reasonably foreseeable: NAPG Two Elk and Black Hills Wygen II Other proposed: NAPG Two Elk Unit Two and NAPG Middle Bear					
Existing coal enhancement:	SGI International ENCOAL-Buckskin (inactive), KFx-K-Fuels Coal Pellet Plant (inactive), and Wyodak Earthco (inactive)					
<b>Sources:</b> BLM 1979, 1981; WGS 1996-2003, and Wyoming State Inspector of Mines Annual Reports, 1990-2003.						

As of October 2003, there were approximately 15,040 oil and gas wells producing in the Wyoming PRB. Most (approximately 12,530) of those wells were CBM wells. The remaining wells (approximately 2,510) were conventional oil or gas wells (WOGCC 2003). Additional wells have been drilled in the basin but have been abandoned or are not yet producing.

Campbell and Converse counties' oil production decreased about 60.4%, from 32.8 million barrels to 13.0 million barrels, over the ten year period from 1992 through 2002. Oil production throughout Wyoming is expected to continue to decline because exploration and production drilling has been weak, and old oil fields with declining

production produce most of Wyoming's oil (WGS 2002). Oil production in the short term may be bolstered by some planned carbon dioxide flood projects in the PRB (WSGS 2003).

Natural gas production has been increasing in Wyoming. In the PRB, this is due to the development of shallow CBM resources. CBM exploration and development is currently ongoing throughout the PRB in Wyoming. As discussed above, as of October 2003, there were approximately 12,500 producing CBM wells in the PRB, primarily in Campbell County

Since the early 1990s, the Wyoming BLM has completed numerous EAs and two EISs analyzing CBM projects. The most recent of these is the four-volume *Final EIS and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project*, which was completed in January 2003. The project area for this EIS includes almost eight million acres of mixed federal, state, and private lands within the Wyoming portion of the PRB, and encompasses all or portions of Campbell, Converse, Sheridan and Johnson counties in Wyoming. This EIS analyzes the cumulative impacts of reasonably foreseeable CBM and conventional oil and gas development. It evaluates the impacts of drilling, completing, operating, and reclaiming almost 39,400 new federal, state, and private CBM wells in addition to the roughly 12,100 federal, state, and private CBM wells that had been drilled or permitted when the EIS analysis was conducted. The EIS also analyzes the impacts of developing 3,200 new conventional oil and gas wells, as well as constructing, operating, and reclaiming various ancillary facilities needed to support the new CBM and conventional wells (BLM 2003a). Total projected short term and long term disturbance associated with the development under the Preferred Alternative were estimated at 211,643 acres and 102,658 acres respectively.

With the completion of this EIS and the *Montana Statewide Final EIS and Proposed Amendment of the Powder River and Billings Resource Management Plan* (BLM 2003b), it is likely that the rate of CBM development will increase in the PRB in Wyoming and Montana.

CBM wells can be drilled on private and state oil and gas leases after approval by the WOGCC and the Wyoming SEO. BLM must analyze the individual and cumulative environmental impacts of all drilling (federal, state, and private), as required by NEPA, before CBM drilling on the federal oil and gas leases can be authorized. BLM does not authorize drilling on state or private leases but must consider the impacts from those wells in their NEPA analyses. In many areas of the PRB the coal estate is federally owned, but the oil and gas estate is privately owned. A June 7, 1999 Supreme Court decision (98-830) assigned the rights to develop CBM on a piece of land to the owner of the oil and gas estate.

In the 1970s, significant uranium development was anticipated in southwest Campbell County and northwest Converse County. This development did not materialize because the price of uranium dropped in the early 1980s. There are currently two *in situ* uranium operations in Converse and Johnson counties, but no mines and no mills. There were

three active *in situ* operations in the PRB in 1999, but one of them, located in southeastern Johnson County, has since ceased operations. The spot market price of uranium has been increasing from \$7.10 per pound of yellowcake in December 2000 to \$10.90 per pound in the first half of 2003.

Scoria (or clinker), which is baked and fused rock formed by spontaneous prehistoric burning of coal seams, is quarried for use as road surfacing material primarily by coal mines but also by a few excavation and construction firms. Bentonite is mined in parts of the Wyoming PRB but not in Campbell or Converse counties.

The proposed West Hay Creek LBA tract is situated at the north end of a nearly continuous corridor of six coal mines (Buckskin, Eagle Butte, Rawhide, Dry Fork, Fort Union, and Wyodak) in northern Campbell County, Wyoming (figure 1-1). The Fort Union Mine is currently inactive; the other five mines are active. This northern mine corridor is approximately 15 miles long and 5 miles wide. Production of coal in this northern mine group began in 1977, excluding the Wyodak Mine which has been in operation since 1923. The maximum permitted production rate for these six mines is 122.9 million tons per year (table 4-5). As a result of the issuance of one maintenance lease and the completion of one lease exchange (Eagle Butte West Extension LBA and EOG-Belco Lease Exchange, table 1-1), approximately 1,658 acres of federal coal have been leased to mines in this northern group since the decertification of the federal coal region in 1990. There are two pending maintenance leases containing approximately 2,238 acres of federal coal in the northern group of mines (West Hay Creek, West Extension, table 1-2).

CBM wells have been drilled around the Buckskin, Rawhide, and Eagle Butte mines. CBM drilling and production is expected to continue in the areas around the coal mines and on the LBAs. Due to the proximity of the coal mining and CBM production operations, cumulative impacts to groundwater, surface water, air quality, and wildlife have occurred and are likely to continue as CBM development continues adjacent to existing surface coal mining operations. These potential impacts are discussed in the following cumulative impact discussions for these resources.

In addition to the ongoing coal mining and leasing and the CBM development, other projects planned in the vicinity of the northern mine group include the construction of the Wygen II coal-fired power plant which has been proposed at the Black Hills Corporation energy complex near the Wyodak Mine site. The power plant could be expected to have overlapping impacts with the impacts of mining the West Hay Creek LBA tract.

Other projects planned in the PRB are located some distance south of the LBA tract near the middle and southern portion of the basin. These include the construction and operation of the North American Power Group's Two Elk and Two Elk Unit 2 power plants east of the Black Thunder Mine; construction and operation by North American Power Group of a 500-megawatt coal fired Middle Bear power plant at the Cordero Rojo Complex; and construction and use of the proposed DM&E rail line. The impacts of mining the West Hay Creek LBA tract would not be expected to overlap with the impacts

of building and operating these projects.

Black Hills Energy Capital, Inc., the independent power subsidiary of Black Hills Corporation, initiated the permitting process to build the 500-MW Wygen II power plant in 2002. The proposed plant would adjoin its other generating plant (Wygen I) near Gillette. It would be similar in features to the existing 360-MW Wyodak power plant at the same location.

The Surface Transportation Board (STB) preliminarily approved the DM&E Railroad expansion plan (to build 280 miles of new track in the PRB and to rehabilitate approximately 600 miles of track across South Dakota and Minnesota) on December 11, 1998. The approval was made pending the completion of an analysis of the environmental impacts of the project. The Surface Transportation Board released the DEIS for public comment in September 2000; the FEIS for the DM&E expansion project was issued November 19, 2001. On January 30, 2002 the Surface Transportation Board announced its final approval for the DM&E PRB expansion project, subject to a number of environmental mitigation conditions and the requirement that DM&E use an environmentally preferable route that avoids sensitive areas along the Cheyenne River. DM&E's originally proposed route in Wyoming generally followed along the Cheyenne River valley.

DM&E originally proposed to start construction in 1999 and complete the new railroad line in 2001; however, final approval and construction could not take place until after the environmental analysis was completed. As a result of lawsuits that were filed against the project, several issues were remanded to the STB for further review and action. Once the lawsuits and the associated issues are resolved, DM&E must obtain permits or approvals from other federal agencies including the BLM, the USDA-FS and COE prior to commencing any construction activities.

The rate of reclamation is one aspect of the surface coal mining operations where the actual levels reached in 1990 and 1995 did not meet the levels predicted for 1990 and 1995 in the regional EISs. In 1997, according to the "*Annual Evaluation Summary Report for the Coal Regulatory Program Administered by the Land Quality Division of the Wyoming Department of Environmental Quality for Evaluation Year 2001*" (OSM 2002), the OSM's Casper Field Office and WDEQ/LQD reviewed four mine sites in Wyoming for compliance with contemporaneous reclamation requirements and compared on-the-ground reclamation with the approved reclamation plan in the permits for each of those mines. In that review, OSM and WDEQ/LQD found that the mine permits they reviewed did not set clear and concise time schedules and requirements for contemporaneous reclamation. In response to those findings, WDEQ/LQD agreed to review required reclamation schedules in all permits and to revise the annual reporting format to include information about contemporaneous reclamation progress. In 2001, contemporaneous reclamation was evaluated at four randomly assigned mines. According to the report cited above, the 2001 evaluation of contemporaneous reclamation "showed that reclamation was following mining disturbance at a reasonable rate. The reclamation rate at all four mines was at least 90% for the areas disturbed for

the previous 12 months. In addition, the standards for measuring reclamation contained in the four permits were reasonably clear and concise." In the annual evaluation report for 2002, the OSM Casper Field Office indicated it is concerned that the rate at which lands are being reclaimed in Wyoming is decreasing when compared to the rate of disturbance. A similar concern is expressed in OSM's 2003 Evaluation Report (OSM 2003).

OSM tracks the ratio of acres of permanent reclamation each year to acres of net disturbance available for reclamation each year. Areas not available for reclamation include things such as stockpiles, active pits, access roads, haul roads, railroad rights-of-way, coal preparation and loading sites, offices, shops, sediment ponds, and other long-term approved uses. The ratio of reclamation to net disturbance was 1.43 for the 2001 evaluation year, 1.68 for the 2002 evaluation year, and 0.98 for the 2003 evaluation year. Since 1990, the ratio of reclamation to net disturbance has ranged from a low of 0.40 in 1997 to a high of 1.68 in 2002 (OSM 2002 and 2003).

Some of the factors that affect achievement of contemporaneous reclamation standards include changing strip ratios which create material surpluses or deficits, using stockpiles to provide material to fill final pit voids or to store new pit boxcut material, changing the direction of mining pits to conform to lease configuration, changing plans to accommodate production growth, and changes in technology or mining method.

Currently, WDEQ/LQD suggests to operators that only large, contiguous areas such as drainage basins be considered for bond release, with the assurance that the area will not be disturbed in the future. Because many mine plans cross a drainage basin several times during the life of mine, final reclamation of some drainage basins may not occur until late in the life of mine.

For the northern group of mines, approximately 24% of the area of disturbance has been backfilled and graded. The Buckskin Mine was one of the nine operations reviewed by the OSM's Casper Field Office, and they found a ratio of backfilled, graded and seeded land to disturbed land of 0.32 for the mine.

### **Topography and Physiography**

Following surface coal mining and reclamation, topography will be modified in three groups of mines that lie within an elongated corridor which extends for about 75 miles from the Buckskin Mine, north of Gillette, to the Antelope Mine, south of Wright (Figure 1-1). The topography in the PRB is characterized by relatively flat or rolling topography. After reclamation, these characteristics will be emphasized in the reclaimed area. In general, in the mining corridor, premining features that were more topographically unique (steeper hills and gullies, and rock outcrops) will generally be smoothed. The overall reduction in topographic diversity in the mining corridor may lower the carrying capacity for big game in the reclaimed areas; however, big game ranges are generally very large and mining activities are not usually located in habitats defined as crucial. The general flattening and smoothing of the topography would result in increased

infiltration of surface water and reduced peak flows from the drainages. These changes would not be significant because the streams typically flow from west to east across the area rather than north to south along the entire corridor. Therefore, only a small part of each stream's drainage area would be disturbed. There would be no substantial cumulative impacts to topography and physiography due to the proximity of CBM development, and the proposed railroad line power plants to the coal mining operations in this area because the construction and operation of those projects would cause minimal topographic and/or physiographic changes.

### **Geology and Minerals**

The PRB coalfield encompasses an area of about 12,000 square miles. Finley and Goolsby (2000) estimate that approximately 587 billion tons of coal in beds thicker than 20 feet and deeper than 200 feet are found in the basin. The remaining strippable Wyodak coal reserves (with 200 feet or less of overburden) are estimated at 15.5 billion short tons (WGS 2002a). In the PRB, the currently leased coal reserves represent a small percentage of the total coal reserves but a large percentage of the shallowest, strippable coal reserves, which are the most economical to recover by surface mining. Within the five operating mines and one inactive mine (the Fort Union Mine) in the northern mine group, approximately 24,715 acres of federal coal are currently leased. This is about a 10% increase over the 22,483 acres of federal coal that were leased in the northern group of mines in 1990, before decertification of the Powder River Federal Coal Region. Actual coal production from 1993 to 2001 for the northern group increased about 17%, compared to a production increase of 58% for the middle group of mines and 137% for the southern group of mines over the same time period.

If maintenance leases are issued for the Buckskin Mine West Hay Creek and the Eagle Butte Mine West Extension LBA tracts as applied for, approximately 2,238 additional acres of federal coal would be leased, which would represent a 9% increase in the area of leased federal coal in the northern group of mines. Under the preferred alternative for the West Hay Creek LBA tract, approximately 921 additional acres would be leased, which would represent a 3.7% increase in the area of leased coal in the northern mine group. The area of disturbance associated with mining these leases is generally greater than the leases themselves, as discussed in other parts of this document. In the case of the preferred alternative and alternative 3 for the West Hay Creek LBA tract, Triton assumes that no coal would be recovered from the approximately 31.16 acres added to the southeast corner of the tract under those alternatives. As a result the estimated area of additional disturbance, for the preferred alternative and alternative 3 is smaller than the area added by the lease. Portions of all the action alternatives are located in the area that will be disturbed by Buckskin Mine to mine the existing leases. Therefore, the additional disturbance area for the action alternatives is less than the additional lease area.

Coal and CBM are nonrenewable resources which form as organic matter decays and undergo chemical changes over geologic time. The CBM and coal resources that are removed to generate heat and power would not be available for use in the future. No

potential damages to the coal resulting from removal of the CBM and water prior to mining have been identified. The CBM operators generally do not completely dewater the coal beds to produce the CBM because that could damage fractures in the coal and limit CBM production. Construction of the proposed railroad line and power plants would not impact the geology or mineral resources in the area, so there would be no overlapping impacts related to these projects.

## Soils

The five operating northern mines would disturb approximately 25,300 acres throughout their combined lives. (Together they would disturb about 350 to 500 acres annually during active mining at the currently planned mining rates.) If the West Hay Creek LBA tract is leased and mined under the proposed action or Preferred Alternative, the disturbance area in the northern group of mines would increase to approximately 26,300 acres. This would represent an additional 4% increase in disturbance. Assuming ten years from initial disturbance to use of a parcel of reclaimed land by domestic livestock, approximately 3,500 to 5,000 acres would be unavailable for such use at any given time during active mining. The replaced topsoil would support a stable and productive native vegetation community adequate in quantity and quality to support planned postmining land uses (rangeland and wildlife habitat).

More widespread, although less intensive, soil disturbance would be associated with proposed CBM development in the PRB. Soil disturbance associated with the construction of the proposed power plants and railroad line, which would be located south of the West Hay Creek LBA tract, would also be less intensive, if they are constructed as proposed.

## Air Quality

The EPA CALPUFF dispersion model was used with meteorological data generated by the MM5 (mesoscale model) and CALMET models to perform air pollutant dispersion modeling to quantify potential PM<sub>10</sub> and SO<sub>2</sub> impacts related to proposed oil and gas development, including CBM development, in the PRB in northeastern Wyoming and southeastern Montana. The modeling was conducted by Argonne National Laboratory at the request of the Wyoming and Montana BLM to analyze potential air quality impacts from the oil and gas development alternatives being considered in the Wyoming *Final EIS and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project* (BLM2003a) and the Montana *Final Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plans* (BLM2003b). These documents will be referred to as the "Wyoming PRB Oil and Gas Project EIS" and the "Montana Statewide EIS," respectively, in the following discussion. The Wyoming project area for this air quality analysis includes Campbell, Sheridan, Johnson, and northern Converse counties. The Montana project area for this air quality analysis includes all of Carter, Powder River, Big Horn, Yellowstone, Carbon, Stillwater, Sweetgrass, Wheatland, Golden Valley, Musselshell, and Treasure counties and portions of Rosebud and Custer counties. The West Hay

Creek LBA tract analysis area is located in northern Campbell County, Wyoming, which lies in the eastern part of the Wyoming project area.

Surface coal mining operations in Montana and Wyoming were included in the air quality impact assessment as nonproject emission sources (other reasonably foreseeable emission sources).

Potential emissions from coal mining activities at each mine within the modeling domain were estimated for 2006, the projected peak emission year for CBM development. The coal mining emissions estimated were based on projected 2006 annual coal production estimates and mining locations provided by the Wyoming and Montana BLM. The reported emission rates per unit of coal production at each mine was provided by the WDEQ/AQD and the Montana Department of Environmental Quality/Air and Waste Management Bureau (MDEQ/AWM)

The Argonne air quality impact analysis was prepared solely under the requirements of NEPA to assess and disclose reasonably foreseeable impacts to the public and BLM and FS decision makers. The air quality impact assessment was based on the best available engineering data and assumptions, meteorology data, and dispersion modeling procedures, as well as professional and scientific judgment. However, where specific data or procedures were not available, reasonable assumptions were incorporated. For example, the air quality impact assessment for Alternative 1 of the Wyoming PRB Oil and Gas Project EIS assumed that all CBM wells would go into production (no dry holes), then operate at full production levels (no shut-ins) for about 7 years, with an overall 20 year life of project (LOP). Potential direct project, indirect, and cumulative air quality impacts were analyzed to predict maximum potential near-field ambient air pollutant concentrations and potential hazardous air pollutant (HAP) impacts, as well as to determine maximum far-field ambient air pollutant concentrations, visibility, and atmospheric deposition (acid rain) impacts. The methodologies used to predict and interpret potential air quality impacts are described in the appendix E.

There are several differences between the cumulative air quality impact analysis conducted for the Wyoming PRB Oil and Gas Project EIS and the Montana statewide EIS by Argonne National Laboratory and the WDEQ/AQD air quality permit analyses described earlier in this chapter. The Argonne analysis focuses on oil and gas and CBM development in the Wyoming and Montana PRB and includes other sources in the area, including surface coal mining, in a broad cumulative analysis. Each WDEQ/AQD permit analysis focuses on near-field coal mining impacts based on detailed information from surface coal mines in a specific area. The two analyses use different models (ISCLT for the WDEQ/AQD permit analyses versus CALPUFF for the Argonne analysis); different emission inventories (entire mine production for WDEQ/AQD permit versus projected production increases for the Argonne analysis); different mine boundary representations (Lands Necessary to Conduct Mining for the WDEQ/AQD analyses versus representative rectangular area for the Argonne analysis); and different background concentrations and sources. The WDEQ/AQD permit analyses use background concentrations of  $15\mu\text{g}/\text{m}^3$  for  $\text{PM}_{10}$  and  $20\mu\text{g}/\text{m}^3$  for  $\text{NO}_2$  to represent



background concentration in the air prior to any coal mining activity and then models all sources in the area regardless of when they were built. The Argonne analysis uses  $17 \mu\text{g}/\text{m}^3$  for  $\text{PM}_{10}$  and  $16.5 \mu\text{g}/\text{m}^3$  for  $\text{NO}_x$ , which represents the ambient air concentrations as of a specified date. Only sources that were constructed or permitted after that date are used in the model. As a result of the differences in the scope and nature of these two analyses, there are differences in the results produced by each analysis.

Air pollution impacts are limited by state, tribal and federal regulations, standards, and implementation plans established under the CAA and administered by the applicable air quality regulatory agencies (including WDEQ/AQD, MDEQ/AWM, or the EPA). The Departments of Environmental Quality for adjacent states have similar jurisdiction over potential air pollutant emission sources in their respective states, which can have a cumulative impact with WDEQ/AQD and MDEQ/AWM approved sources. Air quality regulations require proposed new, or modified existing air pollutant emission sources (including CBM compression facilities) undergo a permitting review before their construction can begin. Therefore, the applicable state air quality regulatory agencies have the primary authority and responsibility to review permit applications and to require emission permits, fees, and control devices, prior to construction and/or operations of new projects.

The U.S. Congress (through the CAA section 116) also authorized local, state, and tribal air quality regulatory agencies to establish air pollution control requirements more (but not less) stringent than federal requirements. As discussed in chapter 1, BLM would not authorize mining by issuing leases for the West Hay Creek LBA tract, but the impacts of mining the coal are considered because it is a logical consequence of issuing a lease. The West Hay Creek LBA tract was applied for by an existing mine with an air quality permit approved by WDEQ/AQD. If the LBA tract is leased as a maintenance tract to the Buckskin Mine, the mine would have to modify its existing approved air quality permit. That modified permit would have to be approved before the LBA tract could be mined. Additional site-specific air quality analysis would be performed, and additional emission control measures (including a BACT analysis and determination) could be required by the applicable air quality regulatory agencies to ensure protection of air quality.

The significance criteria for potential air quality impacts include state, tribal, and federally enforced legal requirements to ensure air pollutant concentrations will remain within specific allowable levels. These requirements include the NAAQS and WAAQS which set maximum limits for several air pollutants, and PSD increments which limit the incremental increase of certain air pollutants (including  $\text{NO}_2$ ,  $\text{PM}_{10}$ , and  $\text{SO}_2$ ) above legally defined baseline concentration levels. These legal limits were presented in table 4-3.

Where legal limits have not been established, BLM uses the best available scientific information to identify thresholds of significant impacts. Thresholds have been identified for HAP exposure, incremental cancer risks, potential atmospheric deposition impacts to sensitive lakes, and a "just noticeable change" in potential visibility impacts.

## Emission Sources

The air quality impact analysis uses market demand predictions in order to estimate levels of coal production in the PRB for modeling purposes. There is enough coal leased to the existing mines in the PRB to supply this market demand during the time of maximum CBM development activity in the PRB, which is the time when the maximum overlapping impacts to air quality would occur. The air quality impact assessment considered production from existing surface coal mines in Wyoming and Montana, including the Buckskin Mine, at levels that would supply anticipated market demand for the years considered in the analysis. As a result, the cumulative impacts predicted by the PRB air quality impact assessment would be the same under the proposed action and all of the alternatives for leasing or not leasing the federal coal in the West Hay Creek LBA tract.

As discussed in chapter 3, the major air pollutants emitted from surface coal mining activities are fugitive dust and tailpipe emissions from large mining equipment. Activities such as blasting, loading, and hauling overburden and coal and the large areas of disturbed land all produce dust. Stationary or point sources are associated with coal crushing, storage, and handling facilities. In general, particulate matter (PM<sub>10</sub>) is the major significant pollutant from coal mine point sources. The measures that are being used to control air pollutant emissions from existing approved mining operations, which are also described in chapter 3, include baghouse dust collection systems, PECs, or atomizers/foggers, paving mine access roads, applying water and chemical dust suppressants on all haul roads used by trucks and/or scrapers, limiting haul truck speeds, limiting material drop heights for shovels and draglines (bucket to truck bed or backfill), using permanent and temporary revegetation of disturbed areas to minimize wind erosion, and using stilling sheds at coal truck dumps. In addition, some of the mines are participating in the control of fugitive emissions from some nearby unpaved county roads by applying dust suppressants. These measures would be applied under all of the alternatives being considered in this EIS.

Air quality impacts related to oil and gas development would occur during construction (due to potential surface disturbance by earth-moving equipment, vehicle traffic fugitive dust, well pad construction, well drilling, well completion testing, as well as drilling rig and vehicle engine exhaust) and production (including non-CBM well production equipment, booster (field) and pipeline (sales) compression engine exhausts). The amount of air pollutant emissions during construction would be controlled by watering disturbed soils, and by air pollutant emission limitations imposed by applicable air quality regulatory agencies. Maximum construction impacts from fugitive dust (24-hour PM<sub>10</sub>) are estimated to be 55 µg/m<sup>3</sup>, about one third of the applicable WAAQS. Actual air quality impacts depend on the amount, duration, location, and emission characteristics of potential emissions sources, as well as meteorological conditions (wind speed and direction, precipitation, and relative humidity). For additional information about the assumptions used in the cumulative air quality impact assessment and how it was conducted, please refer to the Wyoming Oil and Gas Project EIS (BLM2003a), the Montana Statewide EIS ((BLM 2003b) and the Air Quality Impact

## **Predicted Air Quality Impacts**

The Wyoming PRB Oil and Gas Project EIS evaluates four alternatives. Alternative 1 is the Proposed Action, which assumes that there would be 39,400 new CBM wells in the Wyoming PRB by 2012 in addition to the 12,000 existing wells. The proposed action also assumes drilling of an estimated 3,200 conventional oil and gas wells in the same time period. Alternatives 2a and 2b evaluate alternate emission levels and water handling scenarios. The preferred alternative is a combination of Alternative 1 and Alternative 2a. Under Alternative 3 (the No Action Alternative), drilling would not occur on federal oil and gas leases but would continue on state and private oil and gas leases. BLM estimates that approximately 15,500 new CBM wells would be developed on state and private lands by 2012 under this alternative, in addition to the 12,000 existing wells. For the purposes of this EIS, the range of potential near-field impacts predicted by the cumulative air quality analysis for all the three oil and gas action alternatives are shown in the following tables, as well as the potential impacts predicted under the No Action Alternative. Please refer to the Wyoming PRB Oil and Gas Project EIS (BLM 2003a) to see the individual results for each oil and gas alternative.

## **Wyoming PRB Oil and Gas EIS Alternatives 1, 2a, and 2b**

Under all three oil and gas action alternatives, potential direct project air quality impacts would not violate any local, state, tribal, or federal air quality standards.

Based on extensive air quality modeling of potential direct project air quality impacts (Argonne 2002), localized short-term increases in CO, NO<sub>x</sub>, PM<sub>10</sub>, and SO<sub>2</sub> concentrations would occur, but all maximum concentrations are expected to be below applicable NAAQS and WAAQS. All maximum near-field direct project NO<sub>2</sub>, PM<sub>10</sub> and SO<sub>2</sub> concentrations are expected to be below applicable PSD Class II increments (table 4-7), and all maximum far-field direct project concentrations are expected to be below applicable PSD Class I increments (appendix E).

Although potential direct project impacts to even the most sensitive far-field lakes would not be significant, a "just noticeable change" in visibility was predicted to occur at from nine to eleven mandatory federal Class I areas, ranging up to five days at the Washakie Wilderness Area. The maximum potential direct project visibility impacts were predicted to occur on 14 to 20 days per year on the Crow Indian Reservation. A more detailed description of the Argonne National Laboratory air quality impact analysis is presented in the air quality appendix (appendix E).

TABLE 4-7

RANGE OF PREDICTED MAXIMUM POTENTIAL NEAR-FIELD IMPACTS UNDER  
ALTERNATIVE 1, 2A, AND 2B OF THE WYOMING PRB OIL AND GAS PROJECT EIS  
(with Montana Alternative E)

Pollutant	Averaging Time	Project ( $\mu\text{g}/\text{m}^3$ )	Nonproject ( $\mu\text{g}/\text{m}^3$ ) <sup>2</sup>	Cumulative ( $\mu\text{g}/\text{m}^3$ )	PSD Class II ( $\mu\text{g}/\text{m}^3$ )	Background ( $\mu\text{g}/\text{m}^3$ )	Total ( $\mu\text{g}/\text{m}^3$ ) <sup>1</sup>	WAAQS ( $\mu\text{g}/\text{m}^3$ )	NAAQS ( $\mu\text{g}/\text{m}^3$ )
NO <sub>2</sub>	Annual	6 to 8	3	9 to 10	25	17	26 to 28	100	100
SO <sub>2</sub>	Annual	<1	<1	1	20	3	4	60	80
	24 hour	2	2	3	91	8	11	260	365
	3 hour	3	5	5	512	8	13	1,300	1,300
PM <sub>10</sub>	Annual	3	1	4	17	17	21	50	50
	24 hour	15 to 20	9	25 to 31	30	42	67 to 73	150	150
PM <sub>2.5</sub>	Annual	1 to 2	1	2		8	10	15	15
	24 hour	11 to 16	9	12 to 24		19	38 to 43	65	65
CO	8 hour	77 to 156	124	132 to 156		1500	1624 to 1656	10,000	10,000
	1 hour	157 to 223	142	170 to 224		3500	3670 to 3724	40,000	40,000

<sup>1</sup>The contributions from each source represent maxima and do not necessarily occur at the same location. Therefore, the total concentrations will not always equal the sum of the monitored background, project, and nonproject concentrations.

<sup>2</sup>Nonproject sources include CBM sources in Montana and surface coal mining operations in Wyoming and Montana.

TABLE 4-8

**PREDICTED MAXIMUM POTENTIAL NEAR-FIELD IMPACTS UNDER ALTERNATIVE 3  
OF THE WYOMING PRB OIL AND GAS PROJECT EIS**  
(with Montana Alternative E)

Pollutant	Averaging Time	Project ( $\mu\text{g}/\text{m}^3$ )	Nonproject ( $\mu\text{g}/\text{m}^3$ ) <sup>2</sup>	Cumulative ( $\mu\text{g}/\text{m}^3$ )	PSD Class II ( $\mu\text{g}/\text{m}^3$ )	Background ( $\mu\text{g}/\text{m}^3$ )	Total ( $\mu\text{g}/\text{m}^3$ ) <sup>1</sup>	WAAQS ( $\mu\text{g}/\text{m}^3$ )	NAAQS ( $\mu\text{g}/\text{m}^3$ )
NO <sub>2</sub>	Annual	3	3	6	25	17	23	100	100
SO <sub>2</sub>	Annual	<1	<1	<1	20	3	3	60	80
	24 hour	1	2	2	91	8	10	260	365
	3 hour	1	5	5	512	8	13	1300	1300
PM <sub>10</sub>	Annual	1	1	2	17	17	19	50	50
	24 hour	7	9	16	30	42	58	150	150
PM <sub>2.5</sub>	Annual	<1	0.7	1	8	8	9	15	15
	24 hour	6	9	13	19	19	32	65	65
CO	8 hour	183	124	183	1500	1500	1683	10,000	10,000
	1 hour	261	142	261	3500	3500	3761	40,000	40,000

<sup>1</sup>The contributions from each source represent maxima and do not necessarily occur at the same location. Therefore, the Total concentrations will not always equal the sum of the monitored background, project, and nonproject concentrations.

<sup>2</sup>Nonproject sources include CBM sources in Montana and surface coal mines in Wyoming and Montana.

## Wyoming PRB Oil and Gas EIS Alternative 3

Potential direct project air quality impacts would not violate any local, state, tribal, or federal air quality standards under Alternative 3 (No Action) of the Wyoming PRB Oil and Gas Project EIS. Based on extensive air quality modeling of potential direct project air quality impacts (Argonne 2002), localized short-term increases in CO, NO<sub>x</sub>, PM<sub>10</sub>, and SO<sub>2</sub> concentrations would occur, but all maximum concentrations are expected to be below applicable NAAQS and WAAQS. All maximum near-field direct project NO<sub>2</sub>, PM<sub>10</sub> and SO<sub>2</sub> concentrations are expected to be below applicable PSD Class II increments (table 4-8), and all maximum far-field direct project concentrations are expected to be below applicable PSD Class I increments (appendix E).

Although potential direct project impacts to even the most sensitive far-field lakes would not be significant, a "just noticeable change" in visibility was predicted to occur one day per year at the mandatory federal Class I Bridger, Fitzpatrick, and Washakie wilderness areas. The maximum potential direct project visibility impacts were predicted to occur on 10 days per year on the Crow Indian Reservation. A more detailed description of the Argonne National Laboratory cumulative air quality impact analysis is presented in the air quality appendix.

### Cumulative Impacts

The EPA CALMET/CALPUFF dispersion model system was used to predict maximum potential air quality impacts at downwind mandatory federal PSD Class I areas, and other sensitive receptors. This was done 1) to determine if the WAAQS, NAAQS, or PSD Class I increments might be exceeded; 2) to calculate potential nitrate and sulfate atmospheric deposition (and their related impacts) in sensitive lakes; and 3) to predict potential impacts to visibility (regional haze). Argonne National Laboratory also conducted this analysis at the request of the Wyoming and Montana BLM.

Meteorological information was assembled to characterize atmospheric transport and dispersion from several data sources, including: 1) 4 km gridded wind field values derived from the MM5 (mesoscale model) with continuous four-dimensional data assimilation; and 2) hourly surface observations (wind speed, wind direction, temperature, cloud cover, ceiling height, surface pressure, relative humidity, and precipitation).

Wyoming PRB Oil and Gas Project EIS and Montana Statewide Oil and Gas EIS potential project sources were combined with nonproject sources to determine the total potential cumulative air quality impacts. Coal mining operations in Wyoming and Montana were included as nonproject sources.

Potential CO and NO<sub>x</sub> emissions were analyzed to predict potential maximum near-field PSD Class II impacts, as well as potential far-field impacts at 29 mandatory federal PSD Class I and other sensitive areas located in Wyoming, Montana, North and South Dakota, and Nebraska (Argonne 2002). Total concentrations are expected to be in

compliance with applicable WAAQS and NAAQS (appendix E). Table 4-9 presents the maximum predicted air pollutant concentrations at specified PSD Class I areas.

Under the alternatives considered in the Wyoming PRB Oil and Gas Project EIS, potential nonproject and cumulative annual NO<sub>2</sub> concentrations and potential project, and cumulative 24-hour PM<sub>10</sub> concentrations were predicted to be above the PSD Class I increment within the Northern Cheyenne Reservation. Under the Wyoming PRB Oil

**TABLE 4-9**

**MAXIMUM PREDICTED PSD CLASS I AREA  
CUMULATIVE FAR-FIELD IMPACTS (in  $\mu\text{g}/\text{m}^3$ )  
GAS PROJECT EIS ALTERNATIVE 1 (PROPOSED ACTION) AND ALL WEST HAY  
CREEK LEASE APPLICATION EIS ALTERNATIVES**

<b>Pollutant</b>	<b>Averaging Period</b>	<b>Class I Area</b>	<b>Maximum Modeled Concentration (Cumulative)</b>	<b>PSD Class I Increment</b>
Nitrogen dioxide	Annual	Northern Cheyenne Reservation	4.2	2.5
PM <sub>10</sub>	24-hour	Northern Cheyenne Reservation	12.8	8
	Annual	Northern Cheyenne Reservation	1.7	4
Sulfur dioxide	3-hour	Northern Cheyenne Reservation	5.1	25
	24-hour	Absaroka-Beartooth Wilderness	2.4	5
	Annual	Northern Cheyenne Reservation	0.3	2

**Source:** Argonne 2002

and Gas Project EIS Preferred Alternative, cumulative 24-hour PM<sub>10</sub> concentrations were also predicted to be above the PSD Class I increment (8  $\mu\text{g}/\text{m}^3$ ) within the Washakie Wilderness Area. These impacts would be the same under all of the coal leasing alternatives considered in this EIS. As described in the air quality appendix (appendix E), other PSD Class I areas had predicted far-field impacts below applicable increments. All PSD Class II areas had predicted far-field impacts below applicable PSD increments. This NEPA analysis compares potential air quality impacts from the proposed Wyoming PRB Oil and Gas Project EIS alternatives to applicable ambient air quality standards and PSD increments, but these comparisons to PSD Class I and II

increments do not represent a regulatory PSD increment consumption analysis. Even though most of the development activities would occur within areas designated PSD Class II, the potential impacts on regional Class I areas are to be evaluated. For a new source review air quality permit application for a major source, the applicable air quality regulatory agencies may require a regulatory PSD increment analysis. More stringent emission controls beyond BACT may be stipulated in the air quality permits if impacts are predicted to be greater than the PSD Class I or Class II increments. As discussed previously, existing surface coal mining operations in the PRB, including the Buckskin Mine, are not currently affected by the PSD regulations.

Several lakes within four FS-designated wilderness areas for which the most recent and complete data have been collected were identified as being sensitive to atmospheric deposition. The FS has also identified the following limit of acceptable change regarding potential changes in lake chemistry: no more than a 10% change in ANC for those water bodies where the existing ANC is at or above 25  $\mu\text{eq/L}$ ; and no more than a one  $\mu\text{eq/L}$  change for those extremely sensitive water bodies where the existing ANC is below 25  $\mu\text{eq/L}$ .

Based on a Rocky Mountain Region FS screening method (FS 2000), table 4-10 demonstrates that potential impacts to most sensitive lakes would be below applicable significance thresholds. However, under the Wyoming PRB Oil and Gas Project EIS alternatives, potential nonproject ANC impacts were predicted to exceed the 1.0  $\mu\text{eq/L}$  impact threshold at the very sensitive Upper Frozen Lake within the PSD Class I Bridger Wilderness Area. Cumulative ANC impacts ranged from 1.6 to 1.8  $\mu\text{eq/L}$ . Up to 27% of these impacts would be due to direct contributions from the Wyoming PRB Oil and Gas Project EIS alternatives alone. In addition, under Wyoming PRB Oil and Gas Project EIS Alternative 1 and 2A, cumulative ANC impacts (up to 10.4%) were predicted to exceed the 10% impact threshold at Florence Lake within the PSD Class II Cloud Peak Wilderness Area. Nearly 30% of these impacts would be due to direct contributions from the alternatives evaluated in the Wyoming PRB Oil and Gas Project EIS. Potential impacts at all other sensitive lakes (and under all Wyoming PRB Oil and Gas Project EIS alternatives) were below the ANC threshold levels. No sensitive lakes were identified by either the NPS or FWS.

Since the development of the project and nonproject air pollutant emission sources included in the cumulative air quality impact analysis constitute many small sources spread out over a very large area, discrete visible plumes are not likely to affect the mandatory federal PSD Class I areas, but the potential for cumulative visibility impacts (increased regional haze) is a concern. Regional haze degradation is caused by fine particles and gases scattering and absorbing light. Potential changes to regional haze are calculated in terms of a perceptible "just noticeable change" (1.0 dv) in visibility when compared to background conditions.



TABLE 4-10

**PREDICTED TOTAL CUMULATIVE CHANGE IN ACID NEUTRALIZING CAPACITY  
AT SENSITIVE AREA LAKES**

(percent change)

Wilderness Area	Lake	Background ANC ( $\mu\text{eq/L}$ )	Area (hectares)	Change (percent)	Thresholds (percent)
Bridger	Black Joe	69	890	2.2 to 2.1	10
	Deep	61	205	2.5 to 3.0	10
	Hobbs	68	293	1.3 to 1.5	10
	Upper Frozen	5.8 <sup>a</sup>	65	1.6 to 1.9 <sup>b</sup>	1 <sup>b</sup>
Fitzpatrick	Ross	61.4	4,455	1.8 to 2.1	10
Absaroka-Beartooth	Stepping Stone	27	26	2.3 to 2.5	10
	Twin Island	36	45	1.6 to 1.8	10
Cloud Peak	Emerald	55.3	293	5.0 to 6.0	10
	Florence	32.7	417	8.9 to 10.7	10
Popo Agie	Lower Saddlebag	55.5	155	3.2 to 3.8	10

<sup>a</sup> The background concentration is based on only six samples taken on four days between 1997 and 2001.

<sup>b</sup> Since the background ANC value is less than 25  $\mu\text{eq/L}$ , the potential ANC change is expressed in  $\mu\text{eq/L}$ , and the applicable threshold is one  $\mu\text{eq/L}$ .

**Source:** Argonne 2002

A 1.0 dv change is considered a small but noticeable change in haziness as described in the preamble to the EPA regional haze regulations (*Federal Register*, Vol. 64 No. 126, dated July 1, 1999). A 1.0 dv change is defined as about a 10% change in the extinction coefficient (corresponding to a 2% to 5% change in contrast, for a black target against a uniform sky, at the most optically sensitive distance from an observer), which is a small but noticeable change in haziness under most circumstances when viewing scenes within mandatory federal Class I areas.

It should be noted that a 1.0 dv change is not a "just noticeable change" in all cases for all scenes. Visibility changes less than 1.0 dv are likely to be perceptible in some cases, especially where the scene being viewed is highly sensitive to small amounts of pollution, such as due to preferential forward light scattering. Under other view-specific conditions, such as where the sight path to a scenic feature is less than the maximum visual range, a change greater than 1.0 dv might be required to be a "just noticeable change."

This NEPA analysis is not designed to predict specific visibility impacts for specific views in specific mandatory federal Class I areas based on specific project designs. It is to characterize reasonably foreseeable visibility conditions that are representative of a fairly broad geographic region based on reasonable emission source assumptions. This approach is consistent with both the nature of regional haze and the requirements of NEPA. At the time of a preconstruction air quality PSD permit application, the applicable air quality regulatory agency may require a much more detailed visibility impact analysis. Factors such as the magnitude of dv change, frequency, time of the year, and the meteorological conditions during times when predicted visibility impacts are above the 1.0 dv threshold (as well as the modeling analyses assumptions) should all be considered when assessing the significance of predicted impacts.

The FS, NPS, and FWS have published their final FLAG Phase I report (*Federal Register*, Vol. 66 No. 2, dated January 3, 2001), providing "a consistent and predictable process for assessing the impacts of new and existing sources on AQRVs" including visibility. For example, the FLAG report states "A cumulative effects analysis of new growth (defined as all PSD increment-consuming sources) on visibility impairment should be performed," and further, "If the visibility impairment from the proposed action, in combination with cumulative new source growth, is less than a change in extinction of 10 percent [1.0 dv] for all time periods, the FLMs will not likely object to the proposed action." Although the FLAG procedures were primarily designed to provide analysis guidance to PSD permit applicants, the following analysis uses the Final FLAG Phase I report procedures for this NEPA analysis.

Based on multiple iterations of the nonsteady state CALPUFF dispersion modeling system, including the CALMET meteorological model, for four different development alternatives, potential cumulative visibility impacts estimated by the seasonal FLAG screening method exceeded the impact thresholds (including the use of FLAG and WDEQ/AQD provided background extinction values) at all 29 sensitive areas analyzed. Therefore, potential maximum visibility impacts were estimated using the daily FLAG refined method (based on hourly optical extinction and relative humidity values measured at two IMPROVE monitoring locations) for each Class I and Class II sensitive area. Although the potential modeled impacts for each sensitive area were based on 1996 MM5 regional meteorology, these values were compared to hourly optical extinction and relative humidity data collected at two locations in the analysis area between 1989 and 1999.

For example, since the 1.0 dv threshold was predicted to be reached within the mandatory federal PSD Class I Washakie Wilderness Area based on the seasonal FLAG screening methodology, the maximum modeled cumulative impacts at that area were also compared to representative hourly optical and relative humidity values measured at Bridger Wilderness Area between 1989 and 1999 using the daily FLAG refined method (table 4-11). The range of impacts was then summarized as the annual average number of days over the 11-year periods predicted to equal or exceed a 1.0 dv "just noticeable change" (table 4-12).

The prediction of potential visibility impacts based on the daily FLAG refined methodology using measured optical extinction conditions is intended to disclose potential air quality impacts on the affected environment to the public and decision maker before an action is taken. It is not intended to be an air quality regulatory analysis. Such analysis would be conducted by the applicable air quality regulatory agencies before actual development would occur. The applicable air quality regulatory agencies (including the state, tribe, or EPA) would review specific air pollutant emissions preconstruction permit applications that examine source-specific air quality impacts. As part of these permits (depending on source size), the air quality regulatory agencies could require additional air quality impacts analyses or mitigation measures. Thus, before development occurs, additional site-specific air quality analyses would be performed to ensure protection of air quality. For further mitigation information see the "Regulatory Compliance, Mitigation, and Monitoring" section of this chapter and appendix E.

**TABLE 4-11**

**PREDICTED VISIBILITY IMPACTS IN THE MANDATORY FEDERAL PSD CLASS I WASHAKIE WILDERNESS AREA FROM DIRECT WYOMING PRB OIL AND GAS PROJECT EIS ALTERNATIVE SOURCES – DAILY FLAG-REFINED METHOD**  
(average number of days per year predicted to equal or exceed a 1.0 dv "just noticeable change")

Alternative	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
1	4	2	7	6	4	7	4	6	7	2	6
2A	2	2	6	5	4	6	4	5	5	1	4
2B	1	2	6	5	3	6	4	4	5	1	3
3	1	0	4	3	1	1	2	2	2	0	0

**Note:** Potential cumulative visibility impacts were predicted using daily background optical and relative humidity conditions for each of the years listed above.

**Source:** Argonne 2002

Coal mines develop predictive models to assess the potential air quality impacts of their mining operations. Based on these predictive models conducted for PRB mines, mining operations do not have significant off-site particulate pollution impacts, even when production and pollution from neighboring mines are considered. However, this prediction has been based on the assumptions that mining activities are sufficiently removed from the permit boundaries and that neighboring mines are not actively mining in the immediate vicinity (within 0.6-2.5 miles). Previous modeling (BLM 1992a) has shown that incremental particulate pollution impacts decrease to insignificant levels (<1  $\mu\text{g}/\text{m}^3$   $\text{PM}_{10}$  annual average) within 6 miles of active mining.

In cases where mines are within 2 miles, WDEQ follows a modeling protocol which accounts for all mine-generated particulate air pollutants from all nearby mines to determine impacts to ambient air quality. Known as the Mine A/Mine B modeling

TABLE 4-12

**PREDICTED VISIBILITY IMPACTS IN CLASS I AREAS – DAILY FLAG-REFINED METHOD**

(average number of days per year predicted to equal or exceed a 1.0 dv “just noticeable change”)

Class I Area	Alt 1	Alt 2A	Alt 2B	Alt 3	Nonproject Sources	Cumulative Sources
Badlands Wilderness Area <sup>1</sup>	3	3	1	0	13 to 17	18 to 28
Bridger Wilderness Area	4	4	3	1	7 to 9	8 to 12
Fitzpatrick Wilderness Area	4	3	3	1	6 to 9	8 to 12
Gates of the Mtns Wilderness Area	0	0	0	0	3 to 4	3 to 4
Grand Teton National Park	1	1	0	0	3 to 5	4 to 8
North Absaroka Wilderness Area	4	3	2	0	9 to 13	11 to 15
Red Rock Lakes Wilderness Area	0	0	0	0	0 to 1	0 to 3
Scapegoat Wilderness Area	0	0	0	0	2 to 2	2 to 3
Teton Wilderness Area	3	3	2	0	6 to 9	7 to 11
Theodore Roosevelt NMP <sup>2</sup> (North Unit)	0	0	0	0	1 to 1	1 to 3
Theodore Roosevelt NMP <sup>2</sup> (South Unit)	1	0	0	0	1 to 3	2 to 7
U.L. Bend Wilderness Area	1	1	1	0	4 to 5	5 to 8
Washakie Wilderness Area	5	4	4	1	10 to 14	12 to 18
Wind Cave National Park	4	3	2	0	17 to 21	22 to 28
Yellowstone National Park	3	2	1	0	8 to 11	9 to 13
Northern Cheyenne Reservation <sup>3</sup>	17	16	14	7	27 to 82	33 to 92

**Note:** Results shown are the predicted impacts under Wyoming PRB Oil and Gas Project alternatives 1, 2A, 2B, and 3; impacts related to coal mining under all West Hay Creek lease application EIS (alternatives are included Under “Nonproject Sources”)

<sup>1</sup> Congress designated the wilderness area portion of Badlands National Park as a mandatory federal PSD Class I area. The remainder of Badlands National Park is a PSD Class II area.

<sup>2</sup> NMP - National memorial park.

<sup>3</sup> Although the Northern Cheyenne Reservation is a tribal designated PSD Class I area, it is not a mandatory federal PSD Class I area subject to EPA’s regional haze regulations.

**Nonproject Sources** – The impact of all air pollutant emission sources not included in Wyoming PRB Oil and Gas Project EIS Alt 1, Alt 2A, Alt 2B or Alt 3, including existing surface coal mines in Wyoming and Montana and the Montana Statewide EIS sources. The range of potential annual average days above a 1.0 dv “just noticeable change” in visibility corresponds to including Montana Alternative A (low) to Montana Alternative B/C/E (high).

**Cumulative Sources** – The impact of all cumulative air pollutant emission sources combined, including Wyoming PRB Oil and Gas Project EIS Alt 1, Alt 2A, Alt 2B, Alt 3, and nonproject sources (which include the West Hay Creek Lease Application EIS proposed action and alternatives and Montana Statewide EIS sources). The range of potential annual average days above a 1.0 dv “just noticeable change” in visibility corresponds to: including nonproject, Wyoming Alternative 3 and Montana Alternative A sources (low); up to including nonproject, Wyoming Alternative 1 and Montana Alternative B/C/E sources (high).

**Source:** Argonne 2002

procedure, this model evaluates the total impacts of a given mining operation, including those impacts from and on neighboring mines. The Rawhide Mine is located within two miles of the Buckskin Mine.

Gaseous orange clouds, some containing concentrations of  $\text{NO}_x$ , have been produced by overburden blasting at surface coal mines in the PRB. In 1995, 1998, and 1999, OSM received citizen complaints concerning  $\text{NO}_x$  gases generated from blasting operations drifting off mine permit areas (OSM 2000). No citizen complaints were received by OSM or WDEQ during the 2001 evaluation year, which ended on September 30, 2001 (OSM 2002) or the 2002 evaluation year, which ended on September 30, 2002 (OSM 2002). These gaseous orange clouds generally do not overlap due to the distances between mines and the variation in blasting schedules.

The nature of these blasting clouds and human health consequences resulting from short-term exposures to  $\text{NO}_x$  are discussed earlier in this chapter. There is no short-term ambient air standard for  $\text{NO}_2$  in Wyoming.

In response to the public concern about these clouds and the potential consequences to human health, WDEQ and the mines have developed required and voluntary measures to protect the public from exposure to the clouds as described in chapter 3. The mines in the eastern PRB have also been cooperating in a research and development effort aimed at reducing blasting clouds, which are also discussed in chapter 3. This research has led to changes in blasting agents and the size of blasting shots that have reduced  $\text{NO}_x$  emissions during blasting. As indicated above, no citizen complaints were received by OSM or WDEQ/LQD during the 2001 or 2002 evaluation years.

Another air quality concern is the venting of methane that occurs when coal is mined. Methane is generated from coal beds. When coal is mined, either by surface or underground methods, the methane that is present in the coal is vented to the atmosphere. Methane is a greenhouse gas that contributes to global warming. According to the "EIA/DOE, U.S. anthropogenic methane emissions totaled 28.0 million metric tons in 2001 (DOE 2002). US 2001 methane emissions from coal mining were estimated at 2.78 million metric tons (10% of the US total anthropogenic methane emissions in 2001). The EIA/DOE estimates that surface coal mining was responsible for about 0.5e million metric tons of methane emissions in 2001. This represents about 1.89% of the estimated US anthropogenic methane emissions in 2001, and about 19.06% of the estimated methane emissions attributed to coal mining of all types. Based on the 2001 coal production figures, it is estimated that Wyoming and Montana PRB surface coal mines were responsible for approximately 0.98% of the estimated US anthropogenic methane emissions in 2001.

In many areas, including the PRB, CBM is being recovered from coal and sold. On a large scale, recovery of CBM from the coal before mining by both surface and underground methods could potentially gradually reduce US emissions of CBM to the atmosphere. In the PRB, CBM is being produced from the coal areas adjacent to and

generally downdip of the mines. CBM is currently being produced from the same coal seams that would be mined in West Hay Creek LBA tract included in this EIS. As discussed earlier in this chapter, BLM estimates that a large portion of the CBM reserves could be recovered prior to initiation of mining activity on the LBA tract under the proposed action or action alternatives. CBM reserves that are not recovered prior to mining would be vented to the atmosphere.

## Water Resources

### **Groundwater**

As a result of statutory requirements and concerns, several studies and a number of modeling analyses have been conducted to help predict the impacts of surface coal mining on groundwater resources in the Wyoming portion of the PRB. Some of these studies and modeling analyses are discussed below.

In 1987, the USGS, in cooperation with the WDEQ and OSM, conducted a study of the hydrology of the eastern PRB. The resulting description of the cumulative hydrologic effects of all current and anticipated surface coal mining (as of 1987) was published in 1988 in the USGS Water-Resources Investigation Report entitled "*Cumulative Potential Hydrologic Impacts of Surface Coal Mining in the Eastern Powder River Structural Basin, Northeastern Wyoming*", also known as the "CHIA" (Martin, et al. 1988). This report evaluates the potential cumulative groundwater impacts of surface coal mining in the area and is incorporated by reference into this EIS. The CHIA analysis included the proposed mining of all the leases at all of the existing PRB mines as of 1987, including the Buckskin Mine. It did not evaluate groundwater impacts related to potential coal leasing in this area subsequent to 1987 and it did not consider the potential for overlapping groundwater impacts from coal mining and CBM development.

Each mine must assess the probable hydrologic consequences of mining as part of the mine permitting process. The WDEQ/LQD must evaluate the cumulative hydrologic impacts associated with each proposed mining operation before approving the mining and reclamation plan for each mine, and they must find that the cumulative hydrologic impacts of all anticipated mining would not cause material damage to the hydrologic balance outside of the permit area for each mine. As a result of these requirements, each existing approved mining permit includes an analysis of the hydrologic impacts of the surface coal mining proposed at that mine. If revisions to mining and reclamation permits are proposed, then the potential cumulative hydrologic impacts of the revised mining operations must also be evaluated. If the West Hay Creek LBA tract is leased to the applicant, the existing mining and reclamation permit for the Buckskin Mine must be revised and approved before the tract can be mined.

Additional groundwater impact analyses have also been conducted to evaluate the potential cumulative impacts of coal mining and CBM development. One example of these analyses is the report entitled *A Study of Techniques to Assess Surface and Groundwater Impacts Associated with Coal Bed Methane and Surface Coal Mining*,

*Little Thunder Creek Drainage, Wyoming* (Wyoming Water Resources Center 1997). This study was prepared as part of a cooperative agreement involving WDEQ/LQD, the Wyoming State Engineer's Office, the USGS, BLM, OSM, and the University of Wyoming. The Wyoming CBM draft and final EIS (BLM 1999a and 1999c) presented the results of a modeling analysis of the potential cumulative impacts of coal mining and CBM development on groundwater in the coal and overlying aquifers as a result of coal mining and CBM development. The results of these previously prepared analyses are incorporated by reference into this EIS.

The Wyoming PRB Oil and Gas Project EIS includes an updated modeling analysis of the groundwater impacts if 39,000 new CBM wells are drilled in the PRB by the end of 2011. The project area for this EIS covers all of Campbell, Sheridan, and Johnson counties, as well as the northern portion of Converse County.

Another source of data on the impacts of surface coal mining on groundwater is the monitoring that is required by WDEQ/LQD and administered by the mining operators. Each mine is required to monitor groundwater levels and quality in the coal and in the shallower aquifers in the area surrounding their operations. Monitoring wells are also required to record water levels and water quality in reclaimed areas.

The coal mine groundwater monitoring data is published each year by the GAGMO, a voluntary group formed in 1980. Members of GAGMO include most of the companies with operating or proposed mines in the Wyoming PRB, WDEQ, the Wyoming SEO, BLM, USGS, and OSM. GAGMO contracts with an independent firm each year to publish the annual monitoring results. In 1991, GAGMO published a report summarizing the water monitoring data collected from 1980 to 1990 in the Wyoming PRB (Hydro-Engineering 1991b). In 1996, they published a report summarizing the data collected from 1980 to 1995 (Hydro-Engineering 1996a). In 2001, GAGMO published a report summarizing the water monitoring data collected from 1980 to 2000 (Hydro-Engineering 2001).

The northern group of mines uses several hundred acre-feet of water per year for drinking, sanitation, washing equipment, and dust control. Sources of this water include seepage into the mine pits, sediment- and flood-control impoundments, as well as production from the aquifers below the coal.

The major groundwater issues related to surface coal mining that have been identified are:

- the effect of the removal of the coal aquifer and any overburden aquifers within the mine area and replacement of these aquifers with backfill material;
- the extent of the temporary lowering of static water levels in the aquifers around the mine due to dewatering associated with removal of these aquifers within the mine boundaries;

- the effects of the use of water from the subcoal Fort Union Formation by the surface coal mines;
- changes in water quality as a result of surface coal mining; and
- potential overlapping drawdown in the coal due to proximity of coal mining and CBM development.

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

The effects of replacing the coal aquifer and overburden with a backfill aquifer is the first major groundwater concern. The following discussion of recharge, movement, and discharge of water in the backfill aquifer is excerpted from the CHIA (Martin et al. 1988):

*“Postmining recharge, movement, and discharge of groundwater in the Wasatch aquifer and Wyodak coal aquifer will probably not be substantially different from premining conditions. Recharge rates and mechanisms will not change substantially. Hydraulic conductivity of the spoil aquifer will be approximately the same as in the Wyodak coal aquifer allowing groundwater to move from recharge areas where clinker is present east of mine areas through the spoil aquifer to the undisturbed Wasatch aquifer and Wyodak coal aquifer to the west.”*

GAGMO data from 1990 to 2000 verify that recharge has occurred and is continuing in the backfill (Hydro-Engineering 1991a, 1992, 1993, 1994, 1995, 1996b, 1997, 1998, 1999, 2000, 2001). The water monitoring summary reports prepared each year by GAGMO list current water levels in the monitoring wells completed in the backfill and compare them with the 1980 water levels, as estimated from the 1980 coal water-level contour maps. In the 1991 GAGMO 10-year report, some recharge had occurred in 88% of the 51 backfill wells reported for that year. In the GAGMO 20-year report, 79 of the 82 backfill wells (96%) measured contained water.

The cumulative size of the backfill area in the PRB and the duration of mining activity would be increased by mining of the recently issued leases and the currently proposed LBA tracts including the West Hay Creek LBA tract. However, since reclamation is occurring in mined-out areas and the monitoring data demonstrate that recharge of the backfill is occurring, it is not anticipated that additional substantial impacts would occur as a result of any of the pending coal leasing actions. As previously discussed, through December, 2001, about 41% of the area disturbed at the Buckskin Mine had been reclaimed, and backfill monitoring wells indicate that recharge is occurring in the backfill at the Buckskin Mine.

Clinker, also called scoria, the baked and fused rock formed by spontaneous prehistoric burning of the Wyodak-Anderson coal seam, occurs all along the coal outcrop area (figure 4-3) and is believed to be the major recharge source for the backfill aquifer, just as it is for the coal. However, not all clinker is saturated. Some clinker is mined for



road-surfacing material, but saturated clinker is not generally mined because it is difficult to manage the water in the clinker. Therefore, the major recharge source for the backfill aquifer is not being disturbed by current mining. Clinker does not occur in significant amounts within the Buckskin Mine or within the LBA tract. Some surficial clinker is exposed along the northern portion of the LBA tract analysis area, primarily in the SE $\frac{1}{4}$ NE $\frac{1}{4}$  of section 17.

The second major groundwater issue is the extent of water level drawdown in the coal and shallower aquifers in the area surrounding the mines. In this EIS, assessment of cumulative groundwater impacts is based on impact predictions made by Triton for mine-related drawdown at the Buckskin Mine and extrapolating those drawdowns to consider mining of the West Hay Creek LBA tract, along with previous drawdown predictions made within the northern mine group that includes the Buckskin Mine. Figure 4-3 depicts the predicted extent of the five-foot drawdown contour within the coal aquifer from the various mining scenarios. The extent of the five-foot drawdown contour is used by WDEQ/LQD to assess the cumulative extent of impact to the groundwater system caused by mining operations. In figure 4-3, these predictions are compared to the predictions in the CHIA and monitoring information gathered since 1980. Figure 4-3 shows the predicted drawdowns in the coal aquifer due to mining; it does not show the predicted drawdown in the overburden because of the discontinuous nature of the saturated sand aquifers in the Wasatch Formation overburden in the northern group of mines.

Most of the monitoring wells included in the GAGMO 15-year report (542 wells out of 600 total) are completed in the coal beds, in the overlying sediments, or in sand channels or interburden between the coal beds. The changes in water levels in the coal seams after 15 years of monitoring are shown on figure 4-3. This map shows the area where the actual drawdown in the coal seam was greater than 5 feet after 15 years of surface coal mining in comparison with the predicted worst-case 5-foot drawdown derived from groundwater modeling done by the mines. WDEQ/LQD policy is to have the mining companies determine the extent of the 5-foot drawdown contour as a method of determining off-site impacts from the various mining operations. The GAGMO 20-year report shows how much more extensive the area of groundwater drawdown surrounding the mines and to the west has become since CBM has been actively developed in this area.

Figure 4-3 indicates that the actual drawdowns observed after 15 years of mining were still generally within the total cumulative drawdown predicted in the 1988 CHIA. The addition of the pending LBA tracts, including the West Hay Creek tract, would extend the predicted cumulative extent of the 5-foot drawdown caused by coal mining beyond the cumulative drawdown prediction in the 1988 CHIA. As stated above, data from the GAGMO 15 year report (Hydro-Engineering 1996a) are presented in figure 4-3 instead of the more recent data available in the GAGMO 20 year report (Hydro-Engineering 2001) because the earlier data more accurately represent drawdown as a result of coal mining alone, which make that data more comparable to the original assumptions made in the 1988 CHIA. The much more extensive area of groundwater drawdown in the coal

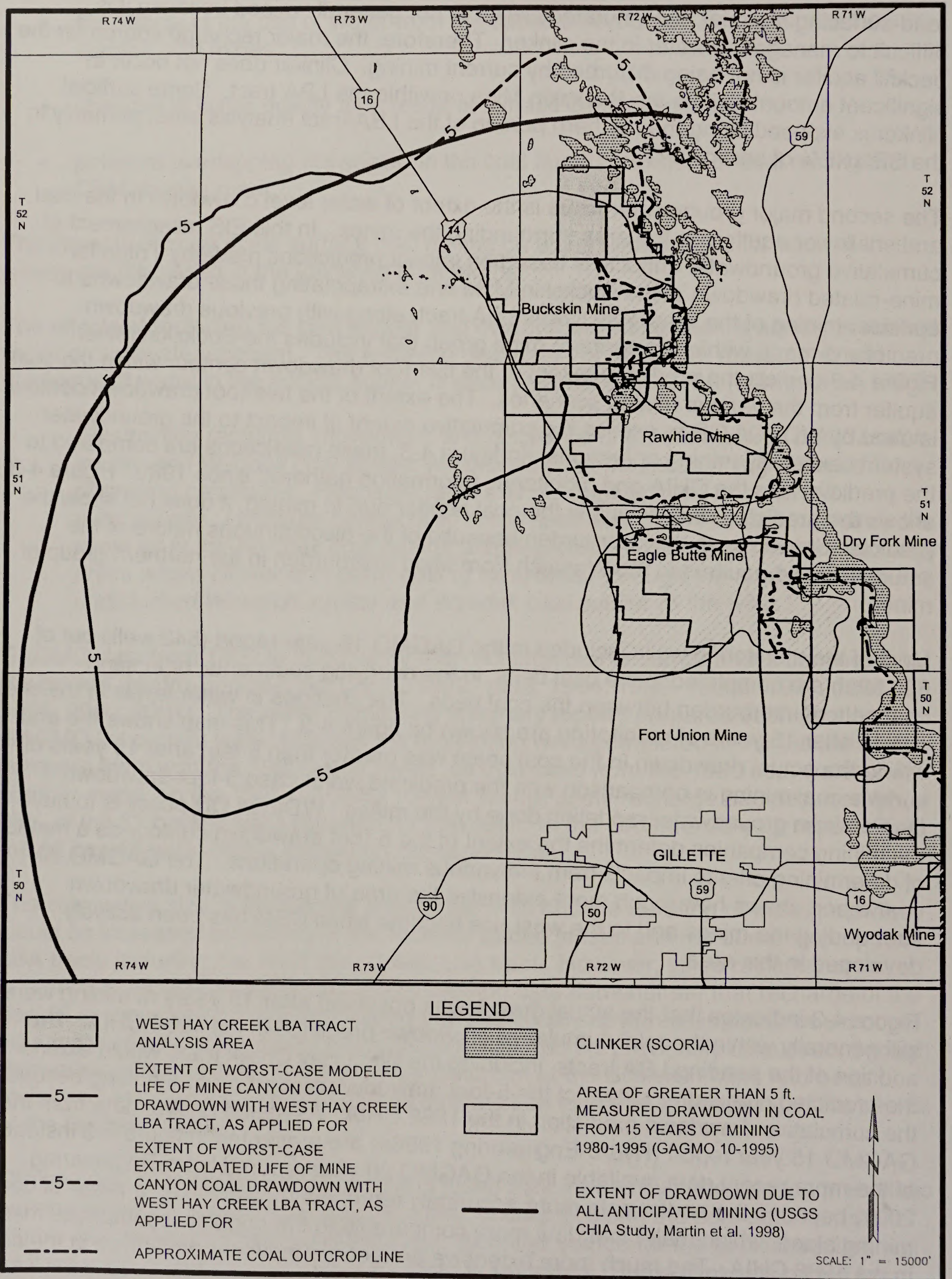


Figure 4-3. Modeled and Extrapolated Worst-Case Coal Aquifer Drawdown Scenarios Showing Extent of Actual 15-yr Drawdowns and USGS Predicted Cumulative Drawdowns.

identified in the GAGMO 20 year report reflects the impacts of nearby CBM activities as well as surface coal mining. The GAGMO 20-year monitoring data do not represent a valid comparison to the CHIA predictions, but they do demonstrate the cumulative impact of surface coal mining and CBM development on the groundwater resource.

The CHIA predicted the approximate area of 5 feet or more water level decline in the Wyodak coal aquifer which would result from "all anticipated coal mining". "All anticipated coal mining" at that time included 16 surface coal mines operating at the time the report was prepared and six additional mines proposed at that time. All of the currently producing mines, including the Buckskin Mine, were considered in the CHIA analysis (Martin et al. 1988). The study predicted that water supply wells completed in the coal may be affected as far away as eight miles from mine pits, although the effects at that distance were predicted to be minimal. Since the depth to coal increases to the west, most stock and domestic wells are completed in the overburden aquifers in the areas west of the mines. Of the 1,200 water supply wells within the maximum impact area defined in the CHIA study in 1987, about 100 were completed in the Wyodak coal aquifer as compared to 580 completed in Wasatch aquifers and about 280 in strata below the coal. There are no completion data available for the remainder of these wells (about 240). Coal companies are required by state and federal law to mitigate any water rights that are interrupted, discontinued, or diminished by mining.

The predicted cumulative effects of mining the LBA tract are depicted on figure 4-3. Based on the 1995 data, groundwater drawdown in the coal had coalesced into a nearly contiguous cone of depression around the Buckskin, Rawhide, Eagle Butte, and Dry Fork mines. Mining within the proposed West Hay Creek tract and the proposed Eagle Butte West Extension tract would expand this area of drawdown if these tracts are leased.

Wells in the Wasatch Formation overburden were predicted to be impacted by drawdown only if they were within 2,000 ft of a mine pit in the CHIA (Martin et al. 1988). Drawdowns occur farther from the mine pits in the coal than in the shallower aquifers because the coal is a confined aquifer that is areally extensive. The area in which the shallower aquifers (Wasatch Formation, alluvium, and clinker) experience a 5-foot drawdown would be much smaller than the area of drawdown in the coal because the shallower aquifers are generally discontinuous, of limited areal extent, and may be confined or unconfined.

If a maintenance lease is issued for the West Hay Creek LBA tract, prior to amending the tract into an existing WDEQ mine permit, the lessee would be required to conduct more detailed groundwater modeling to predict the extent of drawdown in the coal and overburden aquifers caused by mining the LBA tract. WDEQ/LQD would then use the drawdown predictions to update the CHIA for this portion of the PRB. The applicant has installed monitoring wells that would be used to confirm or refute drawdowns predicted by modeling. This modeling would be required as part of the WDEQ mine permitting procedure discussed in chapter 2.

Potential water-level decline in the subcoal Fort Union Formation is the third major groundwater issue. According to the Wyoming State Engineer's records as of July 1999, 14 mines held permits for 42 wells between 400 feet and 10,000 feet deep. The zone of completion of these wells was not specified, and not all of the wells were producing (for example, three of the permits were held by an inactive mine, and one of the wells permitted by the Black Thunder Mine has not been used since 1984).

Water level declines in the subcoal Tullock Aquifer have been documented in the Gillette area. According to Crist (1991), these declines are most likely attributable to pumpage for municipal use by Gillette and for use at subdivisions and trailer parks in and near the city of Gillette. Most of the water-level declines in the subcoal Fort Union aquifers occur within 1 mile of pumped wells (Crist 1991; Martin et al. 1988). The mine facilities in the PRB are separated by a distance of 1 mile or more, so little overlapping drawdown between mine supply wells would be expected.

In response to concerns voiced by regulatory personnel, several mines have conducted impact studies of the subcoal Fort Union Formation. The OSM commissioned a cumulative impact study of the subcoal Fort Union Formation to study the effects of mine facility wells on this aquifer unit (OSM 1984). Conclusions from all these studies are similar and may be summarized as follows:

Because of the discontinuous nature of the sands in this formation and because most large-yield wells are completed in several different sands, it is difficult to correlate completion intervals between wells.

In the Gillette area, water levels in this aquifer are probably declining because the city of Gillette and several subdivisions are using water from the formation (Crist 1991). (Note: Gillette mixes this water with water from wells completed in the deeper Madison Formation. Also, because drawdowns have occurred, some operators are able to dispose of CBM water by injecting it into the subcoal Fort Union Formation near the City of Gillette.)

Because of the large saturated thicknesses available in this aquifer unit, generally 500 feet or more, a drawdown of 100 to 200 feet in the vicinity of a pumped well would not dewater the aquifer.

The Buckskin Mine adjacent to the West Hay Creek LBA tract has a permit from the state engineer for two deeper Fort Union Formation water supply wells. If the LBA tract is leased and mined as proposed, additional water would be withdrawn from the Tullock Aquifer in the area of the Buckskin Mine. The withdrawal of additional water would not be expected to extend the area of water level drawdown over a significantly larger area due to the discontinuous nature of the sands in the Tullock Aquifer and the fact that drawdown and yield reach equilibrium in a well due to recharge effects.

The nearest nonindustrial Fort Union well to the Buckskin Mine facilities is over 4 miles away. Due to the distance involved, these wells have not experienced overlapping

drawdown and are not likely to in the future. The two Buckskin Mine facility wells would be in use for roughly 5 to 6 additional years if the West Hay Creek LBA tract is leased depending on which alternative is selected. Their annual water production would probably not increase.

According to the Wyoming SEO records, most of the permitted wells drilled below 1,000 feet in a 100 mi<sup>2</sup> area surrounding the LBA tract are either for mining, CBM, or oil and gas development. There are approximately nine wells serving subdivisions and local ranches, and there is one county well within this area. The Buckskin Mine does not anticipate drilling additional sub-coal water-supply wells if they acquire the LBA tract. Since, as discussed above, water-level declines in the subcoal Fort Union wells typically do not extend beyond 1 mile of pumped wells and the nearest nonindustrial well completed in the subcoal Fort union is over 4 miles away, no overlapping impacts to nonindustrial sub-coal water supply wells would be expected if the West Hay Creek LBA tract is leased and mined as proposed.

The fourth issue of concern with groundwater is the effect of mining on water quality. Specifically, what effect does mining have on the groundwater quality in the coal and overburden in the surrounding area, and what are the potential water quality problems in the backfill aquifer following mining?

In a regional study of the cumulative impacts of coal mining, the median concentrations of dissolved solids and sulfates were found to be larger in water from backfill aquifers than in water from either the Wasatch overburden or the coal aquifer (Martin et al. 1988). This is expected because blasting and movement of the overburden materials exposes more surface area to water, increasing dissolution of soluble materials, particularly when the overburden materials were situated above the saturated zone in the premining environment. Using data compiled from ten surface coal mines in the eastern PRB, Martin et al. (1988) also concluded that backfill groundwater quality improves markedly after the backfill is leached with one pore volume of water. The same conclusions were reached by Van Voast and Reiten (1988) after analyzing data from the Decker and Colstrip Mine areas in the Montana portion of the PRB. In general, the mine backfill groundwater TDS can be expected to range from 3,000 to 6,000 mg/L, similar to the premining Wasatch Formation aquifer, and meet Wyoming Class III standards for use as stock water.

One pore volume of water is the volume of water which would be required to saturate the backfill following reclamation. The time required for one pore volume of water to pass through the backfill aquifer is greater than the time required for the postmining groundwater system to reestablish equilibrium. According to the CHIA, estimates of the time required to reestablish equilibrium range from tens to hundreds of years (Martin et al. 1988).

Chemical analyses of 336 samples collected between 1981 and 1986 from 45 wells completed in backfill aquifers at ten mines indicated that the quality of water in the backfill will, in general, meet state standards for livestock use when recharge occurs

(Martin et al. 1988). The major current use of water from the aquifers being replaced by the backfill (the Wasatch and Wyodak Coal aquifers) is for livestock because these aquifers are typically high in dissolved solids in their premining state (Martin et al. 1988).

According to monitoring data published by GAGMO (Hydro-Engineering 1991a, 1991b, 1992, 1993, 1994, 1995, 1996b, 1997, 1998, 1999 and 2000), TDS values in backfill wells have ranged from 400 to 25,000 mg/L. Of the 48 backfill wells sampled in 1999 and reported in the 2000 annual GAGMO report (Hydro Engineering 2000), TDS in 75% were less than 5,000 mg/L, TDS in 23% were between 5,000 and 10,000 mg/L, and TDS in one well was above 10,000 mg/L. These data support the conclusion that water from the backfill will generally be acceptable for its current use, which is livestock watering, before and after equilibrium is established. The incremental effect on groundwater quality due to leasing and mining of the LBA tract would be to increase the total volume of backfill and, thus, the time for equilibrium to reestablish.

The fifth area of concern is the potential for cumulative impacts to groundwater resources in the coal due to the proximity of coal mining and CBM development. The Wyodak coal is being developed for both coal and CBM in the same general area. As discussed above, dewatering activities associated with existing CBM development have begun to overlap with and expand the area of groundwater drawdown in the coal aquifer in the PRB over what would occur due to coal mining alone.

Numerical groundwater flow modeling was used to predict the cumulative drawdown in the coal aquifer in the Wyodak CBM Project Final EIS (BLM 1999c), the Draft EIS and Draft Planning Amendment for the Powder River Basin Oil and Gas Project (BLM 2002), and the Final EIS and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project (BLM 2003a). The modeling considered coal mining and CBM development in order to assess cumulative impacts. Modeling was done to simulate mining with and without CBM development in order to differentiate the impacts of the two types of activities. Information from earlier studies was incorporated into the more recent modeling analyses.

As expected, the modeling showed that the groundwater impacts that would result from the proposed CBM development and surface coal mining would be additive in nature and would extend the area experiencing a loss in hydraulic head to the west of the mining area. The area between the CBM fields and the mines would be subject to cumulative drawdown from the two activities. The 20-year GAGMO report stated that drawdowns in all areas have greatly increased in the last few years due to the water production from the Wyodak coal aquifer by coal bed methane producers (Hydro-Engineering 2001).

Figure 4-4 shows the Buckskin Mine life-of-mine drawdown map with the maximum modeled drawdowns for year 2009 from the Wyoming PRB Oil and Gas Project EIS superimposed. These are modeled drawdowns for the upper Fort Union coal and are for the proposed action of drilling and operating 39,400 new CBM wells in addition to the 12,000 CBM wells that had been drilled when the analysis was prepared. The

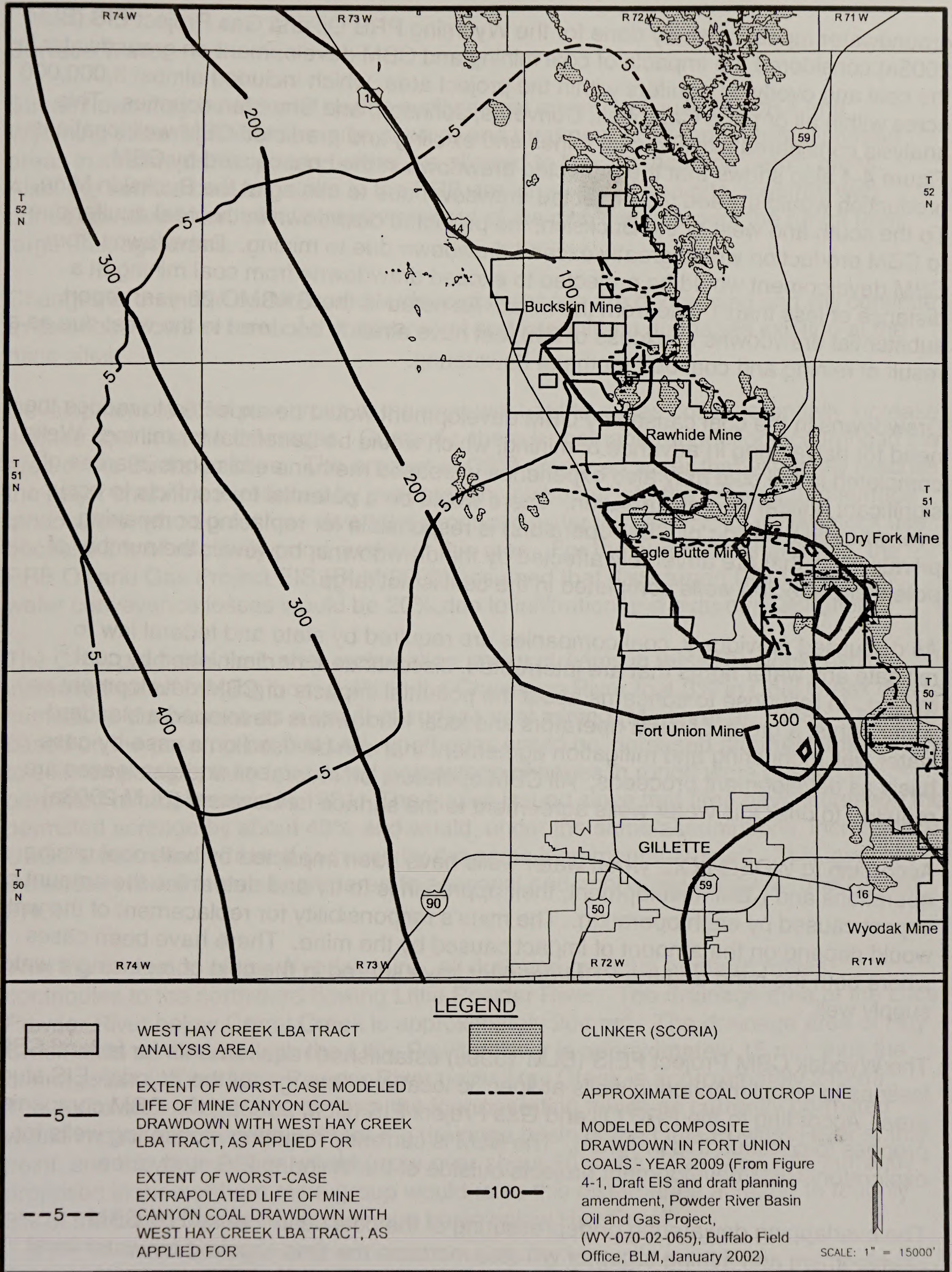


Figure 4-4. Life of Mine Drawdown Map with Maximum Modeled CBM Drawdown Contours Superimposed.

groundwater modeling study done for the Wyoming PRB Oil and Gas Project EIS (BLM 2003a) considered the impacts of coal mining and CBM development on groundwater in the coal and overlying aquifers within the project area, which included almost 8,000,000 acres within all or parts Campbell, Converse, Johnson, and Sheridan counties. This analysis considered existing coal mines and existing and predicted CBM well locations. Figure 4-4 also shows that the projected drawdown in the coal caused by CBM production would exceed the projected drawdown due to mining at the Buckskin Mine. To the south and west of the Buckskin, the projected drawdown in the coal aquifer due to CBM production would greatly exceed drawdown due to mining. Drawdowns from CBM development would be projected to exceed drawdowns from coal mining at a distance of less than 1 mile from the mine. As noted in the GAGMO 20-year report, substantial drawdowns in excess of 240 feet have already occurred to the west due as a result of mining and coal bed methane dewatering.

Drawdowns in the coal caused by CBM development would be expected to reduce the need for dewatering in advance of mining, which would be beneficial for mining. Wells completed in the coal may also experience increased methane emissions in areas of significant aquifer depressurization. There would be a potential for conflicts to occur over who (coal mining or CBM operators) is responsible for replacing or repairing private wells that are adversely affected by the drawdowns; however, the number of potentially affected wells completed in the coal is not large.

As discussed previously, coal companies are required by state and federal law to mitigate any water rights that are interrupted, discontinued, or diminished by coal mining. In response to concerns about the potential impacts of CBM development on water rights, a group of CBM operators and local landowners developed a standard water well monitoring and mitigation agreement that can be used on a case-by-case basis as development proceeds. All CBM operators on federal oil and gas leases are required to offer this water wells agreement to the surface landowners (BLM 2003a).

According to WDEQ/LQD, when water wells have been impacted by both coal mining operations and CBM development, their approach is to try and determine the amount of impact caused by each operation. The mine's responsibility for replacement of the well would depend on the amount of impact caused by the mine. There have been cases where both the mine and the CBM operator have shared in the cost of replacing a water supply well.

The Wyodak CBM Project FEIS (BLM 1999c) established requirements for federal CBM lessees to install monitoring wells at specific locations throughout the Wyodak EIS study area. According to the PRB Oil and Gas Project EIS (BLM 2003a), the CBM companies propose to continue this program. The BLM is currently requiring monitoring wells for exploratory CBM development projects outside of the Wyodak EIS study area.

The overlapping dewatering or depressuring of the coal seam caused by CBM development and mining together will also increase the time required for water-level recovery to occur after the CBM and mining projects are completed.



## Surface Water

Streamflows may be reduced during surface coal mining because SMCRA and Wyoming state regulations require capture and treatment of all runoff from disturbed areas in sedimentation ponds before it is allowed to flow off the mine permit areas. Also, the surface coal mine pits in the PRB are large, and these pits, together with ponds and diversions built to keep water out of the pits, can intercept the runoff from large drainage areas.

Changes in drainage patterns and surface disturbance are decreasing and will continue to decrease flows in most of the ephemeral and intermittent drainages existing at the mine sites.

Development of CBM resources in the area west of the mines could potentially increase surface flow in some drainages. Currently, there is methane production occurring in the area of the Buckskin Mine. The amount of CBM produced water that ultimately reaches the major channels is reduced by evaporation, infiltration into the ground, and surface landowners, who sometimes divert the produced water into reservoirs for livestock use because it is of relatively good quality in this area. For the purposes of analysis, the PRB Oil and Gas Project EIS (BLM 2003) assumed that discharged CBM produced water conveyance losses would be 20%, due to infiltration and evapotranspiration.

The CHIA predicted that, after reclamation, major streams in the PRB would exhibit increased runoff ranging from 0.4% in the Cheyenne River to 4.3% in Coal Creek due to cumulative disturbance as a result of surface coal mining (Martin et al. 1988). This was based on the assumption that unit runoff rates would be increased after reclamation due to soil compaction; these predicted percentage changes in runoff were based on permitted mine acreages in 1981. The leases issued since that time have increased the permitted acreage by about 40% and would, under the same assumptions, increase the USGS's estimates of runoff increase by the same incremental amount. This level of increase in runoff is small compared to seasonal and annual variability of runoff in the PRB.

With the exception of the Wyodak Mine, all drainage from the northern mines contributes to the northward flowing Little Powder River. The drainage area of the Little Powder River below Corral Creek is approximately 204 mi<sup>2</sup>. The drainage area of Hay Creek at its confluence with the Little Powder River is approximately 15 mi<sup>2</sup>; thus the drainage area of the Little Powder River below Hay Creek is approximately 219 mi<sup>2</sup>. The entire area of disturbance from the four operating mines as currently permitted would impact approximately 7% of the drainage basin of the Little Powder River at this point, and this disturbance would occur over about 50 years. The two LBAs currently proposed in the northern mine group would raise this disturbance acreage to roughly 8% of the Little Powder River drainage basin below Hay Creek.

Sediment concentrations should not increase significantly in area streams as a result of

surface coal mining operations even with the addition of mining the pending Buckskin Mine West Hay Creek and Eagle Butte Mine West Extension LBA tracts because state and federal regulations require that all surface runoff from mined lands pass through sedimentation ponds.

The final PRB Oil and Gas Project EIS estimates that the peak year of CBM water production in the Little Powder River sub-watershed would occur in 2005 (BLM 2003). In that year, under the Final PRB Oil and Gas Project EIS preferred alternative (Alternative 2-A), an estimated 2,543 CBM wells would be producing at an average rate of 6.2 gpm per well. The amount of produced water projected to reach the main stem of the Little Powder River sub-watershed during the peak year of CBM water production would be about 19 cfs (13,757 acre-feet /year) based on the modeling done for that EIS. The confluence of Hay Creek, which flows through the West Hay Creek LBA tract, with the Little Powder River is located about 3 miles east of the LBA tract, and some of this CBM produced water would be expected to move through Hay Creek. These CBM water discharges would be expected to be more constant than the naturally occurring flows, which fluctuate widely on a seasonal and annual basis.

The CBM discharges could result in erosion and degradation of small drainages, which could affect water quality and channel hydraulic characteristics. From a surface water standpoint, the increased flows due to CBM discharges and the reduced flows due to surface coal mining tend to offset each other. The CBM development is taking place upstream from the mines. Provisions the mines have taken to prevent water from entering the pits (storage ponds or diversions) could be adversely affected by having to deal with flows that were not included in designs or that change conditions for future designs.

### **Alluvial Valley Floors**

No cumulative impacts to alluvial valley floors are expected to occur as a result of surface coal mining in this area. Surface coal mining operations are not permitted to impact designated AVFs if the AVF is determined to be significant to agriculture. AVFs that are not significant to agriculture can be disturbed during mining but they must be restored as part of the reclamation process. Impacts during mining, before the AVF is restored, would be expected to be incremental, not additive.

### **Wetlands**

Wetlands are discrete features that are delineated on the basis of specific soil, vegetation, and hydrologic characteristics. Wetlands within areas of coal mining disturbance are impacted; wetlands outside the area of disturbance are generally not affected unless their drainage areas (hence, water supplies) are changed by mining. Therefore, the impacts to wetlands as a result of surface coal mining are mostly incremental, not additive as are impacts to groundwater and air quality. Increasing the area to be mined would increase the number of wetlands that would be impacted.

COE requires replacement of all jurisdictional wetlands impacted by surface coal mining operations in accordance with section 404 of the Clean Water Act and determines the number of acres to be restored. COE considers the type and function of each jurisdictional wetland that will be impacted and may require restoration of additional acres if the type and function of the restored wetland will not completely replace the type and function of the original wetland. As part of the mining and reclamation plans for each mine, COE approves the plan to restore the wetlands and the number of acres of wetlands to be restored. WDEQ/LQD allows and sometimes requires mitigation of nonjurisdictional wetlands affected by mining, depending on the values associated with the wetland features. Replacement of functional wetlands may occur in accordance with agreements with the surface managing agency (on public land) or by the private landowners. No public lands are included in the West Hay Creek LBA tract. During mining and before replacement of wetlands, all wetland functions would be lost. The replaced wetlands may not function in the same way as the premine wetlands did; however, all wetlands would be replaced in accordance with COE requirements.

### Vegetation

Most of the land that is being or would be disturbed is sandy prairie grassland, big sagebrush shrubland or agricultural pasturelands and croplands. These vegetation types account for 86% of the LBA analysis area lands. The primary land use in this area is grazing and wildlife habitat. Rangeland is, by far, the predominant land use in the PRB, comprising 92% of the land use in Converse and Campbell counties. At the completion of surface coal mining operations, it is anticipated that all disturbed land would be reclaimed to a condition equal to or greater than the highest previous use. Reclamation is being and would be conducted to restore the previous grazing, wildlife, cropland pastureland and other miscellaneous uses. Reclaimed vegetation types would be mostly in the form of upland grasslands, big sagebrush shrublands, and silver sagebrush shrublands. Where appropriate, cropland, pastureland, and riparian types would be established in approximate relationship to their premining components. Some of the minor vegetation community types, such as those occurring on rough breaks, would not be restored to premining conditions but may be replaced to a higher level due to use of better quality soils.

Based on annual reports prepared by mining companies and submitted to WDEQ, in any given year approximately 8,000 acres of land disturbed by mining activities at the five active northern surface coal mines would not be reclaimed to the point of planting with permanent seed mixtures. Over the life of the five active northern mines, a total of about 25,000 acres would be disturbed. This disturbed area includes all existing federal, state, and private coal leases. Most all of this acreage is native rangeland and would be returned to that state by planting WDEQ/LQD-approved revegetation seed mixtures as required. The 26% that is either agricultural cropland or pastureland and could be reclaimed as such.

Several impacts to vegetation would occur as a result of operations at the five northern mines. Most of the surface disturbance would occur in two vegetation types: upland

grassland (various types) and Wyoming big sagebrush. All five northern mines, including the Buckskin Mine plan to restore these two types as required by law. It is estimated that it would take from 20 to 100 years for big sagebrush density to reach premining levels. The big sagebrush component provides important wildlife habitat (particularly for mule deer, pronghorn, and sage grouse). A reduction in acreage of big sagebrush vegetation type reduces the carrying capacity of the reclaimed lands for pronghorn and sage grouse populations. Mule deer should not be affected since they are not as abundant in this area.

Although some of the less extensive native vegetation types such as riparian bottomland would be restored during reclamation, the treated grazing lands would not. Following reclamation and release of the reclamation bond, privately owned surface lands would be returned to agricultural management. The areas with reestablished native vegetation could again be subject to sagebrush management practices.

Community and species diversities would initially be lower on reclaimed lands. The shrub components would take the longest to be restored to premining conditions. Shrub cover and forage values would gradually increase in the years following reclamation. Over longer periods of time, species re-invasion and shrub establishment on reclaimed lands should largely restore the species and community diversity on these lands to premining levels.

Over the long term, the net effect of the cumulative mine reclamation plans may be the restoration, at least in part, of all vegetation types originally found in the area. However, the shrub component may be substantially reduced in aerial extent. Shrubs are relatively unproductive for livestock but very important for wildlife. All of the vegetation types found in the analysis area are fairly typical for this region of eastern Wyoming.

Vegetation disturbance associated with the proposed CBM development would be more widespread but less intensive and would also be reclaimed. Areas of vegetation disturbance would also be associated with the proposed power plants and railroad line.

The importation and spread of noxious weeds is of concern throughout Wyoming, including the PRB. Noxious weed introduction may be facilitated by energy development as well as by recreational and agricultural activities. Infestation by species of noxious weeds has the potential to alter distribution of vegetation types and, accordingly, alter wildlife habitat distribution and affect wildlife populations in the PRB. The distribution and spread of many plant species of concern are currently being monitored by the Wyoming Cooperative Agricultural Pest Survey in association with county weed and pest districts and the Wyoming Department of Agriculture. As discussed previously, the approved mining and reclamation plans for the existing mines include plans to control invasion by weedy (invasive nonnative) plant species. The amended mining and reclamation plans for the West Hay Creek LBA tract would also include steps to control invasion from such species. Oil and gas operators are being required to submit Integrated Pest Management Plans addressing control of weedy

plant species as part of their applications to drill on federal oil and gas leases (BLM 2003c).

## Wildlife

The direct impacts of surface coal mining on wildlife occur during mining and are therefore short-term. They include road kills by mine-related traffic, restrictions on wildlife movement created by fences, spoil piles and pits, and displacement of wildlife from active mining areas. The indirect impacts last longer and include loss of carrying capacity and microhabitats on reclaimed land due to flatter topography, less diverse vegetative cover, and reduction in sagebrush density.

After mining and reclamation, alterations in the topography and vegetative cover, particularly the reduction in sagebrush density, cause a decrease in carrying capacity and diversity on reclaimed lands. Sagebrush would gradually become reestablished on the reclaimed land, but the topographic changes would be permanent.

Cumulative impacts to most wildlife would increase as additional habitat is disturbed but would moderate as more land is reclaimed. Raptor and grouse breeding areas have been diminishing statewide for at least the last 30 years partly due to surface-disturbing activities. Coal mining and oil and gas exploration and development, including CBM, have been identified as potential contributors to the decline in their breeding habitat. Therefore, surface occupancy and disturbance restrictions, as well as seasonal restriction stipulations, have been applied to operations occurring on or near these crucial areas on public lands. These restrictions have helped protect important raptor and grouse habitat on public lands, but the success of yearlong restrictions on activities near areas critical to grouse has been limited in the PRB where most of the surface is privately owned. Erection of nesting structures and planting of trees on reclaimed land will gradually replace raptor nesting and perching sites; restoration of sagebrush helps replace sagebrush habitat. There is no crucial habitat for waterfowl or fish on the mine sites. Small- and medium-sized animals would move back into the areas once reclamation is completed.

Numerous grazing management projects (fencing, reservoir development, spring development, well construction, vegetative treatments) have also impacted wildlife habitat in the area. The consequences of these developments have proven beneficial to some species and detrimental to others. Fencing has aided in segregation and distribution of livestock grazing, but sheep-tight woven wire fence has restricted pronghorn movement. Water developments are used by wildlife, but without proper livestock management, many of these areas can become overgrazed. The developed reservoirs provide waterfowl, fish, and amphibian habitat. Vegetation manipulations have included the removal or reduction of native grass-shrublands and replacement with cultivated crops (mainly alfalfa/grass hay), as well as a general reduction of shrubs (mainly sagebrush) in favor of grass. These changes have increased spring and summer habitat for grazing animals but have also reduced the important shrub component that is critical for winter range, thus reducing over winter survival for big

game and sage grouse. The reduction in sagebrush has been directly blamed for the downward trend in the sage grouse populations.

The regional EISs (BLM 1974, 1979, and 1981) predicted significant cumulative impacts to pronghorn from existing concentrated mining and related disturbance as a result of habitat disturbance and creation of barriers to seasonal and daily movements. Significant cumulative indirect impacts were also predicted because of increased human population and access resulting in more poaching, increased vehicle/pronghorn collisions, and increased disturbance in general. However, the WGFD recently reviewed monitoring data collected on mine sites for big game species and the monitoring requirements for big game species on those mine sites. Their findings concluded that the monitoring had demonstrated the lack of impacts to big game on existing mine sites. No severe mine-caused mortalities have occurred, and no long-lasting impacts on big game have been noted on existing mine sites. The WGFD recommended that big game monitoring be discontinued on all existing mine sites. New mines will be required to conduct big game monitoring if located in crucial winter range or in significant migration corridors.

Leasing the West Hay Creek LBA tract would increase the area of habitat disturbance in the northern group of mines by approximately four percent and would enlarge the area where daily movement is restricted.

The West Hay Creek LBA tract is within the Gillette Antelope Herd Unit, which is located north of Interstate 90 between Wyoming 59 and the Powder River. The mining operations within the Gillette antelope herd unit are the Buckskin Mine, Eagle Butte Mine, and the Rawhide Mine. These mines will cumulatively disturb approximately 18,000 acres based on existing leases. If the West Hay Creek LBA tract is leased, the estimated mining disturbance to yearlong pronghorn range within the Gillette antelope herd unit would increase by about 900 acres to about 18,900 acres.

The area of active mining in the northern group of mines contains substantial numbers of raptor nests. The largest concentration of nesting activity in the area is associated with the rough breaks country and areas where trees have become established. Raptor mitigation plans are included in the approved mining and reclamation plans of each mine. The raptor mitigation plan for each mine is subject to FWS review and approval before the mining and reclamation plan is approved. Any nests that will be impacted by mining operations must be relocated in accordance with these plans after special use permits are secured from FWS and WGFD. The creation of artificial raptor nest sites and raptor perches may ultimately enhance raptor populations in the mined area. On the other hand, where power poles border roads, perched raptors may continue to be illegally shot, and continued road kills of scavenging eagles may occur. Any influx of people into previously undisturbed land may also result in increased disturbance of nesting and fledgling raptors.

There may be cumulative impacts to raptors as a result of CBM development on and adjacent to the existing coal mining operations. Under the proposed action and the

preferred alternative, the West Hay Creek LBA tract would be leased as a maintenance tract to the Buckskin Mine. As a result, construction of power lines and increases in vehicular traffic related to removing coal from the LBA tract would be limited. However, CBM development on and adjacent to the LBA tract has and will continue to result in construction of new power lines in the area of the existing mines in this area. Where power poles border roads, perched raptors may be illegally shot. The regulations require that surface coal mine operators use the best technology currently available to ensure that electric power lines are designed and constructed to minimize electrocution hazards to raptors. Many of the power lines for CBM development are being constructed underground. CBM development has also resulted in increases in vehicular traffic in and around the existing mining operations. Increases in vehicular traffic may result in increased road kill and associated increases in collisions with bald eagles or other raptors feeding on carrion. In the biological and conference opinion for the Powder River Basin Oil and Gas Project, the FWS states that they believe that "as a direct result of the construction of approximately 7,136 miles of new improved roads and 5,311 miles of overhead distribution lines, there will be direct loss of bald eagles" in the PRB (FWS 2002).

Cumulative impacts to waterfowl from already approved mining, as well as the proposed LBA tract, would be negligible because most of these birds are transient and most of the ponds are ephemeral. In addition, the more permanent impoundments and reservoirs that are impacted by mining would be restored. Sedimentation ponds and wetland mitigation sites would provide areas for waterfowl during mining.

Few vital sage grouse wintering areas or leks have been, or are planned to be, disturbed as a result of already approved mining in this area. No active leks would be disturbed if the West Hay Creek LBA tract is leased and mined. One sage grouse lek has been identified and monitored in the currently approved Buckskin Mine mining and reclamation permit area (in section 16; figure 3-13), but this lek has been inactive for all but one year in surveys conducted since 1995. Wintering habitat is limited in the analysis area. The addition of the LBA tract to the area to be disturbed by the currently approved mining operations at the Buckskin Mine would affect sage grouse nesting habitat during mining. Noise related to the mining activity could indirectly impact sage grouse reproductive success. Sage grouse leks close to active mining could be abandoned if mining-related noise elevates the existing ambient noise levels. Surface coal mining activity is known to contribute to a drop in male sage grouse attendance at leks close to active mining. Over time this can alter the distribution of breeding grouse (Remington and Braun 1991). The direct and indirect impacts of mining encroachment on the grouse population are not clear at this time. An independent research project is underway to investigate how sage grouse use the landscape in the vicinity of active coal mines and how lands can be reclaimed to benefit those populations. Grouse in the North Antelope/Rochelle Complex area are the focus of this study, which is being conducted by Thunderbird Wildlife Consulting and is being funded by Powder River Coal Company, Thunder Basin Coal Company, Triton Coal Company, LLC, AML Research, and WGFD.

Currently approved and proposed surface coal mining and other existing and proposed future activities such as oil and gas development (including conventional and CBM development), agricultural activities (including sagebrush treatment), industrial development (including existing and proposed power plants) and urban development (including construction associated with increasing population), may cumulatively result in increases in sage grouse mortality; sage grouse displacement and harassment, physical degradation or destruction of sage grouse leks and nesting and brooding areas, and sagebrush habitat fragmentation. Some of the disturbance areas would be in the process of being reclaimed as new disturbances are initiated. Sage grouse population levels in reclaimed areas may not reach predisturbance levels.

The existing and proposed mines in the northern PRB would cumulatively cause a reduction in habitat for other mammal and bird species. Many of these species are highly mobile, have access to adjacent habitats, and possess a high reproductive potential. Habitat adjacent to existing and proposed mines includes sagebrush shrublands, upland grasslands, bottomland grasslands, improved pastures, haylands, croplands, wetlands, riparian areas, and ponderosa pine woodlands. As a result, these species should respond quickly and invade suitable reclaimed lands as reclamation proceeds. A research project on habitat reclamation on mined lands within the PRB for small mammals and birds concluded that the diversity of song birds on reclaimed areas was slightly less than on adjacent undisturbed areas, although their overall numbers were greater (Shelley 1992).

Local drainages are generally characterized by intermittent or ephemeral flows and have limited value for aquatic species under natural conditions. Flows in some of these drainages, including Hay Creek, have increased or can be expected to increase and become more constant as a result of the influx of CBM-produced waters and this would be expected to continue. This habitat change may alter the existing habitats for aquatic species in these streams and disrupt fish species distribution in the ephemeral creeks in this area, including Hay Creek, and downstream to the Little Powder River.

The entire area of disturbance from the five operating mines in this area, as currently permitted, would impact approximately 7% of the drainage basin of the Little Powder River, and this disturbance would occur over about 50 years. Other current, proposed, and future activities in the area include oil and gas development and agriculture. The combined effects of these activities on the area's waterways could include fluctuations in natural streamflow and changes in water quality, including increases in sedimentation, salt concentrations, and other contaminants. Cumulative impacts may include changes in species' habitats and diversity. The Dry Fork of the Little Powder River has historically supported a small trout population in its upper reach. Some of the permanent pools along the intermittent and ephemeral drainages, like McGee Reservoir on the LBA tract, support minnows and other nongame fish. The larger impoundments and streams in the area which have fish populations would be restored following mining.

Additional discussions of cumulative impacts to wildlife from coal development and industrialization of the eastern PRB are included in BLM regional EISs for the area



(BLM 1974, 1979, and 1981), and these documents are incorporated by reference into this EIS. The impacts predicted in these documents have generally not been exceeded. Recent findings by the WGFD have revealed that impacts of mining on big game have been minimal. No severe mine-caused mortalities have occurred and no long-lasting impacts on big game have been noted on existing mine sites. The WGFD recommended that big game monitoring be discontinued on all existing mine sites. New mines will be required to conduct big game monitoring if located in crucial winter range or in significant migration corridors, neither of which apply to the LBA tract.

The cumulative impacts of mining the LBA tract would be assessed within the WGFD's and the WDEQ/LQD's review of the mine permit application and the WDEQ/LQD's permit approval process.

### **Threatened, Endangered, and Proposed Wildlife Species**

These are discussed in appendix G.

### **Land Use and Recreation**

Surface coal mining reduces livestock grazing and wildlife habitat, limits access to public lands that are included in the mining areas, and disrupts oil and gas development. In addition, when oil and gas production facilities, such as pipelines and pumping equipment are present on coal leases, these associated facilities and equipment must be removed prior to mining. If the coal is mined before all of the CBM resources are recovered, the CBM resource are released into the atmosphere. The potential impacts of conflicts between CBM and coal development are discussed in the "Geology and Minerals" section in this chapter.

Cumulative impacts resulting from energy extraction in the PRB include a reduction of livestock grazing and subsequent revenues, a reduction in habitat for some species of wildlife (particularly pronghorn, sage grouse and mule deer), and loss of recreational access to public lands (particularly for hunters).

There are no recreation areas, wilderness areas, etc. in the immediate vicinity of the existing northern group of mines, and the majority of the land is seldom used by the public except for dispersed recreation (hunting), off-road vehicles, and sightseeing. Hunting and other public access is generally limited inside of the mine permit areas for safety reasons. The majority of the land surface in the Powder River Basin in general, and in the northern group of mines specifically, is private and access is controlled by the landowner.

Energy development has been the primary cause of human influx into the eastern PRB and energy-development-related indirect impacts to wildlife have and will continue to result from human population growth. The increased human presence associated with the cumulative energy development in the PRB has likely increased levels of legal and illegal hunting. Conversely, the surface coal mines in Converse and Campbell Counties

have become refuges for big game animals during hunting seasons since they are often closed to hunting. As discussed in chapter 3, the major historical management problem with the Gillette antelope herd unit, which includes the West Hay Creek LBA tract, and the Buckskin, Eagle Butte, and Rawhide mines, is the ability to achieve an adequate harvest, according to WGFD. Reclaimed areas provide attractive forage areas for big game.

The demand for outdoor recreational activities, including hunting and fishing, has increased proportionately as population has increased. However, at the same time as these demands have been increasing, wildlife habitat and populations have been reduced. This conflict between decreased habitat availability and increased recreational demand has had (or may have) several impacts: demand for hunting licenses may increase to the point that a lower success in drawing particular licenses will occur, hunting and fishing may become less enjoyable due to limited success and overcrowding; poaching may increase; and the increase in people and traffic has and may continue to result in shooting of nongame species and road kills. Increased off-road activities have and will continue to result in disturbance of wildlife during sensitive wintering or reproductive periods.

Campbell County's public recreation facilities are some of the most extensively developed in the Rocky Mountain region, and use by young, recreation-oriented residents is high. The relatively strong financial position of the county recreation program appears to assure future recreation opportunities for residents regardless of the development of the LBA tract or other specific mining or energy-related development.

### **Cultural Resources**

In most cases, treatment of eligible cultural sites is confined to those that would be directly impacted, while those that may be indirectly impacted receive little or no consideration unless a direct development-associated effect can be established. The higher population levels associated with coal and oil and gas development coupled with increased access to remote areas can result in increased vandalism both on and off mine property. Development of lands in which coal is strip-mineable (shallow overburden) may contribute to the permanent unintentional destruction of segments of the archeological record.

A majority of the recorded cultural resource sites in the PRB are known because of studies at existing and proposed coal mines. An average density estimate of 8.5 sites per mi<sup>2</sup> (640 acres) can be made based on inventories at existing mines in the area, and approximately 25% of these sites are typically eligible for the NRHP. Approximately 580 cultural resource sites will be impacted by already-approved mines, with an estimated 86 of these sites being eligible for nomination to the NRHP. Clearly, a number of sites eligible for nomination to the NRHP have been or will be impacted by coal mining operations within the PRB. Ground disturbance, the major impact, can affect the integrity of or destroy a site. Changes in setting or context greatly impact

historical properties. Mitigation measures such as stabilization, restoration, or moving of buildings may cause adverse impacts to context, in-place values, and overall integrity. Additionally, loss of sites through mitigation can constitute an adverse impact by eliminating the site from the regional database and/or affecting its future research potential.

Beneficial results or impacts can also occur from coal development. Valuable data are collected during cultural resource surveys. Data that would otherwise not be collected until some time in the future, or lost in the interim, are made available for study. Mitigation also results in the collection and preservation of data that would otherwise be lost. The data that have been and will be collected provide opportunities for regional and local archeological research projects.

### **Native American Concerns**

No cumulative impacts to Native American traditional values or religious sites have been identified as a result of the leasing and subsequent mining of federal coal in the PRB.

### **Paleontological Resources**

Impacts to paleontological resources as a result of the already-approved cumulative energy development occurring in the PRB consist of losses of plant, invertebrate, and vertebrate fossil material for scientific research, public education (interpretive programs), and other values. Losses have resulted and will result from the destruction, disturbance, or removal of fossil materials as a result of energy-related surface-disturbing activities, including surface coal mining, as well as unauthorized collection and vandalism. A beneficial impact of energy-related surface disturbance can be the exposure of fossil materials for scientific examination and collection, which might never occur except as a result of overburden removal, exposure of rock strata, and mineral excavation.

### **Visual Resources**

A principal visual impact in this area is the visibility of mine pits and facility areas. People most likely to see these facilities would either be passing through the area or visiting it on mine-related business. Except for the loading facilities, the pits and facilities are not visible from more than a few miles away. Although oil and gas drilling and production facilities are less visually intrusive, they are also visible in the area.

After mining, the reclaimed slopes might appear somewhat smoother than premining slopes; there would be fewer gullies than at present. Even so, the landscape of the reclaimed mines would look very much like undisturbed landscape in the area.

## Noise

Existing land uses within the PRB (mining, livestock grazing, oil and gas production, transportation, and recreation) contribute to noise levels, but wind is generally the primary noise source. Mining-related noise is generally masked by the wind at short distances, so cumulative overlap of noise impacts between mines is not likely.

Recreational users and grazing lessees using lands surrounding active mining areas do hear mining-related noise; but this has not been reported to cause a significant impact. As stated above, wildlife in the immediate vicinity of mining may be adversely affected by noise; however, observations at other surface coal mines in the area indicate that wildlife do adapt to noise conditions associated with active coal mining.

Cumulative increases in noise from trains serving the PRB mines have caused substantial increases (more than five dBA) in noise levels along segments of the rail lines over which the coal is transported to markets. However, no significant adverse impacts have been reported as a result

## Transportation Facilities

New or enhanced transportation facilities (roads, railroads, and pipelines) are expected to occur as a result of energy development in the Powder River Basin. The transportation facilities for the existing mines are already in place. Construction of new rail facilities for transporting coal out of the PRB, such as the proposed DM&E railroad, would add another route of coal transportation out of the basin but would not be expected to increase the number of coal trains without an increase in market demand for the coal. Traffic levels from the mines would be maintained for a longer periods when new coal leases are issued to existing mines. Oil and gas pipelines on federal coal tracts that are leased would have to be relocated or removed prior to mining.

## Socioeconomics

Because of all the energy-related development that has occurred in and around Campbell County during the past 30 years, socioeconomic impacts are a major concern. Wyoming's economy has been structured around the basic industries of extractive minerals, agriculture, tourism, timber, and manufacturing. Each of these basic industries is important, and the extractive mineral industry has long been a vital part of Wyoming's economy. Many Wyoming communities depend on the mineral industry for much of their economic well-being. The minerals industry is by far the largest single contributor to the economy of Wyoming. For example, the 2002 valuation on minerals produced in 2001 was \$6,738,726,062 or 60% of the state's total valuation (Wyoming Department of Revenue 2002). Wyoming ranks among the top ten mineral producing states in the nation. Because most minerals are taxed as a percentage of their assessed valuation, the mineral industry is a significant revenue base for both local and state government in Wyoming.

Between 1990 and 2002, coal production in the Powder River Basin increased by an average of 7.1% per year. WGS is currently projecting that coal production in Campbell County will increase by about 1% per year for the years 2004 through 2007 (WGS 2003-*Geo-Notes* 78). In 2002, Wyoming coal supplied approximately 37% of the United States' steam coal needs (DOE 2003). In 2002, PRB coal was used to generate electricity for public consumption in 35 states and Canada (DOE 2003). Electricity consumers in those states benefit from low prices for PRB coal, from cleaner air due to the low sulfur content of the coal, and from the royalties and bonus payments that the federal government receives from the coal.

Locally, continued sale of PRB coal helps stabilize municipal, county, and state economies. By 2005, annual coal production is projected to generate about \$2.6 billion of total economic activity, including \$351 million of personal income, and support the equivalent of nearly 15,885 full-time positions (BLM 1996a).

In addition to the West Hay Creek LBA tract a number of mineral and related developments have occurred, are in progress, or are anticipated in Campbell County and the surrounding area. The 90 MW Wygen I coal-fired power plant was recently constructed near the Wyodak Mine east of Gillette. The Black Hills Corporation is currently permitting a second coal-fired plant, the 500-MW Wygen II coal-fired power plant, also to be located near the Wyodak Mine. (Black Hills Corporation 2001). NAPG has proposed the construction of three coal-fired power plants in Campbell County: the 300-MW Two Elk and the 500-MW Two Elk Two plants near the Black Thunder Mine, and the 500-MW Middle Bear plant near the Cordero-Rojo Mining Complex. In addition, NAPG has proposed the construction of a power line that would link its proposed 500-MW power plants with interstate transmission lines in the front range of Colorado. According to Pedersen Planning Consultants (2001), power plant development between 2001 and 2010 could bring over 6,000 temporary and 450 permanent jobs to Campbell County alone.

The DM&E Railroad Corporation has proposed the construction of a rail line connecting its existing facilities in South Dakota and Minnesota with PRB coal mines. The lead regulatory agency for the expansion project, the Surface Transportation Board, granted final approval in January 2002 but must address several issues that were remanded back to the agency for further review as a result of lawsuits that were filed against the proposal. DM&E must still obtain permits or approvals from other agencies including the BLM, USFS, and COE. For Wyoming, the estimated direct-construction workforce is 700 persons for the estimated \$1.5 billion project.

Recently, Gillette experienced a population increase as a result of CBM development in the area. In the past several years, Gillette's population has increased, unemployment has decreased, housing has become increasingly tight, and traffic and criminal activity have increased. Coal mining employment has been gradually increasing, but has just reached the level predicted for 1990 in the 1979 regional EIS (see Table 4-6). Under the proposed action for the Wyoming Oil and Gas Project FEIS (BLM 2003), it is estimated that the anticipated CBM development would require 2,047 workers (1,974

direct and 67 indirect) for a 20-year project life. The increasing population in Gillette has increased the demand for housing which has resulted in a very low housing vacancy rate in the city.

If all of the new projects are undertaken, it is likely that the population in northeastern Wyoming would continue to grow, and there would be increasing demands on housing, schools, roads, and law enforcement in the communities in this area. The population increase would be expected to be somewhat dispersed among all of the communities in the area, including Douglas, Wright, and Newcastle as well as Gillette. The extent of the impacts to the local communities would depend on the amount of overlap between the construction periods on the proposed projects. In a 2001 study of future housing needs in Campbell County (Pederson Planning Consultants 2001), it was estimated that increases in CBM development and surface coal mine employment, coupled with the construction of currently proposed power plants, could increase housing demand in Campbell County by over 5,000 housing units, with the peak occurring in about 2005, however, delays in power plant and railroad permitting and construction have altered past predictions of the timing and magnitude of population and housing demand in Campbell County. None of the proposed power plants is currently under construction. Although the timing of their construction and operation has been delayed in the past few years, based on the status of their planning and permitting efforts, the Black Hills Corporation, Inc. Wygen II coal-fired power plant, the NAPG Two Elk coal-fired power plant, and the proposed DM&E rail line are considered reasonably foreseeable developments based on the status of their planning and permitting efforts. Construction of other proposed plants would be dependent on completion of permitting requirements and availability of financing. Construction of the proposed DM&E railroad also depends on completion of permitting requirements and availability of financing as well as resolution of legal issues. Increases in mining employment have been gradual and would potentially occur gradually as new coal leases are issued to existing mines and are permitted for mining.

The construction of coal-fired power plants and the DM&E railroad expansion and continued CBM development would result in direct fiscal benefits to city, county, and state governments. Equipment and facilities would be subject to excise (sales and use) and ad valorem (property) taxes. Counties that have a major construction project of \$50 million or larger also receive extra revenues in the form of impact assistance. For example, according to an article in the *Gillette News-Record*, if the three NAPG power plants are constructed as proposed, Campbell, Converse, Weston, and Crook counties could receive as much as \$11 million in impact assistance (*Gillette News-Record* 2001).

## **SHORT-TERM USE OF THE ENVIRONMENT VS. LONG-TERM PRODUCTIVITY**

From 2004 on, the Buckskin Mine plans to produce coal at an average production level of 25 million tons per year for 12.4 years under the No Action Alternative, for 17.6 years under the proposed action, up to 18.0 years under the preferred alternative, or for 17.6 years under alternative 3 (table 2-1). As the coal is mined, almost all components of the present ecological system, which have developed over a long period of time, would be

Coal is a major source of electricity generation in the US. Emissions from coal-fired power plants are sources of pollution and may contribute to global warming. The Buckskin Mine plans to produce the coal included in the LBA tract at currently permitted levels using existing production and transportation facilities. As a result, leasing the West Hay Creek LBA tract under the proposed action or preferred alternative would not be expected to result in increased or new emissions from coal-fired power plants.

There would be a deterioration of the groundwater quality in the lease area following mining and reclamation, but the water quality would still be adequate for livestock and wildlife. The deterioration would probably persist over a long period of time. During mining, depth to groundwater would increase in the coal aquifer for a distance away from the pits. The water levels in the coal aquifer should return to premining levels at some time (probably less than 100 years) after mining has ceased.

Mining operations and associated activities would degrade the air quality and visual resources of the area on a short-term basis. Following coal removal, removal of surface facilities, and completion of reclamation, there would be no long-term impact on air quality. The long-term impact on visual resources would be negligible.

Short-term impacts to recreation values may occur from reduction in big game populations due to habitat disturbance. These changes would primarily impact hunting in the lease area. However, because reclamation would result in a wildlife habitat similar to that which presently exists, there should be no long-term adverse impacts on recreation.

The proposed action, the preferred alternative, and alternative 3 would extend the life of Buckskin Mine by about 5.2, up to 5.6, and 5.2 years, respectively, thereby enhancing the long-term economy of the region.

## **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

The major commitment of resources would be the mining and consumption of 130 million tons (proposed action), 140 million tons (preferred alternative), or 130 million tons (alternative 3) of coal to be used for electrical power generation. CBM that is not recovered before mining would also be irreversibly and irretrievably lost (see additional discussion of the impacts of venting CBM to the atmosphere in the previous section). It is estimated that one to two percent of the energy produced would be required to mine the coal, and this energy would also be irretrievably lost.

The quality of topsoil on approximately 830 acres (proposed action), 897 acres (preferred alternative), or 830 acres (alternative 3) would be irreversibly changed. Soil formation processes, although continuing, would be irreversibly altered during mining-related activities. Newly formed soil material would be unlike that in the natural landscape.

modified. In partial consequence, the reclaimed land would be topographically lower and, although it would be reclaimed to resemble the premining topographic contours, it would lack some of the original diversity of geometric form.

The forage and associated grazing and wildlife habitat that the LBA tract provides would be temporarily lost during mining and reclamation. During mining there would be a combined loss of vegetation on 830 acres (proposed action), 897 acres (preferred alternative), or 830 acres (alternative 3) with an accompanying disturbance of wildlife habitat, grazing land, cropland and pastureland. This disturbance would occur incrementally over a period of years. The mine site would be returned to equivalent or better forage production capacity for domestic livestock before the performance bond is released. Long-term productivity would depend largely on postmining range-management practices, which to a large extent, would be controlled by private landowners.

Mining would disturb pronghorn habitat, but the LBA tract would be suitable for pronghorn following successful reclamation. No sage grouse leks would be directly disturbed by mining, but some nesting and brood-rearing habitat would be disturbed and grouse populations may not attain premining levels on reclaimed lands. Despite loss and displacement of wildlife during mining, it is anticipated that reclaimed habitat would support a diversity of wildlife species similar to premining conditions. The diversity of species found in undisturbed rangeland would not be completely restored on the leased lands for an estimated 50 years after the initiation of disturbance. Re-establishment of mature sagebrush habitat--which is crucial for pronghorn and sage grouse--could take even longer.

CBM development is taking place on the tract and on adjacent lands. BLM's analysis suggests that a large portion of the CBM resources on the tract can be recovered prior to mining. CBM that is not recovered prior to mining would be vented to the atmosphere during the mining process. Methane is a greenhouse gas which contributes to global warming. According to the EIA/DOE, US anthropogenic methane emissions totaled 28.0 million metric tons in 2001. U.S. 2001 methane emissions from coal mining were estimated at 2.78 million metric tons (10% of the US total anthropogenic methane emissions in 2001). EIA/DOE estimates that surface coal mining was responsible for about 0.53 million metric tons of methane emissions in 2001. This represents about 1.89% of the estimated US anthropogenic methane emissions in 2001, and about 19.06% of the estimated methane emissions attributed to coal mining of all types. Based on the 2001 coal production figure, the Wyoming and Montana PRB coal mines were responsible for approximately 0.98% of the estimated US 2001 anthropogenic methane emission.

Total US methane emissions attributable to coal mining would not be likely to be reduced if the West Hay Creek LBA tract is not leased at this time because total US coal production would not decrease if a lease for this tract is not issued. However, the methane on this LBA tract could potentially be more completely recovered if leasing is delayed.



Wildlife deaths caused directly or indirectly by mining operations would be an irreversible loss.

Loss of life may conceivably occur due to the mining operation and vehicular and train traffic. On the basis of surface coal mine accident rates in Wyoming as determined by the Mine Safety and Health Administration (1997) for the 10-year period 1987-1996, fatal accidents (excluding contractors) occur at the rate of 0.003 per 200,000 man-hours worked. Disabling (lost-time) injuries occur at the rate of 1.46 per 200,000 man-hours worked. Any injury or loss of life would be an irretrievable commitment of human resources.

Disturbance of all known historic and prehistoric sites on the mine area would be mitigated to the maximum extent possible. However, accidental destruction of presently unknown archeological or paleontological values would be irreversible and irretrievable.

#### Governor's Consultation

The BLM Wyoming State Director notified the Governor of Wyoming on October 2, 2002 that information was being developed by BLM for the West Hay Creek LRA.

#### Public Notice

A notice announcing the receipt of the TCC coal lease application was published in the Federal Register on September 12, 2002. BLM published a Notice of Intent to Prepare an Environmental Impact Statement and Record of Decision in the Federal Register on June 23, 2002.

A public meeting announcing the public review process was held on June 3, 2002 at various media centers. A letter describing the LRA was also announced the public review meeting was held on June 14, 2002. The public review meeting was held on June 26, 2002 in Cheyenne, Wyoming. At the public review meeting, the public was invited to provide comments on the LRA. Comments were received from the public and the BLM will be reviewing the comments and will be publishing a Record of Decision on July 23, 2002.

A public meeting announcing the receipt of the TCC coal lease application was held on June 3, 2002 at various media centers. A letter describing the LRA was also announced the public review meeting was held on June 14, 2002.



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## CHAPTER 5: CONSULTATION AND COORDINATION

### INTRODUCTION

In addition to this EIS, other factors and consultations are considered and play a major role in determining the decision on this proposed lease application. These include the following.

#### Regional Coal Team Consultation

The West Hay Creek coal lease application was reviewed and discussed at the October 25, 2000 PRRCT public meeting in Cheyenne, Wyoming. Triton Coal Company presented information about their existing mine and pending lease application at that meeting. Voting and nonvoting members of the PRRCT include the governors of Wyoming and Montana, the Northern Cheyenne Tribe, the Crow Tribal Council, the USFS, OSM, FWS, National Park Service, and USGS. The PRRCT determined that the lands in the application met the qualifications for processing as production maintenance tracts. The PRRCT recommended that the BLM continue to process the WHC lease application.

#### Governor's Consultation

The BLM Wyoming State Director notified the Governor of Wyoming on October 3, 2000 that Triton had filed a lease application with BLM for the West Hay Creek LBA tract.

#### Public Notice

A notice announcing the receipt of the TCC coal lease application was published in the *Federal Register* on September 12, 2000. BLM published a Notice of Intent to Prepare an Environmental Impact Statement and Notice of Scoping in the *Federal Register* on June 25, 2002.

A press release announcing the public scoping meeting was mailed on June 4, 2002 to various media contacts. A letter describing the LBA tract and announcing the public scoping meeting was mailed to the public on June 14, 2002. The public scoping meeting was held on June 26, 2002 in Gillette, Wyoming. At the public meeting, Triton personnel orally presented information about their mine and their need for the coal. The presentation was followed by a question and answer period, during which one oral comment was received. The scoping period extended from June 1 through July 31, 2002 during which time BLM received six written comments.

A press release announcing the release of the draft EIS and notice of the formal public hearing was mailed to various media contacts on March 25, 2003.

The EPA published a Notice of Availability for the DEIS in the *Federal Register* on March 28, 2003. The BLM published a Notice of Availability and Notice of Public Hearing for the DEIS in the *Federal Register* on March 21, 2003. A 60-day comment period on the DEIS ran through May 30, 2003. A formal public hearing was held on April 16, 2003 to solicit public comments on the DEIS, the fair market value, the maximum economic recovery, and the proposed competitive sale of coal from the LBA tract. Following the comment period on the DEIS, the FEIS was prepared. Comments received from the public, state, and federal agencies on the DEIS are included in Appendix H of this FEIS. Parties on the distribution list will be sent copies of the FEIS, and the EPA and BLM each will publish a Notice of Availability for the FEIS in the *Federal Register*. After a 30-day availability period, BLM will make a separate decision to hold or not to hold a competitive lease sale for this tract. Copies of the ROD will be mailed to parties on the mailing list and others who commented on this LBA during the NEPA process.

### **Department of Justice Consultation**

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

### **Other Consultations**

Other federal, state, and local governmental agencies that were directly consulted in preparation of this EIS are listed in Table 5-1.

### **List of Preparers**

Environmental Solutions, Inc. (ESI), a third party contractor under the direction of the BLM prepared this EIS. Representatives from BLM and OSM contributed to and participated in the preparation of the EIS. Tables 5-2 and 5-3 provide listings of the BLM, OSM, and the third-party consultant personnel who participated in the preparation and review of this EIS.

### **Distribution List**

This EIS was distributed to numerous Congressional offices, federal agencies, state governments, local governments, industry representatives, interest groups, and individuals for their review and comment (table 5-4).

**TABLE 5-1  
OTHER FEDERAL, STATE, AND LOCAL GOVERNMENTAL AGENCIES  
CONSULTED IN EIS PREPARATION**

Agency or Organization	Individual	Position
Powder River Regional Coal Team	5 Voting Members and 21 Nonvoting Members	
Wyoming Game and Fish Department	Lynn Jahnke	Wildlife & Fish Supervisor
Wyoming Department of Environmental Quality		
Air Quality Division	Bernard Daily	Program Manager for New Source Review Program
	Judy Shamley	Sr. Analyst
Land Quality Division	Donald McKenzie	District III Supervisor
	Doug Emme	Engineer
Wyoming Department of Administration and Information	Wayne Liu	Division of Economic Analysis, Senior Economist
Wyoming Department of Revenue	Allen Black	Ad Valorem Tax Division, Administrator
	Randy Bolles	Mineral Tax Division, Administrator
Wyoming Employment Center	Betsy Hockert	Analyst
USDA/Natural Resources Conservation Service	Randy White	Soil Scientist

**TABLE 5-2  
CONTRIBUTORS AND REVIEWERS**

Name	Project Responsibility
<b>BLM Casper Field Office</b>	
Mike Karbs	Project Supervisor
Nancy Doelger	Project Leader
Pat Karbs	Writer-Editor
<b>BLM Wyoming State Office</b>	
Susan Caplan	Air Quality and Climate
Jeff Carroll	Botany/Forestry
Bob Janssen	Coal Program Coordination
Janet Kurman	NEPA Coordination
Julie Weaver	Land Adjudication
<b>BLM Buffalo Field Office</b>	
Tom Bills	Wildlife Resources
<b>BLM National Science and Technology Center</b>	
Scott Archer	Air Quality and Climate
<b>Office of Surface Mining Reclamation and Enforcement Western Regional Coordinating Center</b>	
Floyd McMullen	EIS Project Coordinator

**TABLE 5-3  
PREPARERS**

<b>Name</b>	<b>Education/Experience</b>	<b>Responsibility</b>
<b>BLM Casper Field Office</b>		
Nancy Doelger	M.S., B.S. Geology, 25 years professional experience	EIS Project Leader/Editor
<b>BLM Wyoming State Office Reservoir Management Group</b>		
Dwain McGarry	B.S. Graduate Study, Geology, 24 Years professional experience	CBM Geology
Lee Almasy	B.S. Petroleum Engineering, 6 years professional experience	CBM Reservoir Engineering
<b>Environmental Solutions, Inc. – Third Party Contractor</b>		
Tom Peterson	B.S. Environmental Engineering, 25 years professional experience (Licensed Professional Engineer)	Project Management Report Preparation Document Review
Dennis McGirr	B.S. Biology, 26 years professional experience	Report Preparation Document Review
Ann Dickey	B.S. Civil Engineering, 13 years professional experience (Licensed Professional Engineer)	Report Preparation
<b>Knight Technologies, Inc. - Subcontractor</b>		
Naomi Morton Knight	B.S. Electrical Engineering, 10 years professional experience (Licensed Professional Engineer – Mining)	Map and Document Preparation
Craig Knight	A.S. Engineering Technology, 10 years experience, CAD/GIS Specialist	Map and Document Preparation
Doug Ninas	CAD/GIS Specialist, 5 years experience	Map and Document Preparation
<b>Thunderbird Wildlife Consulting, Inc.-Subcontractor</b>		
Kort Clayton	M.S. Biology, 8 years professional experience	Wildlife Baseline
Kimberly Brown	M.S. Biology, 10 years professional experience	Wildlife Baseline
Gwyn McKee	M.S. Wildlife Ecology, 15 years professional experience	Wildlife Baseline
Bonnie Postovit	M.S. Zoology, 25 years professional experience	Wildlife Baseline
Howard Postovit	M.S. Wildlife Ecology, 25 years professional experience	Wildlife Baseline
William Winland	B.S. Biology, 15 years professional experience	Wildlife Baseline

**TABLE 5-3**  
(continued)

Name	Education/Experience	Responsibility
<b>Argonne National Laboratories</b>		
Kyong C. Chun	PhD. Environmental Health Engineering 30 years professional experience	Air Quality Impact Assessment
Young-soo Chang	PhD. Chemical Engineering 20 years professional experience	Air Quality Impact Modeling



**TABLE 5-4  
BLM DISTRIBUTION LIST FOR COAL LEASING**

**Powder River Regional Coal Team**

**Voting Members**

Governor of Wyoming Dave Freudenthal	Governor of Montana Judy Martz
BLM Wyoming State Director Bob Bennett	BLM Montana State Director
BLM Wyoming Deputy State Director Alan Rabinoff	

**Powder River Regional Coal Team**

**Non-Voting Member Agencies and Organizations**

OSM, Western Regional Coordinating Center	USDA Forest Service, Med. Bow Nat. Forest
Devils Tower National Monument	BLM Montana State Office
USGS, Denver Federal Ctr.	BLM Wyoming State Office
Bureau of Indian Affairs, Billings Montana	BLM Washington Office
Crow Tribal Council	Northern Cheyenne Tribal Council
Big Horn County, Montana, Planning Board	Powder River County, Montana
Rosebud County, Montana	Campbell County, Wyoming
USDI Rocky Mountain Regional Solicitor's Office	City of Gillette, Department of Community Development
USFWS, Cheyenne, WY	

**Federal & State Officials**

U.S. Senator Mike Enzi	U.S. Representative Barbara Cubin
U.S. Senator Craig Thomas	Wyoming Representative Deborah Alden
Wyoming Senator Jim Anderson	Wyoming Senator Dick Erb
Wyoming Representative Dave Edwards	Wyoming Representative Jene Jansen
Wyoming Senator John Hines	Wyoming Representative George McMurtry
Wyoming Representative Frank Latta	Wyoming Rep. Jeff Wasserburger
Wyoming Representative Fred Parady	

**Federal Agencies**

BLM Washington Office	BLM Casper Field Office
BLM Buffalo Field Office	BLM Powder River Field Office
Bureau of Indian Affairs	Department of Energy
Bureau of Reclamation	Federal Highway Administration
EPA Region VIII	Mineral Management Service
HQ-USAF/CEVP	National Park Service, Air Resources Div.
National Park Service, Washington Office	Office of Surface Mining, Washington D.C.
USFWS, Washington, D.C.	OSM, Casper Field Office
U.S. Geological Survey, Reston, Virginia	U.S. Army Corps of Engineers
USGS, Water Resource Div.	USDA Forest Service, Douglas Ranger District
USDA Forest Service Rocky Mountain Region	USDI Natural Resources Library
USDI Denver, Colorado	

**State Agencies**

Montana Office of the Governor	Wyoming Clearinghouse Coordinator
WY Employment/Research/Planning Dept.	Wyoming Dept. of Environmental Quality-- Land Quality & Air Quality Divisions
Wyoming Office of Federal Land Policy	Wyoming Div. of Economic Analysis
Wyoming Parks & Cultural Res. Dept.	Wyoming Oil and Gas Cons. Comm.
Wyoming Department of Transportation	Wyoming State Engineer's Office
Wyoming Department of Education	Wyoming State Historic Preservation Office
Wyoming Game & Fish Department	Wyoming Business Council
Wyoming Department of Agriculture	Wyoming Industrial Siting Division
Wyoming Public Service Commission	Wyoming State Geological Survey
Wyoming State Inspector of Mines	Wyoming Water Development Commission
Wyoming Office of the State Treasurer	Wyoming State Planning Coordinator

**TABLE 5-4**  
(continued)

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**Local Agencies and Government**

Campbell County, Wyoming School Superintendent	Campbell County, Wyoming Commission
City of Gillette, Wyoming	Weston County, Wyoming Commission

**Tribal Organizations and Individuals**

Crow Creek Sioux Tribe	Cheyenne River Sioux Tribe
Eastern Shoshone Business Council	Cheyenne River Sioux Historic Preservation Officer
Crow Tribal Cultural Coordinator	Crow Tribe
Eastern Shoshone Cultural Coordinator	Eastern Shoshone Tribal Attorney
Flandreau Santee Sioux Tribe	Long Sioux, Clifford
Northern Arapahoe Business Council	Northern Arapaho Historian
Lower Brule Sioux Tribe	Northern Cheyenne Tribe
Northern Cheyenne Traditional Spokesperson	Northern Cheyenne Historic Preservation Officer
Oglala Lakota Tribe	Rosebud Sioux Cult. Resource Coordinator
S. Cheyenne/S. Arapaho Tribes	Rosebud Sioux Tribe
Santee Sioux Tribe	Sicangu Lakota Treaty Council
Standing Rock Sioux Historic Preservation Officer	Standing Rock Sioux Tribe

**Organizations**

Advisory Council on Historic Preservation	Campbell County Economic Dev. Corp.
Cheyenne Audubon Society	Foundation for N. American Wild Sheep
Biodiversity Conservation Alliance.	Izaak Walton League of America
Medicine Wheel Coalition	Murie Audubon Society
National Mining Association	National Wildlife Federation
Natural Resources Defense Council	Petroleum Association of Wyoming
Powder River Basin Resource Council	Sierra Club (Sheridan, Wyoming)
The Fund for Animals	The Nature Conservancy
Wildlife Management Institute	WY Assoc of Professional Archeologists
Wyoming Bankers Association	Wyoming Business Alliance
Wyoming Geological Association	Wyoming Mining Association
Wyoming Outdoor Council	Wyoming Stock Growers Association
Wyoming Wildlife Federation	Wyoming Wool Growers Association

**Companies/Businesses**

American Colloid Company	Antelope Coal Company
Ark Land Company	Arnjac
Belle Ayr Mine	Bjork, Lindley, Danielson & Baker, P.C.
Bridgeview Coal Company	Buckskin Mine
Burlington Northern Railroad Company	Burns & McDonnell
CH2M Hill	C.H. Snyder Company
Consol, Inc., Exploration & Land Dept	CE&MT, Incorporated
Decker Coal Company	Cordero-Rojo Mine Complex
Ducker, Montgomery, Lewis, & Aronstein	Dry Fork Coal Company
ECC	Eagle Butte Mine
Environmental Solutions, Incorporated	Evergreen Enterprises
Foster-Wheeler Environmental	Glenrock Coal Company
Greystone	Jacobs Ranch Coal Corporation
Independent Consultants Network	Kenneth R. Paulsen Consultants
Intermountain Resources	Kiewit Mining Company

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**TABLE 5-4**  
(continued)

**Companies/Businesses (continued)**

Kennecott Energy Company	L.E. Peabody & Associates
KN Energy	Majestic Petroleum Operations, LLC
Marquiss Minerals Inc.	Marston & Marston
M&K Oil Company, Incorporated	McVehil-Monnett Associates, Inc.
McGraw-Hill	Meineadair Consultants
Mine Engineers, Incorporated	Nerco Coal Company
Mining Associates of Wyoming	Norwest Mine Services
North Rochelle Mine	Pacificorp/Interwest Mining
P&M Coal Company	Poudre Environmental Consulting
PIC Technologies	RAG Coal West, Incorporated
Powder River Coal Company	Riverside Technology, Incorporated
Powder River Energy Corporation	San Juan Coal Company
Redstone Resources	The Rim Companies
Royal Gold Incorporated	Thunder Basin Coalition
Shea & Gardner	Thunderbird Wildlife Consulting
Thunder Basin Coal Company	TRC Environmental
Torch Energy	Triton Coal Company
URS Greiner Woodward Clyde	U.S. West Communications
Western Energy Company	Western Fuels Association
Western Gas Resources	Williams Production RMT Company
WWC Engineering	Wyodak Resources Dev. Corporation
Yates Petroleum Company	

**Press**

Casper Journal	Associated Press
Cheyenne-Wyoming Eagle	Casper Star Tribune
Gillette News-Record	Douglas Budget
Western Coal Newsletter	Rocky Mountain Oil Journal

**Educational Institutions**

CSU, The Libraries	Northwestern Univ. Policy Research Inst.
UW Libraries, Coe Reference Department	

**Individuals**

Antelope, Sr., Howard	Barbero, Ralph
Benson, Scott	Bierman, Sheldon
Barbour, Lorene Trust	Barbour, Steve & Georgia
Carter, Wilma McGee	Cook, Cecle & Lavern Trust
Cundy, Cecil	Daub, Jerry
Dragoo, Denise	Jordan, Christine Sorhage
Jacob, Gerald	Mader, Richard and Ena
Mader, Kelly F.	Natta, F.L.
Mader, Troy	Oedekoven, John Gilbert
Oedekoven, Byron & Marjorie	Robertson, C.J.
Oedekoven, Olin O.	Saulcy, Bill
Rourke, Paul & Jane Offut	Varney, Lena H. Tharp
Varney, Lena H.	Winland, Mark
Williams, John	



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## APPENDIX A

### FEDERAL AND STATE AGENCIES AND PERMITTING REQUIREMENTS

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#### Agency

#### Lease/Permit/Action

#### *FEDERAL*

Bureau of Land Management	Coal lease Resource Recovery & Protection Plan Scoria sales contract Exploration drilling permit
Office of Surface Mining Reclamation and Enforcement	Preparation of mining plan approval document SMCRA oversight
Office of the Secretary of the Interior	Approval of mining plan
Mine Safety and Health Administration	Safety permit and legal ID Ground control plan Major impoundments Explosives use and storage permit
Bureau of Alcohol, Tobacco, and Firearms	Explosive's manufacturer's license Explosives use and storage permit
Federal Communication Commission	Radio Permit: ambulance Mobile relay system radio license
Nuclear Regulatory Commission	Radioactive by-products material license
Army Corps of Engineers	Authorization of impacts to wetlands and other US waters
Department of Transportation	Hazardous waste shipment notification
Federal Aviation Administration	Radio tower permits

#### *STATE*

State Land Commission	Coal lease Scoria lease
Department of Environmental Quality-Land Quality Division	Permit and license to mine
Department of Environmental Quality-Air Quality Division	Air quality permit to operate Air quality permit to construct
Department of Environmental Quality-Water Quality Division	National Pollutant Discharge Elimination System water discharge permit Permit to construct sedimentation pond Authorization to construct septic tank and leach field Authorization to construct and install a public water supply and sewage treatment system
Department of Environmental Quality-Solid Waste Management Program	Solid waste disposal permit-permanent and construction
State Engineer's Office	Appropriation of surface water permits Appropriation of groundwater permits
Industrial Siting Council	Industrial Siting Certificate of Non-Jurisdiction
Department of Health	Radioactive material Certificate of Registration

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# APPENDIX B

## UNSUITABILITY CRITERIA FOR THE WEST HAY CREEK LBA TRACT

UNSUITABILITY CRITERIA	GENERAL RECOMMENDATIONS FOR BUFFALO RESOURCE AREA (BLM 1985, 2001), PLATTE RIVER RESOURCE AREA (BLM1985B), AND THE THUNDER BASIN NATIONAL GRASSLAND (USFS 1985, 2002)	FINDINGS FOR THE WEST HAY CREEK TRACT
<p>1. <b>Federal Land Systems.</b> With certain exceptions that do not apply to this tract, all federal lands included in the following systems are unsuitable for mining: National Parks, National Wildlife Refuges, National System of Trails, National Wilderness Preservation System, National Wild and Scenic Rivers, National Recreation Areas, Lands acquired through the Land and Water Conservation Fund, National Forests and Federal lands in incorporated cities, towns and villages.</p>	<p>There are Federal lands located around Gillette, Sheridan, and Wright that were determined to be unsuitable under this criterion. No TBNG lands are included in the West Hay Creek LBA Tract.</p>	<p>None of the federal lands determined to be unsuitable under Criterion 1 are present on the LBA tract; therefore there are no unsuitable findings.</p>
<p>2. <b>Rights-of-Way and Easements.</b> Federal lands that are within ROWs or easements or within surface leases for residential, commercial, industrial or other public purposes, on federally owned surface, are unsuitable for mining.</p>	<p>Portions of the BNSF&amp;UP railroad, the Tri-County 230-Kv transmission line, and State Highway 450 were found to be unsuitable under this criterion within the general review area.</p>	<p>The portions of the Tri-County 230-Kv transmission line, the BNSF&amp;UP ROW, and Highway 450 that were found to be unsuitable are not located on the West Hay Creek LBA Tract. There are no unsuitable findings under Criterion 2 for the West Hay Creek LBA Tract.</p>
<p>3. <b>Dwellings, Roads, Cemeteries, and Public Buildings.</b> Federal lands within 100 feet of a ROW 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 within 300 feet of an occupied dwelling are unsuitable for mining.</p>	<p>Portions of Wyoming Highway 450, Interstate Highway I-90, and one cemetery were found to be unsuitable under this criterion. Decisions were deferred on other highways/roads, occupied dwellings, and one school.</p>	<p>Wyoming Highway 450, I-90, and the cemetery are not located on the West Hay Creek LBA Tract. No occupied dwellings, other highways/roads, or schools are located on the tract. Therefore, there are no unsuitable findings under Criterion 3 for the West Hay Creek LBA Tract.</p>
<p>4. <b>Wilderness Study Areas.</b> Federal lands designated as wilderness study areas (WSAs) are unsuitable for mining while under review for possible wilderness designation.</p>	<p>No lands in the general review area are within a wilderness study area.</p>	<p>There are no unsuitable findings under Criterion 4 for the LBA tract.</p>
<p>5. <b>Lands with Outstanding Scenic Quality.</b> Scenic federal lands designated by visual resource management analysis as Class I (outstanding visual quality or high visual sensitivity) but not currently on National Register of Natural Landmarks are unsuitable.</p>	<p>No lands in the general review area meet the scenic criteria as outlined.</p>	<p>There are no unsuitable findings under Criterion 5 for the LBA tract.</p>
<p>6. <b>Lands Used for Scientific Study.</b> Federal lands under permit by the surface management agency and being used for scientific studies involving food or fiber production, natural resources, or technology demonstrations and experiments are unsuitable for the duration of the study except where mining would not jeopardize the purpose of the study.</p>	<p>No lands in the general review area are being used for scientific study.</p>	<p>There are no unsuitable findings under Criterion 6 for the LBA tract.</p>
<p>7. <b>Cultural Resources.</b> All publicly or privately owned places which are included in or are eligible for inclusion in the NRHP and an appropriate buffer zone are unsuitable.</p>	<p>On the basis of consultation with SHPO, there were no unsuitable findings under this criterion in the general review area. Continue using the "Standard Archeological Stipulation for Cultural Resources."</p>	<p>There are no unsuitable findings under Criterion 7 for the LBA tract. The "Standard Archeological Stipulation for Cultural Resources" should be applied if this tract is leased.</p>
<p>8. <b>Natural Areas.</b> Federal lands designated as natural areas or National Natural Landmarks are unsuitable.</p>	<p>No lands in the general review area are designated as natural areas or as National Natural Landmarks.</p>	<p>There are no unsuitable findings under Criterion 8 for the LBA tract.</p>
<p>9. <b>Critical Habitat for Threatened or Endangered Plant and Animal Species.</b> Federally designated critical habitat for threatened or endangered plant and animal species, and scientifically documented essential habitat for threatened or endangered species are unsuitable.</p>	<p>There is no federally designated critical habitat for threatened or endangered plant or animal species within the general review area.</p>	<p>There are no unsuitable findings under Criterion 9 for the West Hay Creek LBA Tract.</p>
<p>10. <b>State Listed Species.</b> Federal lands containing habitat determined to be critical or essential for plant or animal species listed by a state pursuant to state law as threatened or endangered shall be considered unsuitable.</p>	<p>Wyoming does not maintain a state list of threatened or endangered species of plants or animals. Therefore, this criterion does not apply.</p>	<p>There are no unsuitable findings under Criterion 10 for the LBA tract.</p>

# APPENDIX B

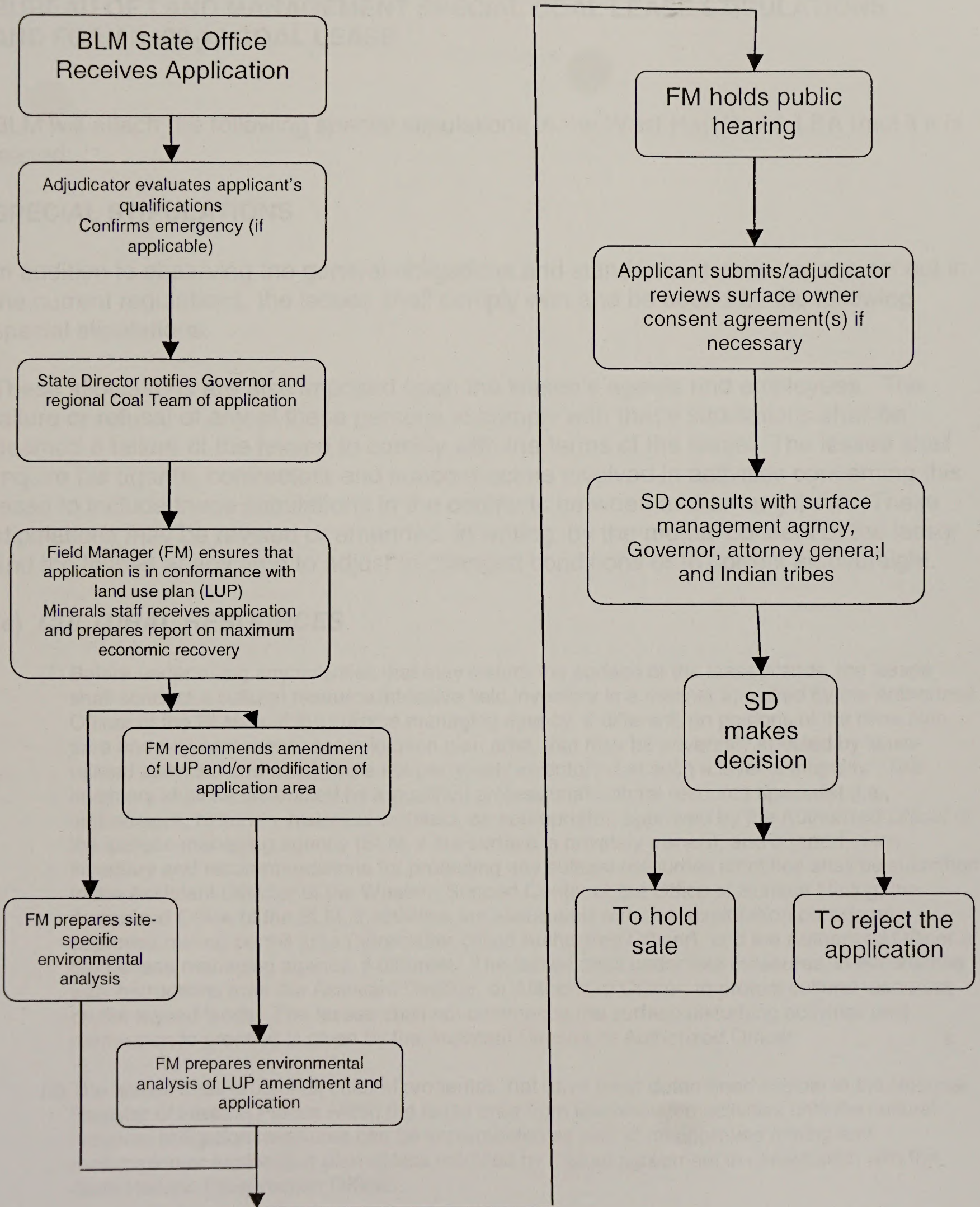
## UNSUITABILITY CRITERIA FOR THE WEST HAY CREEK LBA TRACT

UNSUITABILITY CRITERIA	GENERAL RECOMMENDATIONS FOR BUFFALO RESOURCE AREA (BLM 1985, 2001), PLATTE RIVER RESOURCE AREA (BLM1985B), AND THE THUNDER BASIN NATIONAL GRASSLAND (USFS 1985, 2002)	FINDINGS FOR THE WEST HAY CREEK TRACT
11. <i>Bald or Golden Eagle Nests.</i> An active bald or golden eagle nest and appropriate buffer zone are unsuitable unless the lease can be conditioned so that eagles will not be disturbed during breeding season or unless golden eagle nests will be moved.	Defer suitability decisions and evaluate bald and golden eagle nests on a case by case basis prior to lease issuance. Establish buffer zones around nests after consultation with USFWS.	There are currently no active bald or golden eagle nests or established buffer zones located on the West Hay Creek LBA Tract. There are no unsuitable findings under Criterion 11 for the West Hay Creek LBA Tract.
12. <i>Bald and Golden Eagle Roost and Concentration Areas.</i> Bald and golden eagle roost and concentration areas on federal lands used during migration and wintering are unsuitable unless mining can be conducted in such a way as to ensure that eagles shall not be adversely disturbed.	Defer suitability decisions and evaluate bald and golden eagle roost areas case by case before lease issuance. Establish buffer zones after consultation with USFWS.	There are currently no bald or golden eagle roosts or established buffer zones located on the LBA tract. There are no unsuitable findings under Criterion 12.
13. <i>Falcon Nesting Sites and Buffer Zones.</i> Federal lands containing active falcon (excluding kestrel) cliff nesting sites and a suitable buffer zone shall be considered unsuitable unless mining can be conducted in such a way as to ensure the falcons will not be adversely affected.	Defer suitability decisions on falcon nesting sites and evaluate case by case basis before lease issuance. Establish buffer zones around nesting sites after consultation with USFWS.	There are no falcon nesting sites on the LBA tract; therefore, there are no unsuitable findings under Criterion 13.
14. <i>Habitat for Migratory Bird Species.</i> Federal lands which are high priority habitat for migratory bird species of high federal interest shall be considered unsuitable unless mining can be conducted in such a way as to ensure that migratory bird habitat will not be adversely affected during the period it is in use.	Defer suitability decisions on migratory bird habitat and evaluate case by case before lease issuance. Establish buffer zones around nesting sites after consultation with USFWS.	No high priority habitat for migratory bird species of high federal interest has been identified on the LBA tract and adjacent areas. There are no unsuitable findings under Criterion 14.
15. <i>Fish and Wildlife Habitat for Resident Species.</i> Federal lands which the surface management agency and state jointly agree are fish, wildlife and plant habitat of resident species of high interest to the state, and which are essential for maintaining these priority wildlife species, shall be considered unsuitable unless mining can be conducted in such a way as to ensure no long-term impact on the species will occur.	Defer suitability decisions on grouse leks and evaluate case by case before lease issuance. Establish buffer zones after consultation with USFWS.	There are no active or inactive sage grouse leks on the LBA tract. Two active sharp-tailed grouse leks were identified on lands adjacent to the LBA tract, one within ½ mile. There are no unsuitable findings under Criterion 15.
16. <i>Floodplains.</i> Federal lands in riverine, coastal, and special floodplains shall be considered unsuitable where it is determined that mining could not be undertaken without substantial threat of loss of life or property.	The BLM and USFS have determined that the identified floodplains could potentially be mined. Therefore, all lands within the general review area are considered suitable.	Site-specific stipulations and resource protection safeguards will be applied if necessary during mining and reclamation planning. There are no unsuitable findings under Criterion 16 for the LBA tract.
17. <i>Municipal Watersheds.</i> Federal lands which have been committed by the surface management agency to use as municipal watersheds shall be considered unsuitable.	There are no designated municipal watersheds in the general review area.	There are no unsuitable findings under Criterion 17 for the LBA tract.
18. <i>National Resource Waters.</i> Federal lands with national resource waters, as identified by states in their water quality management plans, and ¼-mile buffer zones shall be unsuitable.	There are no designated national resource waters within the TBNG review area.	There are no unsuitable findings under Criterion 18 for the LBA tract.
19. <i>Alluvial Valley Floors.</i> Federal lands identified by the surface management agency, in consultation with the state, as AVFs where mining would interrupt, discontinue, or preclude farming, are unsuitable. Additionally, when mining federal lands outside an AVF would materially damage the quality or quantity of water in surface or underground water systems that would supply AVFs, the land shall be considered unsuitable.	Consider areas determined to contain alluvial valley floors significant to farming as unsuitable. Defer decisions on other AVFs and analyze on a case-by-case basis at the time a lease action is evaluated.	There are no unsuitable findings under Criterion 19 for the LBA tract.
20. <i>State or Indian Tribe Criteria.</i> Federal lands to which is applicable a criterion proposed by the state or Indian tribe located in the planning area and adopted by rulemaking by the Secretary are unsuitable.	There are no criterion proposed by state or Indian tribes that have been approved by the Secretary of the Interior. No tribal lands are located in or near the review area.	There are no unsuitability findings for this criterion on the LBA tract.



# APPENDIX C

## COAL LEASE-BY-APPLICATION FLOW CHART





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## APPENDIX D

### BUREAU OF LAND MANAGEMENT SPECIAL COAL LEASE STIPULATIONS AND FORM 3400-12 COAL LEASE

BLM will attach the following special stipulations to the West Hay Creek LBA tract if it is leased:

#### SPECIAL STIPULATIONS

In addition to observing the general obligations and standards of performance set out in the current regulations, the lessee shall comply with and be bound by the following special stipulations.

These stipulations are also imposed upon the lessee's agents and employees. The failure or refusal of any of these persons to comply with these stipulations shall be deemed a failure of the lessee to comply with the terms of the lease. The lessee shall require his agents, contractors and subcontractors involved in activities concerning this lease to include these stipulations in the contracts between and among them. These stipulations may be revised or amended, in writing, by the mutual consent of the lessor and the lessee at any time to adjust to changed conditions or to correct an oversight.

#### (a) **CULTURAL RESOURCES**

- (1) Before undertaking any activities that may disturb the surface of the leased lands, the lessee shall conduct a cultural resource intensive field inventory in a manner specified by the Authorized Officer of the BLM or of the surface managing agency, if different, on portions of the mine plan area and adjacent areas, or exploration plan area, that may be adversely affected by lease-related activities and which were not previously inventoried at such a level of intensity. The inventory shall be conducted by a qualified professional cultural resource specialist (i.e., archeologist, historian, historical architect, as appropriate), approved by the Authorized Officer of the surface managing agency (BLM, if the surface is privately owned), and a report of the inventory and recommendations for protecting any cultural resources identified shall be submitted to the Assistant Director of the Western Support Center of the Office of Surface Mining, the Authorized Office of the BLM, if activities are associated with coal exploration outside an approved mining permit area (hereinafter called Authorized Officer), and the Authorized Officer of the surface managing agency, if different. The lessee shall undertake measures, in accordance with instructions from the Assistant Director, or Authorized Officer, to protect cultural resources on the leased lands. The lessee shall not commence the surface disturbing activities until permission to proceed is given by the Assistant Director or Authorized Officer.
- (2) The lessee shall protect all cultural properties that have been determined eligible to the National Register of Historic Places within the lease area from lease-related activities until the cultural resource mitigation measures can be implemented as part of an approved mining and reclamation or exploration plan unless modified by mutual agreement in consultation with the State Historic Preservation Officer.

- (3) The cost of conducting the inventory, preparing reports, and carrying out mitigation measures shall be borne by the lessee.
- (4) If cultural resources are discovered during operations under this lease, the lessee shall immediately bring them to the attention of the Assistant Director or Authorized Officer, or the Authorized Officer of the surface managing agency, if the Assistant Director is not available. 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 lessee unless otherwise specified by the Authorized Officer of the BLM or of the surface managing agency, if different.

- (5) All cultural resources shall remain under the jurisdiction of the United States until ownership is determined under applicable law.

#### **(b) PALEONTOLOGICAL RESOURCES**

If paleontological resources, either large and conspicuous, and/or of significant scientific value are discovered during mining operations, the find will be reported to the Authorized Officer immediately. Mining operations will be suspended within 250 feet of said find. An evaluation of the paleontological discovery will be made by a BLM approved professional paleontologist within five (5) working days, weather permitting, to determine the appropriate action(s) to prevent the potential loss of any significant paleontological value. Operations within 250 feet of such discovery will not be resumed until written authorization to proceed is issued by the Authorized Officer. The lessee will bear the cost of any required paleontological appraisals, surface collection of fossils, or salvage of any large conspicuous fossils or significant scientific interest discovered during the operations.

#### **(c) THREATENED, ENDANGERED, CANDIDATE, or OTHER SPECIAL STATUS PLANT and ANIMAL SPECIES**

The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened or endangered under the Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 *et seq.*, or that have other special status. The Authorized Officer may recommend modifications to exploration and development proposals to further conservation and management objectives or to avoid activity that will contribute to a need to list such species or their habitat or to comply with any biological opinion issued by the Fish and Wildlife Service for the proposed action. The Authorized Officer will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act. The Authorized Officer may require modifications to, or disapprove a proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species, or result in the destruction or adverse modification of designated or proposed critical habitat.

The lessee shall comply with instructions from the Authorized Officer of the surface managing agency (BLM, if the surface is private) for ground disturbing activities associated with coal exploration on federal coal leases prior to approval of a mining and reclamation permit or outside an approved mining and reclamation permit area. The lessee shall comply with instructions from the Authorized Officer of the Office of Surface Mining Reclamation and Enforcement, or his designated representative, for all ground disturbing activities taking place within an approved mining and reclamation permit area or associated with such a permit.

**(d) MULTIPLE MINERAL DEVELOPMENT**

Operations will not be approved which, in the opinion of the Authorized Officer, would unreasonably interfere with the orderly development and/or production from a valid existing mineral lease issued prior to this one for the same lands.

**(e) OIL AND GAS/COAL RESOURCES**

The BLM realizes that coal mining operations conducted on Federal coal leases issued within producing oil and gas fields may interfere with the economic recovery of oil and gas; just as Federal oil and gas leases issued in a Federal coal lease area may inhibit coal recovery. BLM retains the authority to alter and/or modify the resource recovery and protection plans for coal operations and/or oil and gas operations on those lands covered by Federal mineral leases so as to obtain maximum resource recovery.

**(f) RESOURCE RECOVERY AND PROTECTION**

Notwithstanding the approval of a resource recovery and protection plan (R2P2) by the BLM, lessor reserves the right to seek damages against the operator/lessee in the event (i) the operator/lessee fails to achieve maximum economic recovery (MER) (as defined at 43 CFR 3480.0-5(21)) of the recoverable coal reserves or (ii) the operator/lessee is determined to have caused a wasting of recoverable coal reserves. Damages shall be measured on the basis of the royalty that would have been payable on the wasted or unrecoverable coal.

The parties recognize that under an approved R2P2, conditions may require a modification by the operator/lessee of that plan. In the event a coal bed or portion thereof is not to be mined or is rendered unmineable by the operation, the operator/lessee shall submit appropriate justification to obtain approval by the Authorized Officer to lease such reserves unmined. Upon approval by the Authorized Officer, such coal beds or portions thereof shall not be subject to damages as described above. Further, nothing in this section shall prevent the operator/lessee from exercising its right to relinquish all or portion of the lease as authorized by statute and regulation.

In the event the Authorized Officer determines that the R2P2, as approved, will not attain MER as the result of changed conditions, the Authorized Officer will give proper notice to the operator/lessee as required under applicable regulations. The Authorized Office will order a modification if necessary, identifying additional reserves to be mined in order to attain MER. Upon a final administrative or judicial ruling upholding such an ordered modification, any reserves left unmined (wasted) under that plan will be subject to damages as described in the first paragraph under this section.

Subject to the right to appeal hereinafter set forth, payment of the value of the royalty on such unmined recoverable coal reserves shall become due and payable upon determination by the Authorized Officer that the coal reserves have been rendered unmineable or at such time that the operator/lessee had demonstrated an unwillingness to extract the coal.

The BLM may enforce this provision either by issuing a written decision requiring payment of the MMS demand for such royalties, or by issuing a notice of non-compliance. A decision or notice of non-compliance issued by the lessor that payment is due under this stipulation is appealable as allowed by law.

**(g) PUBLIC LAND SURVEY PROTECTION**

The lessee will protect all survey monuments, witness corners, reference monuments, and bearing trees against destruction, obliteration, or damage during operations on the lease areas. If any monuments, corners or accessories are destroyed, obliterated, or damaged by this operation, the lessee will hire an appropriate county surveyor or registered land surveyor to reestablish or restore the monuments, corners, or accessories at the same locations, using the surveying procedures in accordance with the *Manual of Surveying Instructions for the Survey of the Public Lands of the United States*. The survey will be recorded in the appropriate county records, with a copy sent to the Authorized Officer.

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## APPENDIX E

### CUMULATIVE AIR QUALITY IMPACT TECHNICAL SUPPORT DOCUMENTATION

As discussed in chapter 4, an air quality impact assessment was conducted during preparation of the Wyoming Final EIS and Proposed Plan for the PRB Oil and Gas Project (BLM 2003a) and the Montana Statewide Final Oil and Gas EIS and Proposed Amendment of the Powder River and Billings RMPs (BLM 2003b). These documents will be referred to as the "Wyoming PRB Oil and Gas EIS" and the "Montana Statewide EIS" in the following discussion. The air quality impact analysis was prepared to evaluate the impacts of proposed oil and gas development in northeastern Wyoming and southeastern Montana on air quality in the region. This air quality impact assessment included projected coal mining operations in the Wyoming and Montana PRB, and the results are included in the cumulative impact section of this EIS and this appendix. The following technical support document describes the processes used to conduct the air quality impact assessment and provides summaries of relevant analysis data:

#### **Argonne National Laboratory. Environmental Assessment Division.**

2002. Technical Support Document - *Air Quality Impact Assessment for the Montana Final Statewide Oil and Gas EIS and Proposed Amendment of the Powder River and Billings Resource Management Plans and the Wyoming Final EIS and Planning Amendment for the Powder River Basin Oil and Gas Development Project*. Argonne, Illinois.

Copies of this technical support document are available upon request from:

Scott Archer, Senior Air Resource Specialist  
National Science and Technology Center (ST-133)  
Denver Federal Center, Building 50  
P.O. Box 25047  
Denver, Colorado 80225-0047  
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## INTRODUCTION

Air pollution impacts are limited by local, state, tribal and federal air quality regulations, standards, and implementation plans established under the Clean Air Act (CAA) and administered by the WDEQ/AQD and the EPA. Although not applicable to the Alternatives analyzed in the Wyoming PRB Oil and Gas EIS or this EIS, the Montana Department of Environmental Quality, Air and Waste Management Bureau (MTDEQ-AWM) has similar jurisdiction over potential air pollutant emission sources in Montana, which can have a cumulative impact with WDEQ/AQD approved sources.

Fugitive dust and exhaust from construction activities, along with air pollutants emitted during operation (i.e., well operations, booster [field] and pipeline [sales] compressor engines, etc.), are potential causes of air quality impacts. These issues are more likely to generate public concern where natural gas development activities occur near residential areas. The Forest Service (FS), National Park Service (NPS), and the Fish and Wildlife Service (FWS) have also expressed concerns regarding potential atmospheric deposition (acid rain) and visibility impacts within distant downwind PSD (prevention of significant deterioration) Class I and PSD Class II sensitive areas under their administration, located throughout Wyoming, Montana, southwestern North Dakota, western South Dakota, and northwestern Nebraska.

## EXISTING AIR QUALITY

The project area for the Wyoming PRB Oil and Gas EIS includes Campbell, Sheridan, Johnson, and northern Converse counties. The project area for the Montana Statewide EIS includes all of Carter, Powder River, Big Horn, Yellowstone, Carbon, Stillwater, Sweetgrass, Wheatland, Golden Valley, Musselshell, and Treasure counties, and portions of Rosebud and Custer counties. The analysis area for the West Hay Creek LBA tract is located in northern Campbell County, Wyoming, which lies in the eastern part of the project area for the Wyoming and PRB Oil and Gas EIS.

As described in chapter 3, specific air quality monitoring is not conducted throughout most of the project area for the Wyoming PRB Oil and Gas Project EIS and the Montana Statewide EIS. Air quality conditions are likely to be very good, as characterized by limited air pollution emission sources (few industrial facilities and residential emissions in the relatively small communities and isolated ranches) and good atmospheric dispersion conditions, resulting in relatively low air pollutant concentrations. As part of the air quality impact assessment prepared by Argonne National Laboratory (Argonne 2002), monitoring data measured throughout northeastern Wyoming and southeastern Montana were assembled and reviewed. Although monitoring is primarily conducted in urban or industrial areas, the data selected are considered to be the best available representation of background air pollutant concentrations throughout the project area. Specific values presented in Table AQ-1 were used to define background conditions in the air quality impact analysis. The assumed background pollutant concentrations are below applicable ambient air quality



standards for all pollutants and averaging times. These National and Wyoming standards, and PSD increment values, are also presented in table AQ-1.

## REGULATORY FRAMEWORK

The NAAQS and WAAQS set the absolute upper limits for specific air pollutant concentrations at all locations where the public has access. The analysis of the proposed alternatives must demonstrate continued compliance with all applicable local, state, tribal, and federal air quality standards. Existing air quality throughout most of the project area for the Wyoming PRB Oil and Gas Project EIS and Montana Statewide EIS is in attainment with all ambient air quality standards, as demonstrated by the relatively low concentration levels presented in table AQ-1. However, four areas have been designated as federal nonattainment areas where the applicable standards have been violated in the past: Sheridan, Wyoming (PM<sub>10</sub> - moderate); and Billings (CO), Lame Deer (PM<sub>10</sub> - moderate) and Laurel (SO<sub>2</sub> - primary), Montana. EPA Region 8 staff are concerned that PM<sub>10</sub> monitoring data collected near and south of Gillette, Wyoming, have also exceeded both the NAAQS and the available PSD Class II increment. Specific monitoring data are presented in tables AQ-2 and AQ-3.

Air quality regulations require certain proposed new, or modified existing, air pollutant emission sources (including CBM compression facilities) undergo a permitting review before their construction can begin. Therefore, the applicable air quality regulatory agencies have the primary authority and responsibility to review permit applications and to require emission permits, fees and control devices, prior to construction and/or operation. In addition, Congress (through the CAA Section 116) authorized local, state, and tribal air quality regulatory agencies to establish air pollution control requirements more (but not less) stringent than federal requirements. Also, under both FLPMA and the CAA, BLM can not authorize any activity which would not conform to all applicable local, state, tribal, and federal air quality laws, regulations, standards, and implementation plans.

Given the current attainment status for most of the Project Area for the Wyoming PRB Oil and Gas Project EIS and Montana Statewide EIS, future development projects which have the potential to emit more than 250 tons per year of any criteria pollutant (or certain listed sources that have the potential to emit more than 100 tons per year) would be required to undergo a site-specific regulatory PSD increment consumption analysis under the federal new source review permitting regulations. Development projects subject to the PSD regulations may also be required by the applicable air quality regulatory agencies to incorporate additional emission control measures (including a

BACT analysis and determination) to ensure protection of air quality resources, and demonstrate that the combined impacts of all PSD sources will not exceed the allowable incremental air quality impacts for NO<sub>2</sub>, PM<sub>10</sub>, and SO<sub>2</sub>.

**TABLE AQ-1**  
**ASSUMED BACKGROUND CONCENTRATIONS, APPLICABLE AMBIENT**  
**AIR QUALITY STANDARDS, AND PSD INCREMENT VALUES**  
(in  $\mu\text{g}/\text{m}^3$ )

Pollutant	Averaging Time <sup>a</sup>	Background Concentration	National Ambient Air Quality Standards	Wyoming Ambient Air Quality Standards	PSD Class I Increment	PSD Class II Increment
carbon monoxide	1-hour	3,500 <sup>b</sup>	40,000	40,000	---	---
	8-hours	1,500 <sup>b</sup>	10,000	10,000	---	---
Lead	Quarterly	n/a	1.5	1.5	---	---
Nitrogen dioxide	Annual	16.5 <sup>c</sup>	100	100	2.5	25
Ozone	1-hour	82 <sup>d</sup>	235	235	---	---
	8-hours	130 <sup>d</sup>	157	157	---	---
PM <sub>2.5</sub>	24-hours	19 <sup>f</sup>	65	65	---	---
	Annual	7.6 <sup>f</sup>	15	15	---	---
PM <sub>10</sub>	24-hours	42 <sup>f</sup>	150	150	8	30
	Annual	17 <sup>f</sup>	50	50	4	17
sulfur dioxide	3-hours	8 <sup>e</sup>	1,300	1,300	25	512
	24-hours	8 <sup>e</sup>	365	260	5	91
	Annual	3 <sup>e</sup>	80	60	2	20

**Notes:**

<sup>a</sup>Annual standards are not to be exceeded; short-term standards are not to be exceeded more than once per year.

<sup>b</sup>Amoco Ryckman Creek collected for an 8-month period during 1978-1979, summarized in the Riley Ridge EIS (BLM 1983).

<sup>c</sup>Data collected in Gillette, Wyoming (1996 – 1997).

<sup>d</sup>Data collected in Pinedale, Wyoming (1992 – 1994).

<sup>e</sup>Data collected at Devil's Tower (1983).

<sup>f</sup>Data collected in Gillette, Wyoming (1999).

**Source:** Argonne (2002)

n/a - data not available

**TABLE AQ-2**  
**ANNUAL AVERAGE PM<sub>10</sub> MONITORING DATA COLLECTED**  
**NEAR AND SOUTH OF GILLETTE, WYOMING**  
(in  $\mu\text{g}/\text{m}^3$ )

Location	Station Number	1996	1997	1998	1999	2000	2001	2002 <sup>a</sup>
Rochelle R0-1	869	n/a	n/a	[15.3]	24.2	20.2	22.6	[25] <sup>b</sup>
North Rochelle E	874	n/a	n/a	n/a	[40] <sup>b</sup>	[51] <sup>b</sup>	[50] <sup>b</sup>	33.5 <sup>b</sup>
Black Thunder BTM 26-2	877	21.0	17.7	23.2	33.4	30.9	25.6	[30] <sup>b</sup>
Antelope Site 4	881	n/a	14.5	13.4	16.2	16.7	19.8	[12] <sup>b</sup>
Triton Coal / Buckskin Mine	884	11.5	12.6	12.1	12.0	17.6*	18.3	[16] <sup>b</sup>
Cordero Hv-2	885	14.3	15.3	15.1	14.5	26.0*	24.3*	[30] <sup>b</sup>
Cordero Hv-3	889	11.9	10.9	10.4	9.7	17.1	19.8	[14] <sup>b</sup>
Coal Creek Ccm 26	890	9.0	7.9	8.6	8.5	8.3	[2.0]	n/a
Thunder Basin Coal / BTM	891	13.8	12.0	14.4	17 <sup>b</sup>	24.5	37 <sup>b</sup>	[57] <sup>b</sup>
Belle Ayr Ba-4, 5n, 5s	892	15.5	14.6	14.2	15.0	20.1	25 <sup>b</sup>	[20] <sup>b</sup>
Jacob Ranch Site 4	894	28.3	24.3*	25.1*	35.4*	35.9*	19.6*	30.2 <sup>c</sup>
Dry Fork Coal Co	896	13.8	13.0	10.5	9.3	10.8	13.2	[13] <sup>b</sup>
Triton Coal / Gillette	899	21.5	22.7	15.3	17.2	19.0*	21.0	[18] <sup>b</sup>
AMAX Eagle Butte Eb-5	900	12.5	10.6	11.6	11.7	15.0	15 <sup>b</sup>	[15] <sup>b</sup>
Jacob Ranch Site 5	905	15.0	14.6	15.1	20.5	21.3	29.2 <sup>c</sup>	25.6 <sup>c</sup>
North Rochelle 1	907	n/a	20.6	18.4	38.6	46.8	50.8*,c	37.8 <sup>d</sup>
Black Thunder BTM 36-1	915	n/a	n/a	n/a	n/a	[18] <sup>b</sup>	26 <sup>b</sup>	[16] <sup>b</sup>
Gillette, Wyoming	1002	16.1	16.7	17.6*	19.1*	20.7*	19.9*	[17] <sup>b</sup>

**Notes:**

<sup>a</sup>Incomplete data year; values reported through July 1, 2002.

<sup>b</sup>Supplemental data provided by (Payton 2002).

<sup>c</sup>Data provided by Jacobs Ranch Coal Company (2003).

<sup>d</sup>WDEQ/AQD does not agree with EPA's calculated value. Refer to appendix H, comment letter 7 and comment response 1 for an explanation.

$\mu\text{g}/\text{m}^3$  - micrograms per cubic meter.

n/a - data not available.

[data] - data in brackets are not reliable due to the small number of samples collected.

data\* - starred data are combined from two or more samplers operating at the same location during the same year.

Source: EPA (2002b)

**TABLE AQ-3**  
**SECOND MAXIMUM 24-HOUR AVERAGE PM<sub>10</sub> MONITORING DATA COLLECTED**  
**NEAR AND SOUTH OF GILLETTE, WYOMING**  
(in  $\mu\text{g}/\text{m}^3$ )

Location	Station Number	1996	1997	1998	1999	2000	2001	2002 <sup>a</sup>
Rochelle R0-1	869	n/a	n/a	[23]	62	46	63	[55] <sup>b</sup>
North Rochelle E	874	n/a	n/a		122	143	<b>156<sup>b</sup></b>	[124] <sup>b</sup>
Black Thunder BTM 26-2	877	66	44	55	125	123	101	[62] <sup>b</sup>
Antelope Site 4	881	n/a	32	32	35	50	54	[25] <sup>b</sup>
Triton Coal / Buckskin Mine	884	31	34	36	36	53*	73 <sup>b</sup>	[43] <sup>b</sup>
Cordero Hv-2	885	32	36	42	36	73*	65*	[55] <sup>b</sup>
Cordero Hv-3	889	30	22	25	26	46	47	[40] <sup>b</sup>
Coal Creek Ccm 26	890	20	16	23	25	31	n/a	n/a
Thunder Basin Coal / BTM	891	34	26	39	43 <sup>b</sup>	80	97 <sup>b</sup>	[155] <sup>b</sup>
Belle Ayr Ba-4, 5n, 5s	892	39	34	53	56	48	70 <sup>b</sup>	[35] <sup>b</sup>
Jacob Ranch Site 4	894	101	62*	54*	103*	88*	119 <sup>b</sup>	n/a
Dry Fork Coal Co	896	34	39	35	22	32	42	[34] <sup>b</sup>
Triton Coal / Gillette	899	85	65	37	45	54*	80 <sup>b</sup>	[73] <sup>b</sup>
AMAX Eagle Butte Eb-5	900	30	37	37	51	48	61	[36] <sup>b</sup>
Jacob Ranch Site 5	905	44 <sup>b</sup>	39	43	47	50	97	n/a
North Rochelle 1	907	n/a	39	49	100	125	<b>268<sup>b</sup></b>	[211] <sup>b</sup>
Black Thunder BTM 36-1	915	n/a	n/a	n/a	n/a	[24]	76 <sup>b</sup>	[31] <sup>b</sup>
Gillette, Wyoming	1002	46 <sup>b</sup>	29	36*	42*	60*	43 <sup>b</sup>	[35] <sup>b</sup>

**Notes:**

<sup>a</sup>Incomplete data year; values reported through July 1, 2002.

<sup>b</sup>Supplemental data provided by (Payton 2002).

$\mu\text{g}/\text{m}^3$  - micrograms per cubic meter.

n/a - data not available.

[data] - data in brackets are not reliable due to the small number of samples collected.

data\* - starred data are combined from two or more samplers operating at the same location during the same year.

Source: EPA 2000

A regulatory PSD increment consumption analysis may be conducted as part of a new source review, or independently. The determination of PSD increment consumption is a legal responsibility of the applicable air quality regulatory agencies, with EPA oversight.

In addition, an analysis of cumulative impacts due to all existing sources and the permit applicant's sources is also required during new source review to demonstrate that applicable ambient air quality standards will be met during the operational lifetime of the permit applicant's operations.

Coal mining in the vicinity of the West Hay Creek LBA tract is not currently affected by the PSD regulations for two reasons: surface coal mines are not on the EPA list of 28 major emitting facilities for PSD regulation, and point-source emissions from individual mines do not exceed the PSD emissions threshold of 250 tons per year.

Sources subject to the PSD permit review procedure are also required to demonstrate potential impacts to AQRVs. These include visibility impacts, degradation of mountain lakes from atmospheric deposition (acid rain), and effects on sensitive flora and fauna in the Class I areas. The CAA also provides specific visibility protection procedures for the mandatory federal Class I areas designated by Congress on August 7, 1977, which included wilderness areas greater than 5,000 acres in size, as well as national parks and national memorial parks greater than 6,000 acres in size as of that date. The Fort Peck and Northern Cheyenne tribes have also designated their lands as PSD Class I, although the national visibility regulations do not apply in these areas. The allowable incremental impacts for NO<sub>2</sub>, PM<sub>10</sub>, and SO<sub>2</sub> within these PSD Class I areas are very limited. The remainder of the project area for the Wyoming PRB Oil and Gas Project EIS and Montana Statewide EIS is designated PSD Class II with less stringent requirements.

## **AGENCY ROLES AND AUTHORITIES**

### **EPA**

The EPA administers the federal Clean Air Act (42 U.S.C. 7401 et seq.) to maintain the National Ambient Air Quality Standards (NAAQS) that protect human health and to preserve the rural air quality in the region by assuring the PSD Class I and Class II increments for SO<sub>2</sub>, NO<sub>2</sub>, and PM<sub>10</sub>, are not exceeded. EPA has delegated this CAA authority to the states of Montana and Wyoming.

Until the tribes have an EPA-approved tribal program, EPA will administer air quality requirements within Indian country. EPA is responsible for assuring that NAAQS are attained and that the tribally-designated Northern Cheyenne Class I sensitive airshed is protected, as well as the Class II increment limits that apply on the Crow Reservation. EPA will implement an air permitting program for major sources within Indian country, including BACT analysis, where appropriate. At this time, there is no federal minor source permitting program. Therefore, EPA cannot regulate minor sources in Indian country directly unless EPA, based on the results of a PSD increment consumption model, decides to implement a federal implementation plan (FIP). Based on future regulatory modeling in cooperation with MDEQ, EPA and the Bureau of Indian Affairs (BIA) may require either tribe to apply **BACM** to unimproved roads in Indian country or

other control measures sufficient to avoid exceeding the Class I and Class II increment limits for PM<sub>10</sub>.

### **Wyoming DEQ**

Wyoming regulates pollutants emitted into the air through the Wyoming Environmental Quality Act (W.S. 35-11-101 et. seq.). Wyoming is also authorized by an approved state implementation plan (SIP) to administer all requirements of the PSD permit program under the CAA. Additionally, the approved Wyoming SIP contains a number of programs which provide for the implementation, maintenance, and enforcement of the NAAQS, including a new source review program for minor source permitting which requires, among other things, application of BACT for all new or modified sources regardless of size or source category. Included as well are authorities for the control of particulate emissions, including fugitive particulate emissions from haul roads, access roads, or general facility boundaries. Wyoming is also delegated responsibility to operate an approved ambient air quality monitoring network for the purpose of demonstrating compliance with the National and Wyoming ambient air quality standards.

### **Bureau of Land Management**

NEPA requires that federal agencies consider mitigation of direct and cumulative impacts during their preparation of an EIS (BLM Land Use Planning Manual 1601). Under the CAA, federal agencies are to comply with SIPs regarding the control and abatement of air pollution. Before an RMP or an amendments to an RMP is approved, the state director is to submit any known inconsistencies with SIPs to the Governor of that state. If the Governor of the state recommends changes in the proposed RMP or amendment to meet SIP requirements, the state director shall provide the public an opportunity to comment on those recommendations (BLM Land Use Planning Manual at Section 1610.3-2).

### **Forest Service**

The FS administers nine wilderness areas (WAs) that could be affected by direct effects associated with the proposed development considered in the Wyoming PRB Oil and Gas Project EIS and Montana Statewide EIS: Bridger; Fitzpatrick; North Absaroka, Absaroka-Beartooth, and Washakie WAs, next to Yellowstone National Park; Teton WA; U.L. Bend WA; Cloud Peak WA; and Popo Agie WA with mandatory Class I designation. As federal land managers, the FS could act in a consultative role to stipulate that the BLM modeling results, or any future EPA or state-administered PSD refined modeling results (if justified), triggers adverse impairment status. Should the FS determine impairment of WAs, then BLM, the state, and/or EPA may need to mitigate this predicted adverse air quality effect.

## National Park Service

Three areas administered by the NPS--Yellowstone National Park, Devils Tower National Monument, and Bighorn Canyon National Recreation Area--could be affected by direct effects associated with the proposed development considered in the Wyoming PRB Oil and Gas Project EIS and Montana Statewide EIS. As federal land managers, the NPS could act in a consultative role to stipulate that the BLM modeling results, or any future EPA or state-administered PSD refined modeling results (if justified), triggers adverse impairment status. Should the Park Service determine impairment of NPS-administered Class I areas, then BLM, the state, and/or EPA may need to mitigate this predicted adverse air quality effect.

### **AIR QUALITY IMPACT ASSESSMENT**

Chapter 4 of this EIS discusses the air quality impact modeling results for the Buckskin Mine and the cumulative air quality impact assessment that was conducted for the Wyoming PRB Oil and Gas Project EIS and the Montana Statewide EIS. An extensive air quality impact assessment technical support document was also prepared by Argonne National Laboratory (Argonne 2002) and is available for review. Argonne analyzed potential impacts from: individual proposed Alternatives 1, 2A, 2B, and 3 of the Wyoming PRB Oil and Gas EIS; "Other" (non-alternative) emission sources, including surface coal mining in the Wyoming and Montana PRB; and all sources cumulatively by alternative. Alternatives 1, 2A and 2B of the Wyoming PRB Oil and Gas EIS have similar emission inventories, except half of the booster (field) compressors would be electrified under Alternative 2A, and all of the booster (field) compressors would be electrified under Alternative 2B.

The air quality impact assessment conducted for the Wyoming PRB Oil and Gas Project EIS and Montana Statewide EIS was based on the best available engineering data and assumptions, meteorology data, and dispersion modeling procedures, as well as professional and scientific judgment. However, where specific data or procedures were not available, reasonable assumptions were incorporated. For example, the air quality impact assessment assumed that the maximum CBM, conventional oil, coal and other development would occur simultaneously, whereas actual development would occur under different time schedules.

Potential air pollutant emissions from the emission sources under the Proposed Alternative for the Wyoming PRB Oil and Gas Project EIS were combined with other (non-alternative) sources to determine the total potential cumulative air quality impacts. These other (non-alternative) sources included development associated with emission sources permitted: 1) by the WDEQ/AQD; 2) by the MTDEQ-AWM; and 3) within the states of North Dakota, South Dakota and Nebraska; plus 4) the Montana Statewide EIS Alternative sources (BLM 2002).

Potential direct, indirect, and cumulative air quality impacts from the Proposed Action and Alternatives for the Wyoming PRB Oil and Gas Project EIS, and other (non-alternative) sources, including surface coal mining in the Wyoming and Montana PRB, were analyzed and reported solely under the requirements of the National Environmental Policy Act (NEPA), in order to assess and disclose reasonably foreseeable impacts to both the public and the BLM decision maker. Due to the preliminary nature of this NEPA analysis, it should be considered an estimate of predicted impacts. Actual impacts at the time of development (subject to air pollutant emission source permitting) are likely to be different.

Given the lack of representative wind measurements throughout the CBM emphasis area, the EPA CALPUFF dispersion model was used with regional wind speed and direction values derived from the 1996 MM5 (mesoscale model) and CALMET meteorological models (Argonne 2002). Meteorological information was assembled to characterize atmospheric transport and dispersion from several 1996 data sources, including: 36 km gridded MM5 (mesoscale model) values with continuous four-dimensional data assimilation; and hourly surface observations (wind speed, wind direction, temperature, cloud cover, ceiling height, surface pressure, relative humidity, and precipitation.)

Potential air quality impacts were predicted using the EPA CALPUFF dispersion model. The meteorology data and air pollutant emission values were combined to predict maximum potential direct, indirect, and cumulative near-field air quality impacts in the vicinity of assumed CBM well and CBM pipeline compressor engine emission sources for comparison with applicable air quality standards and PSD Class II increments. Maximum potential near-field particulate matter emissions from traffic on unpaved roads and during well pad construction were used to predict the maximum annual and 24-hour average PM<sub>2.5</sub>, PM<sub>10</sub>, and SO<sub>2</sub> impacts. Maximum air pollutant emissions from each CBM well would be temporary (i.e., occurring during a 12-day construction period) and would occur in isolation, without significantly interacting with adjacent well locations. Particulate matter emissions from well pad and resource road construction would be minimized by application of water and/or chemical dust suppressants. The control efficiency of these dust suppressants was computed at 50% during construction. During well completion testing, natural gas could be burned (flared) up to 24 hours.

Air pollutant dispersion modeling was also performed to quantify CO, NO<sub>2</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, and hazardous air pollutant (HAP) impacts during operation. Operation emissions would primarily occur due to increased CBM pipeline compression requirements, including booster (field) and pipeline (sales) compressor stations. Since produced natural gas is nearly pure methane, with little or no liquid hydrocarbons or sulfur compounds, direct **VOC** emissions or objectionable odors are not likely to occur. HAP impacts were predicted based on an assumed 9,900 horsepower, six-unit, reciprocating compressor engine station operating at full load with emissions generated by a single stack.



The significance criteria for potential air quality impacts include local, state, tribal, and federally enforced legal requirements to ensure air pollutant concentrations will remain within specific allowable levels. These requirements and legal limits were presented in table AQ-1. Where legal limits have not been established, BLM uses the best available scientific information to identify thresholds of significant adverse impacts. Thresholds have been identified for HAP exposure, potential ANC changes to sensitive lake water chemistry, and a 1.0 dv "just noticeable change" in potential visibility impacts.

Since neither the WDEQ/AQD nor EPA have established HAP standards, predicted 8-hour HAP concentrations were compared to a range of 8-hour state maximum acceptable ambient concentration levels (EPA 1997a). Pollutants which were predicted to exceed these state threshold levels were also analyzed to determine the possible incremental cancer-risk for a most likely exposure (MLE) to residents, and to a maximally exposed individual (MEI), such as compressor station workers. These cancer risks were calculated based on the maximum predicted annual concentrations, EPA's unit risk factors for carcinogenic compounds (EPA 1997b), and an adjustment for time spent at home or on the job.

The EPA CALPUFF dispersion model was also used to determine maximum far-field ambient air quality impacts at downwind mandatory federal PSD Class I areas, and other sensitive receptors, to: 1) determine if the PSD Class I increments might be exceeded; 2) calculate potential total sulfur and nitrogen deposition, and their related impacts to in sensitive lakes; and 3) predict potential visibility impacts (regional haze) within distant sensitive receptors.

Several lakes within five FS-designated wilderness areas were identified as being sensitive to atmospheric deposition and for which the most recent and complete data have been collected. The FS (Fox et al. 1989) has identified the following total deposition (wet plus dry) thresholds below which no adverse impacts are likely: five kg/ha-yr for sulfur, and three kg/ha-yr for nitrogen. The FS (2000) has also developed a screening method which identifies the following limit of acceptable change regarding potential changes in lake chemistry: no more than a 10% change in ANC for those water bodies where the existing ANC is at or above 25  $\mu\text{eq/l}$  and no more than a one  $\mu\text{eq/l}$  change for those extremely sensitive water bodies where the existing ANC is below 25  $\mu\text{eq/l}$ . No sensitive lakes were identified by either the NPS or FWS.

Since the potential air pollutant emission sources constitute many small sources spread out over a very large area, discrete visible plumes are not likely to impact the distant sensitive areas, but the potential for cumulative visibility impacts (increased regional haze) is a concern. Regional haze degradation is caused by fine particles and gases scattering and absorbing light. Potential changes to regional haze are calculated in terms of a perceptible "just noticeable change" (1.0 dv) in visibility when compared to background conditions. A 1.0 dv change is considered potentially significant in

mandatory federal PSD Class I areas as described in the EPA regional haze regulations (40 CFR 51.300 et seq.), and as originally presented in Pitchford and Malm (1994). A 1.0 dv change is defined as about a 10% change in the extinction coefficient (corresponding to a 2% to 5% change in contrast, for a black target against a clear sky, at the most optically sensitive distance from an observer), which is a small but noticeable change in haziness under most circumstances when viewing scenes in mandatory federal Class I areas.

It should be noted that a 1.0 dv change is not a "just noticeable change" in all cases for all scenes. Visibility changes less than 1.0 dv are likely to be perceptible in some cases, especially where the scene being viewed is highly sensitive to small amounts of pollution, such as due to preferential forward light scattering. Under other view-specific conditions, such as where the sight path to a scenic feature is less than the maximum visual range, a change greater than 1.0 dv might be required to be a "just noticeable change." However, this NEPA analysis is not designed to predict specific visibility impacts for specific views in specific mandatory federal Class I areas based on specific project designs, but to characterize reasonably foreseeable visibility conditions that are representative of a fairly broad geographic region, based on emission source assumptions. This approach is consistent with both the nature of regional haze and the requirements of NEPA. At the time of a pre-construction air quality PSD permit review, the applicable air quality regulatory agency may require a much more detailed visibility impact analysis. Factors such as the magnitude of change, frequency, time of the year, and the meteorological conditions during times when predicted visibility impacts are above the 1.0 dv threshold (as well as inherent conservatism in the modeling analyses) should all be considered when assessing the significance of predicted impacts.

The FS, NPS, and FWS have published their "Final FLAG Phase I Report" (Federal Register, Vol. 66 No. 2, dated January 3, 2001), providing "a consistent and predictable process for assessing the impacts of new and existing sources on AQRVs" including visibility. For example, the FLAG report states "A cumulative effects analysis of new growth (defined as all PSD increment-consuming sources) on visibility impairment should be performed," and further, "If the visibility impairment from the proposed action, in combination with cumulative new source growth, is less than a change in extinction of 10% [1.0 dv] for all time periods, the FLMs will not likely object to the proposed action."

The FLAG report also recommends a two-step analysis process to evaluate potential visibility impacts from either a single proposed air pollutant emission source (the seasonal FLAG screening method) or potential cumulative visibility impacts from a group of air pollutant emission sources (the daily FLAG refined method). As described in Argonne (2002), this NEPA analysis first used the seasonal FLAG "natural background" screening method (based on both the FLAG and WDEQ/AQD reference levels) to exclude those sensitive areas where visibility impacts were not likely to occur. Since no areas were excluded using the seasonal FLAG screening method, this NEPA

analysis then applied the daily FLAG refined method (based on hourly background optical extinction and relative humidity values measured in both the Badlands and Bridger wilderness areas between 1989 and 1999) to determine the average number of days a 1.0 dv “just noticeable change” would be reached annually in each sensitive area. Although the use of observed hourly optical extinction and relative humidity values is appropriate in this NEPA analysis (where the potential visibility impacts are predicted to occur based on the reasonably foreseeable background conditions), EPA’s regional haze regulations are based on optical conditions reconstructed from PM<sub>2.5</sub> and PM<sub>10</sub> data collected every third day under the IMPROVE program.

### **Estimation of Emission Factors: AP-42**

Air quality impacts for various air pollutants are determined by the use of air dispersion models using specific source emission rates. For natural gas compressors, the emissions of nitrogen oxides are determined by the assumed permitted emission rate allowed by the state. For fugitive dust impacts, emission rates are obtained from EPA’s AP-42 document that is titled “Compilation of Air Pollutant Emission Factors.” An AP-42 emission factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant. Emission factors may be appropriate to use in a number of situations such as making source-specific emission estimates for areawide inventories. These inventories have many purposes including ambient dispersion modeling and analysis, control strategy development, and in screening sources for compliance investigations. In most cases, these factors are simply averages of all available data of acceptable quality, and are generally assumed to be representative of long-term averages for all sources in a specific category.

### **Modeling Assumptions**

When reviewing the predicted near- and far-field air quality impacts, it is important to understand that assumptions were made regarding development, emissions, meteorology, atmospheric transport and chemistry, and atmospheric deposition. For example, there is uncertainty regarding ultimate development of CBM in the Wyoming and Montana PRB (i.e., number of wells, equipment to be used, specific locations of wells, etc.).

The following assumptions were used in the analysis:

- Total predicted short-term air pollutant impact concentrations were assumed to be the sum of the assumed background concentration, plus the predicted maximum cumulative modeled concentrations, which may occur under different meteorological conditions.

- Assumed background air pollution concentrations were assumed to occur throughout the 20-year **LOP** at all locations in the region, even though monitoring is primarily conducted in urban or industrial areas, rather than rural areas. The uniform background PM<sub>10</sub> levels for each state are assumed to be representative of the background conditions for the entire modeled area of the PRB, based on monitoring data gathered throughout northeastern Wyoming and southeastern Montana.
- The maximum predicted air quality impacts occur only in the vicinity of the anticipated emission sources. Actual impacts would likely be less at distances beyond the predicted points of maximum impact.
- All emission sources were assumed to operate at their reasonably foreseeable maximum emission rates simultaneously throughout the LOP. Given the number of sources included in this analysis, the co-probability of such a scenario actually occurring over an entire year (or even 24-hours) is small.
- In developing the emissions inventory and model, there is uncertainty regarding ultimate oil and gas development (i.e., number of wells, equipment to be used, specific locations, etc.) Most (90%) proposed CBM wells and 30% of conventional wells were assumed to be fully operational and remain operating (no shut ins) throughout the LOP.
- The total proposed booster (field) and pipeline (sales) compression engines were assumed to operate at their rated capacities continuously throughout the LOP (no phased increases or reductions). In reality, compression equipment would be added or removed incrementally as required by the well field operation, compressor engines would operate below full horsepower ratings, and it is unlikely all compressor stations would operate at maximum levels simultaneously.
- The HAP analyses assumed a 9,900 horsepower, six-unit, reciprocating compressor engine station would operate at full load and at maximum emission levels continuously throughout the LOP.
- The emissions inventory and model use peak years of construction and peak years of operations, which would not occur throughout the entire development region at the same time. However, it is possible that conditions close to this could occur in some isolated areas.
- The emissions inventory and model assumed a NO<sub>x</sub> emission rate for compressor engines of 1.5 g/hp-hr in Montana and 1.0 g/hp-hr in Wyoming. Since BACT is decided on a case-by-case basis, actual emission rates could be decided to be less or more than this level by the Wyoming or Montana DEQ, and

on Indian lands by EPA, for field and sales compressor engines. Actual NO<sub>x</sub> emission rates may range from 0.7 to 2 g/hp-hr.

- There are no applicable local, state, tribal, or federal acid deposition standards. In the absence of applicable standards, the acid deposition analysis assumed that a “limit of acceptable change” is: a 10% change in ANC for lakes with a background ANC greater than 25 µeq/l; or a 1 µeq/l change in ANC for lakes with a background ANC less than 25 µeq/l, and would be a reasonably foreseeable significant adverse impact. Further, the atmospheric deposition impact analysis assumed no other ecosystem components would affect lake chemistry for a full year (assuming no chemical buffering due to interaction with vegetation or soil materials).
- The visibility impact analysis assumed that a 1.0 dv “just noticeable change” would be a reasonably foreseeable significant adverse impact, although there are no applicable local, state, tribal, or federal regulatory visibility standards. However, some FLMs are using 0.5 dv as a screening threshold for significance.
- Mitigation measures are included in the emissions inventory and model that may not be achievable in all circumstances. However, actual mitigation decided by the developers and local and state authorities may be greater or less than those assumed in the analysis. For example, maintaining a construction road speed limit of 15 mph may be reasonable in a construction zone but difficult to enforce elsewhere. Full (100%) mitigation of fugitive dust from disturbed lands may not be achievable. Further, 50% reduction in fugitive emissions is assumed based on construction road wetting on the unimproved access road to the pad and at the pad, but this level of effectiveness is characterized as the maximum possible. Wetting was assumed for maintenance traffic, which is not likely to occur, but this is considered to be a small effect because of limited traffic.
- Induced or secondary growth related to increases in vehicle miles traveled (VMT) (believed to be on the order of 10% overall) is not included in the emissions inventory and model. Not all fugitive dust emissions (including county and other collector roads) have been included in the emissions inventory and model.
- Fugitive dust emissions from roads are treated as area sources rather than line sources in the model, which may thereby reduce or increase the predicted ambient concentrations at maximum concentration receptor points near the source, depending on the inputs to the model (meteorology, terrain, etc.) By not placing modeled receptors close to emission sources (e.g. wells and roads), the model may not capture higher ambient concentrations near these sources. A more refined, regulatory model may yield higher concentrations at locations near fugitive dust sources.

- For comparisons to the PSD Class I and II increments, the emissions inventory and model included only CBM and RFFD sources. Other existing increment consuming sources such as Campbell County coal mines were not included in this comparison, as the air quality analysis does not represent a regulatory PSD increment consumption analysis. A regulatory PSD increment consumption analysis needs to identify and consider all PSD increment consuming sources to determine the level of PSD Class II increment consumption. Monitoring data in Wyoming has indicated an upward trend in PM concentrations in Campbell County since 1999, which coincides with CBM development but is also exacerbated by prolonged drought in the region.

It is important to note that before actual development could occur, the applicable air quality regulatory agencies (including the state, tribe, or EPA) would review specific air pollutant emissions preconstruction permit applications that examine potential project-specific air quality impacts. As part of these permit reviews (depending on source size), the air quality regulatory agencies could require additional air quality impact analyses or mitigation measures. Thus, before development occurs, additional site-specific air quality analyses would be performed to ensure protection of air quality.

### **Modeling Results**

The following tables present the detailed atmospheric dispersion modeling results for the alternatives considered in the Wyoming PRB Oil and Gas Project EIS. These results are summarized in chapter 4, "Cumulative Environmental Consequences" (Air Quality). As discussed in chapter 4, the cumulative impacts predicted by the PRB air quality impact assessment would be the same under the Proposed Action and the alternatives for leasing or not leasing federal coal considered in this EIS. This is because the air quality impact analysis used market demand predictions in order to estimate levels of coal production in the PRB for modeling purposes. There is enough coal leased to the existing mines in the PRB to supply this market demand during the time of maximum CBM development activity in the PRB, which is the time when the maximum overlapping impacts to air quality would occur.

**TABLE AQ-4**  
**PREDICTED HAZARDOUS AIR POLLUTANT IMPACTS AND SIGNIFICANCE**  
**THRESHOLDS**  
(in  $\mu\text{g}/\text{m}^3$ )

Pollutant	Averaging Time	Direct Modeled Impact	Range of State Acceptable Ambient Concentration Levels <sup>1</sup>
formaldehyde	8-hours	11.9	4.5 (FL07) - 71 (NV01)
n-hexane	8-hours	0.6	1,800 (FL07) - 36,000 (CT01)
benzene	8-hours	0.7	30 (FL04) - 714 (NV01)
toluene	8-hours	4.6	1,870 (IN03) - 8,930 (NV01)
Ethyl benzene	8-hours	< 0.1	4,340 (ND01) - 43,500 (VT01)
xylene	8-hours	0.2	2,170 (IN01) - 10,400 (NV01)

<sup>1</sup>Agencies:

CT01 - Connecticut Department of Environmental Protection; Air Compliance Unit

FL04 - Broward County Department of Natural Resource Protection (Florida)

FL07 - Pinellas County Air Pollution Control Board (Florida)

IN01 - Indiana Department of Environmental Management

IN03 - Indianapolis Air Pollution Control Division (Indiana)

ND01 - North Dakota Dept. of Health; Division of Environmental Engineering

NV01 - Nevada Division of Environmental Protection; Air Quality Control

VT01 - Vermont Dept of Environmental Conservation; Air Pollution Control Division

Source: Argonne (2002)

**TABLE AQ-5**  
**WYOMING PRB OIL AND GAS PROJECT EIS ALTERNATIVE 1 - PREDICTED CRITERIA POLLUTANT IMPACTS AND**  
**APPLICABLE SIGNIFICANCE THRESHOLDS**  
(in  $\mu\text{g}/\text{m}^3$ )

Pollutant	Avg Time <sup>a</sup>	Location	Increment	Alt 1	Other	Cum	Background	Total	National	Wyoming
Carbon monoxide	1-hour	near-field	---	223	142	224	3,500	3,724	40,000	40,000
	8-hours	far-field <sup>1</sup>	---	5	100	100	3,500	3,600	40,000	40,000
		near-field	---	156	124	156	1,500	1,656	10,000	10,000
		far-field <sup>2</sup>	---	19	70	78	1,500	1,578	10,000	10,000
nitrogen dioxide	Annual	near-field	25	8.0	3.3	10.5	17	27	100	100
		far-field <sup>3</sup>	25	0.4	5.1	5.4	17	22	100	100
		far-field <sup>2</sup>	2.5	0.3	3.9 <sup>b</sup>	4.2 <sup>b</sup>	17	21	100	100
PM <sub>2.5</sub>	24-hours	near-field	---	16.0	8.6	24.4	19	43	65	65
		far-field <sup>3</sup>	---	5.1	9.7	14.7	19	34	65	65
	Annual	near-field	---	1.7	0.7	2.3	8	10	15	15
		far-field <sup>3</sup>	---	0.2	1.1	1.2	8	9	15	15
PM <sub>10</sub>	24-hours	near-field	30	20.2	9.3	30.8 <sup>b</sup>	42	73	150	150
		far-field <sup>4</sup>	30	0.5	29.7	29.7	42	72	150	150
	Annual	far-field <sup>2</sup>	8	3.9	9.4 <sup>b</sup>	12.8 <sup>b</sup>	42	55	150	150
		far-field <sup>5</sup>	8	2.2	7.0	9.2 <sup>b</sup>	42	51	150	150
		near-field	17	3.3	0.9	4.1	17	21	50	50
far-field <sup>4</sup>	17	<0.1	2.7	2.7	17	20	50	50		
sulfur dioxide	3-hours	near-field	512	3.3	4.5	4.6	8	13	1,300	1,300
	24-hours	far-field <sup>3</sup>	512	0.7	17.1	17.1	8	25	1,300	1,300
		near-field	91	1.7	1.8	3.2	8	11	365	260
		far-field <sup>3</sup>	91	0.3	5.3	5.3	8	13	365	260
	Annual	near-field	20	0.5	0.2	0.6	3	4	80	60
far-field <sup>3</sup>	20	<0.1	0.4	0.4	0.4	3	3	80	60	



## TABLE AQ-5: FOOTNOTES

<sup>a</sup>Annual impacts are the first maximum value; short-term impacts are the second maximum value.

<sup>b</sup>It is possible that **Other** and **Cum** emission sources could exceed the PSD Class I increment on the Northern Cheyenne Indian Reservation, and that **Cum** emission sources could exceed the PSD Class I increment in the Washakie Wilderness Area, and the PSD Class II increment near the maximum potential development. A regulatory "PSD Increment Consumption Analysis" should be conducted during permitting by the appropriate air quality regulatory agency.

### Notes:

**Alt 1** - Direct modeled Wyoming PRB Oil and Gas Project EIS Alternative 1 impacts.

**Other** - Direct modeled "Reasonably Foreseeable Development" impacts. The impact from all air pollutant emission sources not included in **Alt 1**, including projected surface coal mining in the Wyoming and Montana PRB and the Montana Statewide EIS Alternative B/C/E sources. Potential impacts from Montana Alternatives A and D would be less.

**Cum** - Cumulative modeled impacts. Since these values represent the maximum cumulative impact location, they may not be a simple sum of the maximum direct **Alt 1** and **Other** impacts, which can occur at different locations.

**Total** - The sum of the cumulative modeled impact and the assumed background concentration.

**National** - Applicable National Ambient Air Quality Standard.

**Wyoming** - Applicable Wyoming Ambient Air Quality Standard.

### Locations:

<sup>1</sup> Absaroka-Beartooth Wilderness Area

<sup>2</sup> Northern Cheyenne Indian Reservation

<sup>3</sup> Crow Indian Reservation

<sup>4</sup> Fort Belknap Indian Reservation

<sup>5</sup> Washakie Wilderness Area

**Source:** Argonne (2002)

TABLE AQ-6

**WYOMING PRB OIL AND GAS PROJECT EIS ALTERNATIVE 1 - PREDICTED ATMOSPHERIC DEPOSITION IMPACTS AND APPLICABLE SIGNIFICANCE THRESHOLDS**

Location	PSD Class	Lake	Total Sulfur Deposition (kg/ha-yr)				Total Nitrogen Deposition (kg/ha-yr)				Acid Neutralizing Capacity (percent)				
			Alt 1	Other	Cum	Thld	Alt 1	Other	Cum	Thld	Bkgd ( $\mu$ eq/l)	Alt 1	Other	Cum	Thld
Bridger WA	I	Black Joe	<0.01	0.01	0.01	5	0.01	0.02	0.03	3	69.0	0.7	1.9	2.6	10
		Deep	<0.01	0.01	0.01	5	0.01	0.02	0.03	3	61.0	0.8	2.1	2.9	10
		Hobbs	<0.01	0.01	0.01	5	0.01	0.01	0.02	3	68.0	0.4	1.1	1.5	10
		Upper Frozen	<0.01	0.01	0.01	5	0.01	0.02	0.03	3	5.8 <sup>a</sup>	0.5 <sup>a</sup>	1.3 <sup>a</sup>	1.8 <sup>a</sup>	1 <sup>a</sup>
Fitzpatrick WA	I	Ross	<0.01	0.01	0.01	5	0.01	0.02	0.02	61.4	0.5	1.6	2.1	10	
Absaroka- Beartooth WA	II	Stepping Stone	<0.01	0.02	0.02	5	0.01	0.03	0.03	3	27.0	0.3	2.2	2.5	10
		Twin Island	<0.01	0.02	0.02	5	0.01	0.03	0.03	3	36.0	0.2	1.6	1.8	10
Cloud Peak WA	II	Emerald	<0.01	0.03	0.03	5	0.04	0.07	0.10	3	53.3	1.7	4.2	5.9	10
		Florence	<0.01	0.03	0.03	5	0.04	0.07	0.11	3	32.7	3.1	7.2	10.4 <sup>b</sup>	10 <sup>b</sup>
Popo Agie WA	II	Lower Saddlebag	<0.01	0.01	0.01	5	0.01	0.02	0.04	3	55.5	1.0	2.6	3.6	10

**Notes:**

<sup>a</sup>Since the background acid neutralizing capacity at Upper Frozen Lake is less than 25  $\mu$ eq/l, the applicable significance threshold is less than a 1  $\mu$ eq/l change. This threshold is exceeded by **Other** and **Cum** emission sources. However, the background concentration is based on only six samples taken on four days between 1997 and 2001.

<sup>b</sup>Potential changes in acid neutralizing capacity is predicted to exceed the applicable significance level by less than one percent due to **Cum** emission sources

**Alt 1** - Direct modeled Wyoming PRB Oil and Gas Project EIS Alternative 1 impacts.

**Other** - Direct modeled "Reasonably Foreseeable Development" impacts. The impact from all air pollutant emission sources not included in **Alt 1**, including projected surface coal mining in the Wyoming and Montana PRB the Montana Statewide EIS Alternative B/C/E sources. Potential impacts from Montana Alternatives A and D would be less.

**Cum** - Cumulative modeled impacts. Since these values represent the maximum cumulative impact at a specific location, they are the sum of the maximum direct **Alt 1** and **Other** impacts.

**Thld** - Impact threshold. Total sulfur and nitrogen thresholds from Fox, et al. (1989); acid neutralizing capacity thresholds from USFS (2000).

**WA** - Wilderness Area.

**Source:** Argonne (2002)

TABLE AQ-7

# WYOMING PRB OIL AND GAS PROJECT EIS ALTERNATIVE 1 - DAILY FLAG REFINED METHOD - VISIBILITY IMPACT ANALYSIS

(number of days  $\geq 1.0$  dv per year)

Sensitive Location	PSD Classification	Alt 1	Other	Cum
Badlands WA	mandatory federal Class I	3	13 to 17	24 to 28
Bridger WA	mandatory federal Class I	4	7 to 9	10 to 12
Fitzpatrick WA	mandatory federal Class I	4	6 to 9	10 to 12
Gates of the Mountains WA	mandatory federal Class I	0	3 to 4	4 to 4
Grand Teton NP	mandatory federal Class I	1	3 to 5	6 to 8
North Absaroka WA	mandatory federal Class I	4	9 to 13	12 to 15
Red Rock Lakes WA	mandatory federal Class I	0	0 to 1	1 to 3
Scapegoat WA	mandatory federal Class I	0	2 to 2	3 to 3
Teton WA	mandatory federal Class I	3	6 to 9	10 to 11
Theodore Roosevelt NMP (North)	mandatory federal Class I	0	0 to 1	2 to 3
Theodore Roosevelt NMP (South)	mandatory federal Class I	1	1 to 3	4 to 7
U.L. Bend WA	mandatory federal Class I	1	4 to 5	6 to 8
Washakie WA	mandatory federal Class I	5	10 to 14	15 to 18
Wind Cave NP	mandatory federal Class I	4	17 to 21	28 to 32
Yellowstone NP	mandatory federal Class I	3	8 to 11	11 to 13
Fort Peck IR	Tribal designated Class I	0	1 to 3	2 to 5
Northern Cheyenne IR	Tribal designated Class I	17	27 to 82	42 to 92
Absaroka-Beartooth WA	federal Class II	4	28 to 32	30 to 33
Agate Fossil Beds NM	federal Class II	2	8 to 11	15 to 19
Bighorn Canyon NRA	federal Class II	9	17 to 30	23 to 34
Black Elk WA	federal Class II	4	17 to 20	26 to 31
Cloud Peak WA	federal Class II	13	17 to 30	30 to 39
Crow IR	federal Class II	20	59 to 108	69 to 116
Devils Tower NM	federal Class II	9	17 to 25	39 to 47
Fort Belknap IR	federal Class II	1	60 to 61	61 to 62
Fort Laramie NHS	federal Class II	2	10 to 14	17 to 20
Jewel Cave NM	federal Class II	4	19 to 23	32 to 36
Mount Rushmore NMem	federal Class II	3	13 to 17	22 to 26
Popo Agie WA	federal Class II	4	7 to 9	10 to 13
Soldier Creek WA	federal Class II	2	10 to 13	18 to 21

Alt 1 - Direct modeled Wyoming PRB Oil and Gas Project EIS Alternative 1 impacts.

Other - Direct modeled "Reasonably Foreseeable Development" impacts. The impact from all air pollutant emission sources not included in Alt 1, including projected surface coal mining operations in the Montana and Wyoming PRB and the Montana Statewide EIS sources. The range of values corresponds to including Montana Alternative A (low) to Montana Alternative B/C/E (high).

Cum - Cumulative modeled impacts. Since these values represent the maximum visibility impact anywhere within the sensitive location, they may not be a simple sum of the maximum direct Alt 1 and Other impacts, which can occur at different locations.

Locations: IR-Indian Reservation; NHS-National Historic Site; NM-National Monument; NMP-National Memorial Park; NMem-National Memorial; NP-National Park; NRA-National Recreation Area; WA-Wilderness Area.

Source: Argonne (2002).

**TABLE AQ-8**  
**WYOMING PRB OIL AND GAS PROJECT EIS ALTERNATIVE 2A - PREDICTED CRITERIA POLLUTANT IMPACTS**  
**AND APPLICABLE SIGNIFICANCE THRESHOLDS**  
(in  $\mu\text{g}/\text{m}^3$ )

Pollutant	Avg Time <sup>a</sup>	Location	Increment	Alt 2A	Other	Cum	Back-ground	Total	National	Wyoming
carbon monoxide	1-hour	near-field	---	158	142	197	3,500	3,697	40,000	40,000
		far-field <sup>1</sup>	---	4	100	100	3,500	3,600	40,000	40,000
	8-hours	near-field	---	93	124	132	1,500	1,632	10,000	10,000
		far-field <sup>2</sup>	---	14	70	76	1,500	1,576	10,000	10,000
nitrogen dioxide	Annual	near-field	25	7.2	3.3	9.6	17	27	100	100
		far-field <sup>3</sup>	25	0.4	5.1	5.4	17	22	100	100
		far-field <sup>2</sup>	2.5	0.2	3.9 <sup>b</sup>	4.1 <sup>b</sup>	17	21	100	100
		near-field	---	13.0	8.6	21.3	19	40	65	65
PM <sub>2.5</sub>	24-hours	far-field <sup>3</sup>	---	4.5	9.7	14.0	19	33	65	65
		near-field	---	1.5	0.7	2.1	8	10	15	15
	Annual	far-field <sup>3</sup>	---	0.2	1.1	1.2	8	9	15	15
		near-field	---	17.5	9.3	27.7	42	70	150	150
PM <sub>10</sub>	24-hours	far-field <sup>4</sup>	30	0.4	29.7	29.7	42	72	150	150
		far-field <sup>2</sup>	8	3.4	9.4 <sup>b</sup>	12.4 <sup>b</sup>	42	54	150	150
	Annual	far-field <sup>5</sup>	8	1.8	7.0	8.8 <sup>b</sup>	42	51	150	150
		near-field	17	3.1	0.9	3.9	17	21	50	50
		far-field <sup>4</sup>	17	<0.1	2.7	2.7	17	20	50	50
sulfur dioxide	3-hours	near-field	512	3.3	4.5	4.6	8	13	1,300	1,300
		far-field <sup>3</sup>	512	0.7	17.1	17.1	8	25	1,300	1,300
	24-hours	near-field	91	1.7	1.8	3.2	8	11	365	260
		far-field <sup>3</sup>	91	0.3	5.3	5.3	8	13	365	260
	Annual	near-field	20	0.5	0.2	0.6	3	4	80	80
		far-field <sup>3</sup>	20	<0.1	0.4	0.4	3	3	80	80

## TABLE AQ-8: FOOTNOTES

### Notes:

<sup>a</sup> Annual impacts are the first maximum value; short-term impacts are the second maximum value.

<sup>b</sup> It is possible that **Other** and **Cum** emission sources could exceed the PSD Class I increment on the Northern Cheyenne Indian Reservation, and that **Cum** emission sources could exceed the PSD Class I increment in the Washakie Wilderness Area; a regulatory "PSD Increment Consumption Analysis" should be conducted during permitting by the appropriate air quality regulatory agency.

**Alt 2A** - Direct modeled Wyoming PRB Oil and Gas Project EIS Alternative 2A impacts.

**Other** - Direct modeled "Reasonably Foreseeable Development" impacts. The impact from all air pollutant emission sources not included in

**Alt 2A**, including projected surface coal mining operations in the Montana and Wyoming PRB and the Montana Statewide EIS Alternative B/C/E sources. Potential impacts from Montana Alternatives A and D would be less.

**Cum** - Cumulative modeled impacts. Since these values represent the maximum cumulative impact location, they may not be a simple sum of the maximum direct **Alt 2A** and **Other** impacts, which can occur at different locations.

**Total** - The sum of the cumulative modeled impact and the assumed background concentration.

**National** - Applicable National Ambient Air Quality Standard.

**Wyoming** - Applicable Wyoming Ambient Air Quality Standard.

### Locations:

- <sup>1</sup> Absaroka-Beartooth Wilderness Area
- <sup>2</sup> Northern Cheyenne Indian Reservation
- <sup>3</sup> Crow Indian Reservation
- <sup>4</sup> Fort Belknap Indian Reservation
- <sup>5</sup> Washakie Wilderness Area

**Source:** Argonne (2002)

**TABLE AQ-9  
WYOMING PRB OIL AND GAS PROJECT EIS ALTERNATIVE 2A - PREDICTED ATMOSPHERIC DEPOSITION  
IMPACTS AND APPLICABLE SIGNIFICANCE THRESHOLDS**

Location	PSD Class	Lake	Total Sulfur Deposition (kg/ha-yr)				Total Nitrogen Deposition (kg/ha-yr)				Acid Neutralizing Capacity (percent)				
			Alt 2A	Other	Cum	Thld	Alt 2A	Other	Cum	Thld	Bkgd (µeq/l)	Alt 2A	Other	Cum	Thld
Bridger WA	I	Black Joe Deep Hobbs Upper Frozen	<0.0	0.01	0.01	5	0.01	0.02	0.03	3	69.0	0.6	1.9	2.5	10
			<0.0	0.01	0.01	5	0.01	0.02	0.03	3	61.0	0.7	2.1	2.8	10
			<0.0	0.01	0.01	5	0.01	0.01	0.02	3	68.0	0.3	1.1	1.5	10
			<0.0	0.01	0.01	5	0.01	0.02	0.03	3	5.8 <sup>a</sup>	0.5 <sup>a</sup>	1.3 <sup>a</sup>	1.8 <sup>a</sup>	1 <sup>a</sup>
Fitzpatrick WA	I	Ross	<0.0	0.01	0.01	5	0.01	0.02	0.02	61.4	0.5	1.6	2.0	10	
Absaroka-Beartooth WA	II	Stepping Stone Twin Island	<0.0	0.02	0.02	5	<0.0	0.03	0.03	3	27.0	0.3	2.2	2.5	10
			<0.0	0.02	0.02	5	<0.0	0.03	0.03	3	36.0	0.2	1.6	1.8	10
Cloud Peak WA	II	Emerald Florence	<0.0	0.03	0.03	5	0.03	0.07	0.10	3	53.3	1.5	4.2	5.7	10
			<0.0	0.03	0.03	5	0.03	0.07	0.10	3	32.7	2.8	7.2	10.0	10
Popo Agie WA	II	Lower Saddlebag	<0.0	0.01	0.01	5	0.01	0.02	0.03	55.5	0.9	2.6	3.5	10	

## TABLE AQ-9: FOOTNOTES

### Notes:

<sup>a</sup> Since the background acid neutralizing capacity at Upper Frozen Lake is less than 25  $\mu\text{eq/l}$ , the applicable significance threshold is less than a 1  $\mu\text{eq/l}$  change. This threshold is exceeded by **Other** and **Cum** emission sources. However, the background concentration is based on only six samples taken on four days between 1997 and 2001.

**Alt 2A** - Direct modeled Wyoming PRB Oil and Gas Project EIS Alternative 2A impacts.

**Other** - Direct modeled "Reasonably Foreseeable Development" impacts. The impact from all air pollutant emission sources not included in **Alt 2A**, including projected surface coal mining operations in the Wyoming and Montana PRB and the Montana Statewide EIS Alternative B/C/E sources. Potential impacts from Montana Alternatives A and D would be less.

**Cum** - Cumulative modeled impacts. Since these values represent the maximum cumulative impact at a specific location, they are the sum of the maximum direct **Alt 2A** and **Other** impacts.

**Thld** - Impact threshold. Total sulfur and nitrogen thresholds from Fox, et al. (1989); acid neutralizing capacity thresholds from USFS (2000).

**WA** - Wilderness Area.

**Source:** Argonne (2002)

**TABLE AQ-10**  
**WYOMING PRB OIL AND GAS PROJECT EIS ALTERNATIVE 2A –**  
**DAILY FLAG REFINED METHOD - VISIBILITY IMPACT ANALYSIS**  
(number of days  $\geq 1.0$  dv per year)

Sensitive Location	PSD Classification	Alt 2A	Other	Cum
Badlands WA	mandatory federal Class I	3	13 to 17	24 to 27
Bridger WA	mandatory federal Class I	4	7 to 9	10 to 12
Fitzpatrick WA	mandatory federal Class I	3	6 to 9	9 to 12
Gates of the Mountains WA	mandatory federal Class I	0	3 to 4	4 to 4
Grand Teton NP	mandatory federal Class I	1	3 to 5	6 to 7
North Absaroka WA	mandatory federal Class I	3	9 to 13	12 to 14
Red Rock Lakes WA	mandatory federal Class I	0	0 to 1	1 to 3
Scapegoat WA	mandatory federal Class I	0	2 to 2	2 to 3
Teton WA	mandatory federal Class I	3	6 to 9	9 to 11
Theodore Roosevelt NMP (North)	mandatory federal Class I	0	0 to 1	2 to 3
Theodore Roosevelt NMP (South)	mandatory federal Class I	0	1 to 3	4 to 6
U.L. Bend WA	mandatory federal Class I	1	4 to 5	5 to 8
Washakie WA	mandatory federal Class I	4	10 to 14	14 to 18
Wind Cave NP	mandatory federal Class I	3	17 to 21	27 to 30
Yellowstone NP	mandatory federal Class I	2	8 to 11	11 to 13
Fort Peck IR	Tribal designated Class I	0	1 to 3	2 to 5
Northern Cheyenne IR	Tribal designated Class I	16	27 to 82	39 to 91
Absaroka-Beartooth WA	federal Class II	3	28 to 32	29 to 33
Agate Fossil Beds NM	federal Class II	1	8 to 11	14 to 17
Bighorn Canyon NRA	federal Class II	8	17 to 30	22 to 34
Black Elk WA	federal Class II	3	17 to 20	25 to 29
Cloud Peak WA	federal Class II	12	17 to 30	28 to 38
Crow IR	federal Class II	16	59 to 108	69 to 115
Devils Tower NM	federal Class II	6	17 to 25	36 to 44
Fort Belknap IR	federal Class II	1	60 to 61	61 to 61
Fort Laramie NHS	federal Class II	2	10 to 14	17 to 19
Jewel Cave NM	federal Class II	3	19 to 23	30 to 35
Mount Rushmore NMem	federal Class II	2	13 to 17	21 to 25
Popo Agie WA	federal Class II	3	7 to 9	10 to 12
Soldier Creek WA	federal Class II	1	10 to 13	17 to 21



## TABLE AQ-10: FOOTNOTES

**Notes:**

**Alt 2A** - Direct modeled Wyoming PRB Oil and Gas Project EIS Alternative 2A impacts.

**Other** - Direct modeled "Reasonably Foreseeable Development" impacts. The impact from all air pollutant emission sources not included in Wyoming PRB Oil and Gas Project EIS **Alt 2A**, including projected surface coal mining operations in the Wyoming and Montana PRB and the Montana Statewide EIS sources. The range of values corresponds to including Montana Alternative A (low) to Montana Alternative B/C/E (high).

**Cum** - Cumulative modeled impacts. Since these values represent the maximum visibility impact anywhere within the sensitive location, they may not be a simple sum of the maximum direct **Alt 2A** and **Other** impacts, which can occur at different locations.

**Locations:** **IR**-Indian Reservation; **NHS**-National Historic Site; **NM**-National Monument; **NMP**-National Memorial Park; **NMem**-National Memorial; **NP**-National Park; **NRA**-National Recreation Area; **WA**-Wilderness Area.

**Source:** Argonne (2002)

**TABLE AQ-11  
WYOMING PRB OIL AND GAS PROJECT EIS ALTERNATIVE 2B - PREDICTED CRITERIA POLLUTANT IMPACTS  
AND APPLICABLE SIGNIFICANCE THRESHOLDS**

(in  $\mu\text{g}/\text{m}^3$ )

Pollutant	Avg Time <sup>a</sup>	Location	Increment	Alt 2B	Other	Cum	Background	Total	National	Wyoming
carbon monoxide	1-hour	near-field	---	157	142	170	3,500	3,670	40,000	40,000
		far-field <sup>1</sup>	---	3	100	100	3,500	3,600	40,000	40,000
	8-hours	near-field	---	77	124	124	1,500	1,624	10,000	10,000
		far-field <sup>2</sup>	---	9	70	74	1,500	1,574	10,000	10,000
nitrogen dioxide	Annual	near-field	25	6.3	3.3	8.8	17	26	100	100
		far-field <sup>3</sup>	25	0.3	5.1	5.3	17	22	100	100
		far-field <sup>2</sup>	2.5	0.2	3.9 <sup>b</sup>	4.1 <sup>b</sup>	17	21	100	100
PM <sub>2.5</sub>	24-hours	near-field	---	10.7	8.6	19.0	19	38	65	65
		far-field <sup>3</sup>	---	3.8	9.7	13.4	19	32	65	65
	Annual	near-field	---	1.3	0.7	2.0	8	10	15	15
		far-field <sup>3</sup>	---	0.1	1.1	1.2	8	9	15	15
PM <sub>10</sub>	24-hours	near-field	30	15.2	9.3	25.5	42	67	150	150
		far-field <sup>4</sup>	30	0.4	29.7	29.7	42	72	150	150
	Annual	far-field <sup>2</sup>	8 <sup>b</sup>	3.0	9.4 <sup>b</sup>	12.1 <sup>b</sup>	42	54	150	150
		far-field <sup>5</sup>	8	1.5	7.0	8.5 <sup>b</sup>	42	50	150	150
	Annual	near-field	17	2.9	0.9	3.7	17	21	50	50
		far-field <sup>4</sup>	17	<0.1	2.7	2.7	17	20	50	50
sulfur dioxide	3-hours	near-field	512	3.3	4.5	4.6	8	13	1,300	1,300
		far-field <sup>3</sup>	512	0.7	17.1	17.1	8	25	1,300	1,300
	24-hours	near-field	91	1.7	1.8	3.2	8	11	365	260
		far-field <sup>3</sup>	91	0.3	5.3	5.3	8	13	365	260
	Annual	near-field	20	0.5	0.2	0.6	3	4	80	60
		far-field <sup>3</sup>	20	<0.1	0.4	0.4	3	3	80	60

## TABLE AQ-11: FOOTNOTES

### Notes:

- <sup>a</sup> Annual impacts are the first maximum value; short-term impacts are the second maximum value.
- <sup>b</sup> It is possible that **Other** and **Cum** emission sources could exceed the PSD Class I increment on the Northern Cheyenne Indian Reservation, and that **Cum** emission sources could exceed the PSD Class I increment in the Washakie Wilderness Area; a regulatory "PSD Increment Consumption Analysis" should be conducted during permitting by the appropriate Air Quality Regulatory Agency.
- Alt 2B** - Direct modeled Wyoming PRB Oil and Gas Project EIS Alternative 2B impacts.
- Other** - Direct modeled "Reasonably Foreseeable Development" impacts. The impact from all air pollutant emission sources not included in **Alt 2B**, including projected surface coal mining operations in the Wyoming and Montana PRB and the Montana Statewide EIS Alternative B/C/E sources. Potential impacts from Montana Alternatives A and D would be less.
- Cum** - Cumulative modeled impacts. Since these values represent the maximum cumulative impact location, they may not be a simple sum of the maximum direct **Alt 2B** and **Other** impacts, which can occur at different locations.
- Total** - The sum of the cumulative modeled impact and the assumed background concentration.
- National** - Applicable National Ambient Air Quality Standard.
- Wyoming** - Applicable Wyoming Ambient Air Quality Standard.

### Locations:

- <sup>1</sup> Absaroka-Beartooth Wilderness Area
- <sup>2</sup> Northern Cheyenne Indian Reservation
- <sup>3</sup> Crow Indian Reservation
- <sup>4</sup> Fort Belknap Indian Reservation
- <sup>5</sup> Washakie Wilderness Area

Source: Argonne (2002)

TABLE AQ-12

WYOMING PRB OIL AND GAS PROJECT EIS ALTERNATIVE 2B - PREDICTED ATMOSPHERIC DEPOSITION IMPACTS AND APPLICABLE SIGNIFICANCE THRESHOLDS

Location	PSD Class	Lake	Total Sulfur Deposition (kg/ha-yr)				Total Nitrogen Deposition (kg/ha-yr)				Acid Neutralizing Capacity (percent)				
			Alt 2B	Other	Cum	Thld	Alt 2B	Other	Cum	Thld	Bkgd (µeq/l)	Alt 2B	Other	Cum	Thld
Bridger WA	I	Black Joe	<0.01	0.01	0.01	5	0.01	0.02	0.03	3	69.0	0.6	1.9	2.4	10
		Deep	<0.01	0.01	0.01	5	0.01	0.02	0.03	3	61.0	0.6	2.1	2.7	10
		Hobbs	<0.01	0.01	0.01	5	<0.01	0.01	0.02	3	68.0	0.3	1.1	1.4	10
		Upper Frozen	<0.01	0.01	0.01	5	0.01	0.02	0.03	3	5.8 <sup>a</sup>	0.4 <sup>a</sup>	1.3 <sup>a</sup>	1.7 <sup>a</sup>	1 <sup>a</sup>
Fitzpatrick WA	I	Ross	<0.01	0.01	0.01	5	0.01	0.02	3	61.4	0.4	1.6	2.0	10	
Absaroka-Beartooth WA	II	Stepping Stone	<0.01	0.02	0.02	5	<0.01	0.03	0.03	3	27.0	0.2	2.2	2.5	10
		Twin Island	<0.01	0.02	0.02	5	<0.01	0.03	0.03	3	36.0	0.2	1.6	1.8	10
Cloud Peak WA	II	Emerald	<0.01	0.03	0.03	5	0.03	0.07	0.10	3	53.3	1.3	4.2	5.5	10
		Florence	<0.01	0.03	0.03	5	0.03	0.07	0.10	3	32.7	2.5	7.2	9.7	10
Popo Agie WA	II	Lower Saddlebag	<0.01	0.01	0.01	5	0.01	0.02	0.03	3	55.5	0.8	2.6	3.4	10

Notes:

<sup>a</sup>Since the background acid neutralizing capacity at Upper Frozen Lake is less than 25 µeq/l, the applicable significance threshold is less than a 1 µeq/l change. This threshold is exceeded by **Other** sources alone, as well **Cum** sources. However, the background concentration is based on only six samples taken on four days between 1997 and 2001.

**Alt 2B** - Direct modeled Wyoming PRB Oil and Gas Project EIS Alternative 2B impacts.

**Other** - Direct modeled "Reasonably Foreseeable Development" impacts. The impact from all air pollutant emission sources not included in **Alt 2B**, including projected surface coal mining operations in the Wyoming and Montana PRB and the Montana Statewide EIS Alternative B/C/E sources. Potential impacts from Montana Alternatives A and D would be less.

**Cum** - Cumulative modeled impacts. Since these values represent the maximum cumulative impact at a specific location, they are the sum of the maximum direct **Alt 2B** and **Other** impacts.

**Thld** - Impact threshold. Total sulfur and nitrogen thresholds from Fox, et al. (1989); acid neutralizing capacity thresholds from USFS (2000).

**WA** - Wilderness Area.

Source: Argonne (2002)

**TABLE AQ-13**  
**WYOMING PRB OIL AND GAS PROJECT EIS ALTERNATIVE 2B - DAILY FLAG**  
**REFINED METHOD - VISIBILITY IMPACT ANALYSIS**

(number of days  $\geq 1.0$  dv per year)

Sensitive Location	PSD Classification	Alt 2B	Other	Cum
Badlands WA	mandatory federal Class I	1	13 to 17	22 to 26
Bridger WA	mandatory federal Class I	3	7 to 9	9 to 11
Fitzpatrick WA	mandatory federal Class I	3	6 to 9	9 to 11
Gates of the Mountains WA	mandatory federal Class I	0	3 to 4	4 to 4
Grand Teton NP	mandatory federal Class I	0	3 to 5	5 to 7
North Absaroka WA	mandatory federal Class I	2	9 to 13	12 to 14
Red Rock Lakes WA	mandatory federal Class I	0	0 to 1	1 to 2
Scapegoat WA	mandatory federal Class I	0	2 to 2	2 to 3
Teton WA	mandatory federal Class I	2	6 to 9	9 to 11
Theodore Roosevelt NMP (North)	mandatory federal Class I	0	0 to 1	1 to 3
Theodore Roosevelt NMP (South)	mandatory federal Class I	0	1 to 3	3 to 6
U.L. Bend WA	mandatory federal Class I	1	4 to 5	5 to 7
Washakie WA	mandatory federal Class I	4	10 to 14	14 to 17
Wind Cave NP	mandatory federal Class I	2	17 to 21	25 to 28
Yellowstone NP	mandatory federal Class I	1	8 to 11	11 to 13
Fort Peck IR	Tribal designated Class I	0	1 to 3	2 to 4
Northern Cheyenne IR	Tribal designated Class I	14	27 to 82	38 to 90
Absaroka-Beartooth WA	federal Class II	3	28 to 32	29 to 33
Agate Fossil Beds NM	federal Class II	0	8 to 11	13 to 16
Bighorn Canyon NRA	federal Class II	7	17 to 30	21 to 33
Black Elk WA	federal Class II	2	17 to 20	24 to 28
Cloud Peak WA	federal Class II	9	17 to 30	27 to 37
Crow IR	federal Class II	14	59 to 108	68 to 115
Devils Tower NM	federal Class II	5	17 to 25	34 to 42
Fort Belknap IR	federal Class II	1	60 to 61	61 to 61
Fort Laramie NHS	federal Class II	1	10 to 14	16 to 19
Jewel Cave NM	federal Class II	2	19 to 23	29 to 33
Mount Rushmore NMem	federal Class II	1	13 to 17	21 to 24
Popo Agie WA	federal Class II	3	7 to 9	10 to 12
Soldier Creek WA	federal Class II	1	10 to 13	16 to 20

### TABLE AQ-13: FOOTNOTES

**Notes:**

**Alt 2B** - Direct modeled Wyoming PRB Oil and Gas Project EIS Alternative 2B impacts.

**Other**- Direct modeled "Reasonably Foreseeable Development" impacts. The impact from all air pollutant emission sources not included in **Alt 2B**, including projected surface coal mining operations in the Wyoming and Montana PRB and the Montana Statewide EIS "sources. The range of values corresponds to including Montana Alternative A (low) to Montana Alternative B/C/E (high).

**Cum** - Cumulative modeled impacts. Since these values represent the maximum visibility impact anywhere within the sensitive location, they may not be a simple sum of the maximum direct **Alt 2B** and **Other** impacts, which can occur at different locations.

**Locations:** **IR**-Indian Reservation, **NHS**-National Historic Site; **NM**-National Monument; **NMP**-National Memorial Park; **NMem**-National Memorial; **NP**-National Park; **NRA**-National Recreation Area; **WA**-Wilderness Area.

**Source:** Argonne (2002)

**TABLE AQ-14**  
**WYOMING PRB OIL AND GAS PROJECT EIS ALTERNATIVE 3 - PREDICTED CRITERIA POLLUTANT IMPACTS AND**  
**APPLICABLE SIGNIFICANCE THRESHOLDS**  
(in  $\mu\text{g}/\text{m}^3$ )

Pollutant	Avg Time <sup>a</sup>	Location	Increment	Alt 3	Other	Cum	Background	Total	National	Wyoming
carbon monoxide	1-hour	near-field	---	261	142	261	3,500	3,761	40,000	40,000
	8-hours	far-field <sup>1</sup>	---	2	100	100	3,500	3,600	40,000	40,000
		near-field	---	183	124	183	1,500	1,683	10,000	10,000
		far-field <sup>2</sup>	---	8	70	75	1,500	1,575	10,000	10,000
nitrogen dioxide	Annual	near-field	25	3.0	3.3	5.8	17	23	100	100
		far-field <sup>3</sup>	25	0.3	5.1	5.3	17	22	100	100
		far-field <sup>2</sup>	2.5	0.1	3.9 <sup>b</sup>	4.1 <sup>b</sup>	17	21	100	100
PM <sub>2.5</sub>	24-hours	near-field	---	5.7	8.6	13.5	19	32	65	65
		far-field <sup>4</sup>	---	0.2	12.7	12.7	19	32	65	65
	Annual	near-field	---	0.7	0.7	1.3	8	9	15	15
		far-field <sup>4</sup>	---	0.0	1.2	1.2	8	9	15	15
PM <sub>10</sub>	24-hours	near-field	30	7.1	9.3	15.6	42	58	150	150
		far-field <sup>4</sup>	30	0.2	29.7	29.7	42	72	150	150
	Annual	far-field <sup>2</sup>	8	1.5	9.4 <sup>b</sup>	10.7 <sup>b</sup>	42	53	150	150
		far-field <sup>5</sup>	8	0.9	7.0	7.8	42	50	150	150
		near-field	17	1.2	0.9	1.9	17	19	50	50
far-field <sup>4</sup>	17	<0.1	2.7	2.7	17	20	50	50		
sulfur dioxide	3-hours	near-field	512	1.2	4.5	4.6	8	13	1,300	1,300
		far-field <sup>3</sup>	512	0.3	17.1	17.1	8	25	1,300	1,300
	24-hours	near-field	91	0.6	1.8	2.2	8	10	365	260
		far-field <sup>3</sup>	91	0.1	5.3	5.3	8	13	365	260
		near-field	20	0.2	0.2	0.3	3	3	80	60
far-field <sup>3</sup>	20	<0.1	0.4	0.4	3	3	80	60		

## TABLE AQ-14: FOOTNOTES

### Notes:

<sup>a</sup>Annual impacts are the first maximum value; short-term impacts are the second maximum value.

<sup>b</sup>It is possible that **Other** and **Cum** emission sources could exceed the PSD Class I increment on the Northern Cheyenne Indian Reservation; a regulatory "PSD Increment Consumption Analysis" should be conducted during permitting by the appropriate Air Quality Regulatory Agency.

**Alt 3** - Direct modeled Wyoming PRB Oil and Gas Project EIS Alternative 3 impacts.

**Other** - Direct modeled "Reasonably Foreseeable Development" impacts. The impact from all air pollutant emission sources not included in **Alt 3**, including projected surface coal mining operations in the Wyoming and Montana PRB and the Montana Statewide EIS Alternative B/C/E sources. Potential impacts from Montana Alternatives A and D would be less.

**Cum** - Cumulative modeled impacts. Since these values represent the maximum cumulative impact location, they may not be a simple sum of the maximum direct **Alt 3** and **Other** impacts, which can occur at different locations.

**Total** - The sum of the cumulative modeled impact and the assumed background concentration.

**National** - Applicable National Ambient Air Quality Standard.

**Wyoming** - Applicable Wyoming Ambient Air Quality Standard.

### Locations:

- <sup>1</sup> Absaroka-Beartooth Wilderness Area
- <sup>2</sup> Northern Cheyenne Indian Reservation
- <sup>3</sup> Crow Indian Reservation
- <sup>4</sup> Fort Belknap Indian Reservation
- <sup>5</sup> Washakie Wilderness Area

**Source:** Argonne (2002)



TABLE AQ-15

WYOMING PRB OIL AND GAS PROJECT EIS ALTERNATIVE 3 - PREDICTED ATMOSPHERIC DEPOSITION IMPACTS  
AND APPLICABLE SIGNIFICANCE THRESHOLDS

Location	PSD Class	Lake	Total Sulfur Deposition (kg/ha-yr)				Total Nitrogen Deposition (kg/ha-yr)				Acid Neutralizing Capacity (percent)				
			Alt 3	Other	Cum	Thld	Alt 3	Other	Cum	Thld	Alt 3	Other	Cum	Thld	
Bridger WA	I	Black Joe	<0.01	0.01	0.01	5	<0.01	0.02	0.03	3	69.0	0.3	1.9	2.1	10
		Deep	<0.01	0.01	0.01	5	<0.01	0.02	0.02	3	61.0	0.3	2.1	2.4	10
		Hobbs	<0.01	0.01	0.01	5	<0.01	0.01	0.02	3	68.0	0.2	1.1	1.3	10
		Upper Frozen	<0.01	0.01	0.01	5	<0.01	0.02	0.02	3	5.8 <sup>a</sup>	0.2 <sup>a</sup>	1.3 <sup>a</sup>	1.5 <sup>a</sup>	1 <sup>a</sup>
Fitzpatrick WA	I	Ross	<0.01	0.01	0.01	5	<0.01	0.02	0.02	3	61.4	0.2	1.6	1.7	10
Absaroka- Beartooth WA	II	Stepping Stone	<0.01	0.02	0.02	5	<0.01	0.03	0.03	3	27.0	0.1	2.2	2.4	10
		Twin Island	<0.01	0.02	0.02	5	<0.01	0.03	0.03	3	36.0	0.1	1.6	1.7	10
Cloud Peak WA	II	Emerald	<0.01	0.03	0.03	5	0.01	0.07	0.08	3	53.3	0.7	4.2	4.9	10
		Florence	<0.01	0.03	0.03	5	0.02	0.07	0.08	3	32.7	1.3	7.2	8.5	10
Popo Agie WA	II	Lower Saddlebag	<0.01	0.01	0.01	5	<0.01	0.02	0.03	3	55.5	0.4	2.6	3.0	10

**Notes:**

<sup>a</sup>Since the background acid neutralizing capacity at Upper Frozen Lake is less than 25  $\mu\text{eq/l}$ , the applicable significance threshold is less than a 1  $\mu\text{eq/l}$  change. This threshold is exceeded by **Other** sources alone, as well **Cum** sources. However, the background concentration is based on only six samples taken on four days between 1997 and 2001

**Alt 3** - Direct modeled Wyoming PRB Oil and Gas Project EIS Alternative 3 impacts.

**Other** - Direct modeled "Reasonably Foreseeable Development" impacts. The impact from all air pollutant emission sources not included in **Alt 3**, including projected surface coal mining operations in the Wyoming and Montana PRB and the Montana Statewide EIS Alternative B/C/E sources. Potential impacts from Montana Alternatives A and D would be less.

**Cum** - Cumulative modeled impacts. Since these values represent the maximum cumulative impact at a specific location, they are the sum of the maximum direct **Alt 3** and **Other** impacts.

**Thld** - Impact threshold. Total sulfur and nitrogen thresholds from Fox, et al. (1989); acid neutralizing capacity thresholds from USFS (2000).

WA - Wilderness Area.

Source: Argonne (2002).

TABLE AQ-16

WYOMING PRB OIL AND GAS PROJECT EIS ALTERNATIVE 3 - DAILY FLAG REFINED METHOD - VISIBILITY IMPACT ANALYSIS

(number of days  $\geq 1.0$  dv per year)

Sensitive Location	PSD Classification	Alternative 3	Other	Cumulative
Badlands WA	mandatory federal Class I	0	13 to 17	18 to 21
Bridger WA	mandatory federal Class I	1	7 to 9	8 to 10
Fitzpatrick WA	mandatory federal Class I	1	6 to 9	8 to 10
Gates of the Mountains WA	mandatory federal Class I	0	3 to 4	3 to 4
Grand Teton NP	mandatory federal Class I	0	3 to 5	4 to 6
North Absaroka WA	mandatory federal Class I	0	9 to 13	11 to 13
Red Rock Lakes WA	mandatory federal Class I	0	0 to 1	0 to 2
Scapegoat WA	mandatory federal Class I	0	2 to 2	2 to 3
Teton WA	mandatory federal Class I	0	6 to 9	7 to 10
Theodore Roosevelt NMP (North)	mandatory federal Class I	0	0 to 1	1 to 2
Theodore Roosevelt NMP (South)	mandatory federal Class I	0	1 to 3	2 to 4
U.L. Bend WA	mandatory federal Class I	0	4 to 5	5 to 6
Washakie WA	mandatory federal Class I	1	10 to 14	12 to 16
Wind Cave NP	mandatory federal Class I	0	17 to 21	22 to 25
Yellowstone NP	mandatory federal Class I	0	8 to 11	9 to 12
Fort Peck IR	Tribal designated Class I	0	1 to 3	2 to 4
Northern Cheyenne IR	Tribal designated Class I	7	27 to 82	33 to 87
Absaroka-Beartooth WA	federal Class II	0	28 to 32	28 to 32
Agate Fossil Beds NM	federal Class II	0	8 to 11	10 to 14
Bighorn Canyon NRA	federal Class II	3	17 to 30	19 to 32
Black Elk WA	federal Class II	0	17 to 20	20 to 24
Cloud Peak WA	federal Class II	3	17 to 30	23 to 35
Crow IR	federal Class II	10	59 to 108	65 to 113
Devils Tower NM	federal Class II	1	17 to 25	26 to 34
Fort Belknap IR	federal Class II	0	60 to 61	61 to 61
Fort Laramie NHS	federal Class II	0	10 to 14	13 to 16
Jewel Cave NM	federal Class II	0	19 to 23	24 to 28
Mount Rushmore NMem	federal Class II	0	13 to 17	17 to 20
Popo Agie WA	federal Class II	1	7 to 9	8 to 11
Soldier Creek WA	federal Class II	0	10 to 13	13 to 16

## TABLE AQ-16: FOOTNOTES

**Notes:**

**Alt 3** - Direct modeled Wyoming PRB Oil and Gas Project EIS Alternative 3 impacts.

**Other** - Direct modeled "Reasonably Foreseeable Development" impacts. The impact from all air pollutant emission sources not included in **Alt 3**, including projected surface coal mining operations in the Wyoming and Montana PRB and the Montana Statewide EIS sources. The range of values corresponds to including Montana Alternative A (low) to Montana Alternative B/C/E (high).

**Cum** - Cumulative modeled impacts. Since these values represent the maximum visibility impact anywhere within the sensitive location, they may not be a simple sum of the maximum direct **Alt 3** and **Other** impacts, which can occur at different locations.

**Locations:** **IR**-Indian Reservation; **NHS**-National Historic Site; **NM**-National Monument; **NMP**-National Memorial Park; **NMem**-National Memorial; **NP**-National Park; **NRA**-National Recreation Area; **WA**-Wilderness Area.

**Source:** Argonne (2002)

Location	Alt 3	Other	Cumulative
Badlands National Monument	10.01	10.01	10.01
Black Hills National Monument	13.58	13.58	13.58
Devils Postpile National Monument	14.50	14.50	14.50
Grand Staircase-Escalante National Monument	14.50	14.50	14.50
Grand Teton National Park	14.50	14.50	14.50
Jefferson National Historic Site	14.50	14.50	14.50
John Day National Monument	14.50	14.50	14.50
Joshua Tree National Monument	14.50	14.50	14.50
Montezuma National Monument	14.50	14.50	14.50
North American Westlands Area	14.50	14.50	14.50
North Park National Monument	14.50	14.50	14.50
Red Rock Lakes National Monument	14.50	14.50	14.50
Shoshone National Monument	14.50	14.50	14.50
Teton National Park	14.50	14.50	14.50
Thodore Roosevelt National Park	14.50	14.50	14.50
Thodore Roosevelt National Park (South Unit)	14.50	14.50	14.50
U.S. Fish and Wildlife Service	14.50	14.50	14.50
Wind Cave National Monument	14.50	14.50	14.50
Yellowstone National Park	14.50	14.50	14.50
Yellowstone National Park	14.50	14.50	14.50

## Mitigation Options

Mitigation may be applied to fugitive dust and nitrogen oxide (NO<sub>x</sub>) impacts. Fugitive dust refers to any particulate matter that is not deliberately emitted by a well-defined source. Fugitive dust sources typically include windblown dust from unvegetated lands and unpaved roads. Table AQ-17 shows several fugitive dust mitigation options available. Other mitigation measures that are utilized by surface coal mines in Wyoming to control fugitive dust emissions are listed in chapter 3.

Nitrogen oxide emissions are associated with combustion. Table AQ-18 shows several options available to mitigate NO<sub>x</sub> impacts related to production of oil and gas, including CBM. Mitigation measures that the mines have instituted or that WDEQ may require related to coal mining operations are listed in chapter 3.

**TABLE AQ17**  
**PREDICTED VISIBILITY IMPACTS IN CLASS I AREAS – DAILY FLAG REFINED METHOD**  
(maximum cumulative deciview change)

Class I area	Alt 1	Alt 2a	Alt 2b	Alt 3
Badlands Wilderness Area <sup>1</sup>	10.91	10.67	10.43	9.46
Bridger Wilderness Area	13.28	12.67	12.21	11.15
Fitzpatrick Wilderness Area	16.57	15.83	15.21	14.01
Gates of the Mtns Wilderness Area	14.99	14.61	14.22	13.17
Grand Teton National Park	6.95	6.67	6.44	5.8
North Absaroka Wilderness Area	14.89	14.12	13.51	12.21
Red Rock Lakes Wilderness Area	2.85	2.75	2.67	2.37
Scapegoat Wilderness Area	9.89	9.58	9.35	8.55
Teton Wilderness Area	14.59	13.97	13.46	12.38
Theodore Roosevelt NMP <sup>2</sup> (North Unit)	3.65	3.46	3.29	2.75
Theodore Roosevelt NMP <sup>2</sup> (South Unit)	4.62	4.37	4.14	3.51
U.L. Bend Wilderness Area	29.05	27.97	26.97	24.01
Washakie Wilderness Area	24.79	23.82	22.96	21.48
Wind Cave National Park	9.05	8.81	8.59	8.06
Yellowstone National Park	12.79	12.19	11.59	10.25
Northern Cheyenne Reservation <sup>3</sup>	54.75	52.8	50.71	45.02

**TABLE AQ-18**  
**FUGITIVE DUST MITIGATION MEASURES (PM<sub>10</sub>)**  
**EFFECTIVENESS AND COST**

	Dust Sources					
	Disturbed Areas	Unpaved Roads <sup>1</sup>				
Mitigation Options	Establish plant cover for all disturbed lands by certain time (re-vegetation)	Water roads to attain certain percent moisture <sup>2</sup>	Apply soil stabilizer	Set and enforce speed limit	Gravel roads	Pave road
Effectiveness	Level proportional to percentage of land cover	0 – 50% reduction in uncontrolled dust emissions	33 to 100% control efficiency	80% for 15 mph <sup>3</sup> 65% for 20 mph <sup>3</sup> 25% for 30 mph <sup>3</sup>	30% reduction	90% reduction
Estimated Cost		\$4000/mile	\$2,000 to \$4,000/mile per year	Unknown	\$9,000/mile	\$11,000 to \$60,000/mile

**Notes:**

<sup>1</sup>Improved and County roads

<sup>2</sup>Wetting of construction roads during the construction period. Wetting of construction roads not required for once a month maintenance trips to well pads.

<sup>3</sup>Reductions assume 40 mile per hour base speed.

**TABLE AQ19  
NITROGEN OXIDES (NO<sub>x</sub>) MITIGATION MEASURES EFFICIENCY**

	NO <sub>x</sub> Emissions Sources			
	Field Compressors	Sales Compressors	Temporary Diesel Generators <sup>1</sup>	Heavy Equipment
Mitigation Options/ Efficiency	Implement best available control technology. <sup>2</sup>	Implement best available control technology. <sup>2</sup>	Register with state; WDEQ regulate as appropriate.	Voluntary use of diesel engines.
	Typically results in a NO <sub>x</sub> emission rate of about 1 g/bhp-hr.	Typically results in a NO <sub>x</sub> emission rate of about 1 g/bhp-hr.		

**Notes:**

<sup>1</sup>Wyoming is currently registering these generators to determine if NO<sub>x</sub> emissions are significant.

<sup>2</sup>BACT could include electric compression.

# APPENDIX F

## SURFACE AND GROUNDWATER RIGHTS WITHIN AND ADJACENT TO THE WEST HAY CREEK LBA TRACT

SURFACE WATER RIGHTS												
Permit <sup>1</sup>	T	R	S	Qtrqtr	Status <sup>2</sup>	Supply type	Uses <sup>3</sup>	Facility Name	Applicant	Source	Priority	
C72/199A	52	72	14	SE	SENW	PUD	ORI	IRR	P.L.R. Spreader System	D. C. Holler and Jane Holler, husband and wife	Hay Creek	5/10/1974
P14204D	52	72	14	NE	NESE	PUD	ORI	IRR	Ben Hur Ditch	Ben Hur Stock Farm	Corrall Creek	1/13/1916
P24338D	52	72	14	SE	SENW	PUD	ORI	IRR	P.L.R. Spreader System	D. C. Holler	Hay Creek	5/10/1974
31/1/11S	52	72	18	N	NENW	UNA	ORI	STO	Franklin #1 Stock Reservoir	Redstone Resources, Inc.**Byron F Oedekoven		12/4/2001
P17056D	52	72	20	SE	SESE	PUD	ORI	STO, DOM	Hay Springs Water Supply Ditch	Frank Oedekoven	Hay Spring	1/2/1926
P24874D	52	72	20	SE	SESE	PUD	ORI	OIL, TEM, IND, DRI	C & K Petroleum, Inc. Oil Well Pump Point	C & K Petroleum, Inc.	C & K Spring	10/29/1975
C34/176A	52	72	21	SW	SWNW	PUO	ORI	IRR, DOM	Grant Reservoir	John J. Grant	Hay Creek	6/12/1909
C34/177A	52	72	21	SW	SWNW	PUD	ORI	IRR, DOM	Grant Ditch	John J. Grant	Hay Creek	6/12/1909
P1562R	52	72	21	SW	SWNW	PUO	ORI	IRR, DOM	Grant Reservoir	John Grant	Hay Creek	6/12/1909
P9149D	52	72	21	SW	SWNW	PUD	ORI	IRR, DOM	Grant Ditch	John Grant	Hay Creek	6/12/1909
31/5/320R	52	72	16	SE	SENW	UNA	ORI		Sedimentation No. 33 Reservoir	Triton Coal Company** Wy State Lands & Investments	Main Branch Hay Creek	7/21/2003
31/2/320R	52	72	18	SE	SENE	UNA	ORI		Hay Creek Blocking Dike Reservoir	Triton Coal Company** Wy State Lands & Investments	Main Branch Hay Creek	7/21/2003
31/3/320R	52	72	20	NW	NWSE	UNA	ORI		TCO Sump Reservoir	Triton Coal Company** Wy State Lands & Investments		7/21/2003
P11075R	52	72	20	SE	SESE	UNA	ORI	IND, FLO	Sedimentation No. 18 Reservoir	Triton Coal Company	Hay Creek	8/2/2000
P11076R	52	72	20	SE	SESW	UNA	ORI	IND, FLO	Sedimentation No. 19 Reservoir	Triton Coal Company	Sed-19 Draw	8/2/2000
P11209R	52	72	20	SW	SWSE	UNA	ORI	IND, FLO	Sedimentation No. 25 Reservoir	Triton Coal Company	South Prong Hay Creek	5/31/2001
P11240R	52	72	21	SW	SWNW	UNA		IND, FLO	Sedimentation No. 29 Reservoir	Triton Coal Company, Llc	Hay Creek	9/21/2001
P11294R	52	72	21	N	NENW	UNA	ORI	IND, FLO	Sedimentation No. 31 Reservoir	Triton Coal Company, Llc, Buckskin Mine	Sed-31 Draw	6/3/2002
P10681R	52	72	28	NW	NWNW	UNA	ORI	IND	Life Of Mine No. 6A Reservoir	Triton Coal Company L.L.C.	Hay Creek	3/25/1998
31/1/321S	52	72	30	SW	SWNE	UNA	ORI	STO	Lower Triton Stock Reservoir	Triton Coal Company	Spring Draw	7/22/2003
31/2/321S	52	72	30	NW	NWNE	UNA	ORI	STO	Upper Triton Stock Reservoir	Triton Coal Company	Spring Draw	7/22/2003

<sup>1,2</sup> **Abbreviations**

ADJ      Adjudicated  
 DEW      Dewatering  
 DRI      Drilling  
 IRR      Irrigation  
 MON      Monitoring  
 PU      Point of use  
 PUO      Point of outlet  
 UNA      Unadjudicated

CBM      Coal bed methane  
 DOM      Domestic  
 EXP      Expired  
 MIS      Miscellaneous  
 OIL      Water haul for oil well drilling  
 PUD      Point of diversion  
 STO      Stock

<sup>3</sup>“A”: indicates adjudicated or finalized water rights and unless the right is a territorial appropriation, there will be a match in the reference column from one of the following permit types for the unadjudicated portion of the water right.

“D”: signifies a ditch or pipeline permit.

“E”: signifies an enlargement of a ditch or pipeline permit.

“S”: signifies a stock reservoir permit.

“R”: signifies a reservoir permit.

**Note:** A double asterisk (\*\*) in the “Applicant” column represents a separator between parties where multiple parties are involved.

**Surface Water Search Area in T52N, R72W**

<b>Section</b>	<b>Description</b>
7	SESW, S $\frac{1}{2}$ SE
8	S $\frac{1}{2}$ S $\frac{1}{2}$
9	S $\frac{1}{2}$ SW
14	S $\frac{1}{2}$ N $\frac{1}{2}$ , N $\frac{1}{2}$ S $\frac{1}{2}$
15	S $\frac{1}{2}$ N $\frac{1}{2}$ , N $\frac{1}{2}$ S $\frac{1}{2}$
16	S $\frac{1}{2}$ NE, NW, SW, N $\frac{1}{2}$ SE
17	All
18	NE, E $\frac{1}{2}$ NW, E $\frac{1}{2}$ SW, SE
19	NE, E $\frac{1}{2}$ NW, E $\frac{1}{2}$ SW, SE
20	All
21	N $\frac{1}{2}$ NW, SWNW, W $\frac{1}{2}$ SW
28	W $\frac{1}{2}$ NW
29	N $\frac{1}{2}$
30	NE, W $\frac{1}{2}$ NW

Search conducted 3/21/2004



## GROUNDWATER RIGHTS WITHIN 3 MILES OF THE WEST HAY CREEK LBA

Permit #	Priority	T	R	S	Q-Q	Stat.	Uses	Applicant	Facility Name	Well Depth	Stat Depth	Yld Act	Chem	Well Log
P128642W	8/22/2000	51	72	5	SWSW	GST	CBM	Continental Industries	Rawhide 13-5	240	135	6	No	Yes
P129239W	9/1/2000	51	72	5	SESW	GST	CBM	Continental Industries	Rawhide 14-5	210	100	5	No	Yes
P18183P	5/31/1963	51	72	5	SENE	GST	DOM, STO	Gilbert Oedekoven	John #1	450	150	10	Yes	No
P110782W	6/29/1998	51	72	6	NWNW	GST	STO, CBM	Devon Energy Corp.	Caballo Fed. TFU 11C-612	358	34	25	No	Yes
P111284W	7/31/1998	51	72	6	SWSE	GST	STO, CBM	Devon Energy Corp.	Caballo TFU 34C-612	264	97	25	No	Yes
P104713W	12/9/1996	51	72	6	SENW	GST	STO, CBM	Devon Energy Corp. (Nevada)	Caballo 22C-612	322	0	5	No	Yes
P108927W	2/23/1998	51	72	6	NENW	GST	STO, MIS, CBM	Devon Energy Corp. (Nevada)	Caballo 21C-612	378	240	20	No	Yes
P103472W	8/9/1996	51	72	6	NENW	GST	STO, MIS, CBM	Redstone Resources, Inc	Caballo #21C-612	111	-1	0	No	Yes
P110870W	7/13/1998	51	72	6	NWSW	GST	STO, CBM	Wy State Board of Land Commissioners** Devon Energy Corp.	Caballo State TFU 13C-612	331	44	25	No	Yes
P131325W	11/30/2000	51	73	1	NWSW	GST	STO, CBM	20 Mile Land Company** Devon Energy Production Company, L.P.	20 Mile 23A-1313	264	139	25	No	Yes
P110783W	6/29/1998	51	73	1	SENE	GST	STO, CBM	Devon Energy Corp.	Caballo Fed. TFU 42C-113	422	40	25	No	Yes
P110785W	6/29/1998	51	73	1	SESE	GST	STO, CBM	Devon Energy Corp.	Caballo Fed. TFU 44C-113	377	61	25	No	Yes
P110786W	6/29/1998	51	73	1	NWNE	GST	STO, CBM	Devon Energy Corp.	Caballo Fed. TFU 31C-113	437	63	25	No	Yes
P108420W	12/16/1997	51	73	1	SESE	GST	STO, CBM	Devon Energy Production Company, L.P.	Caballo Federal 44C-113	377	61	25	No	Yes
P120554W	11/17/1999	51	73	1	SESW	GST	STO, CBM	John Daly** Devon Energy Production Co. L.P.	20 Mile 24C-113	448	330	25	No	Yes
P120555W	11/17/1999	51	73	1	SESW	GST	STO, CBM	John Daly** Devon Energy Production Co. L.P.	20 Mile 24A-113	214	25	25	No	Yes
P110806W	6/29/1998	51	73	1	NWSW	GST	STO, CBM		20 Mile TFU 13C-1413	5333	42	25	No	Yes
P52307W	6/2/1980	51	73	2	SWSE	GST	DOM, STO	Daly Livestock Inc. & Twenty Mile Land	Daly Home Ranch	800	375	25	No	Yes
P120543W	11/17/1999	51	73	2	SESE	GST	STO, CBM	John Daly** Devon Energy Production Co. L.P.	20 Mile 44C-213	537	320	25	No	Yes
P120544W	11/17/1999	51	73	2	SESE	GST	STO, CBM	John Daly** Devon Energy Production Co. L.P.	20 Mile 44A-213	257	54	25	No	Yes
P120545W	11/17/1999	51	73	2	SENE	GST	STO, CBM	John Daly** Devon Energy Production Co. L.P.	20 Mile 42C-213	634	102	25	No	Yes
P120546W	11/17/1999	51	73	2	SENE	GST	STO, CBM	John Daly** Devon Energy Production Co. L.P.	20 Mile 42A-213	290	38	25	No	Yes

## GROUNDWATER RIGHTS WITHIN 3 MILES OF THE WEST HAY CREEK LBA

Permit #	Priority	T	R	S	Q-Q	Stat.	Uses	Applicant	Facility Name	Well Depth	Stat Depth	Yld Act	Chem	Well Log
P120550W	11/17/1999	51	73	2	NWSE	GST	STO, CBM	John Daly** Devon Energy Production Co. L.P.	20 Mile 33C-213	634	222	25	No	Yes
P120551W	11/17/1999	51	73	2	NWSE	GST	STO, CBM	John Daly** Devon Energy Production Co. L.P.	20 Mile 33A-213	340	14	25	No	Yes
P120552W	11/17/1999	51	73	2	NWNE	GST	STO, CBM	John Daly** Devon Energy Production Co. L.P.	20 Mile 31C-213	679	40	25	No	Yes
P120553W	11/17/1999	51	73	2	NWNE	GST	STO, CBM	John Daly** Devon Energy Production Co. L.P.	20 Mile 31A-213	420	40	25	No	Yes
P25G	12/31/1947	52	72	2	NWNE	UNA	IND	Texas Co.	Adon Water Well #1	567	445	7		No
P122762W	1/31/2000	52	72	4	SWNW	GSI	STO, CBM	Redstone Resources, Inc.	McGee 12C-422					No
P122763W	1/31/2000	52	72	4	NESW	GSI	STO, CBM	Redstone Resources, Inc.	McGee 23C-422					No
P122764W	1/31/2000	52	72	4	SWNE	GSI	STO, CBM	Redstone Resources, Inc.	McGee32C-422					No
P122765W	1/31/2000	52	72	4	SWSE	GSI	STO, CBM	Redstone Resources, Inc.	McGee34C-422					No
P135542W	5/30/2001	52	72	4	SWNW	GSI	CBM	Redstone Resources, Inc.	Franklin 12C-422					No
P135544W	5/30/2001	52	72	4	NESW	GSI	CBM	Redstone Resources, Inc.	Franklin 23C-422					No
P135546W	5/30/2001	52	72	4	SWNE	GSI	CBM	Redstone Resources, Inc.	Franklin 32C-422					No
P135548W	5/30/2001	52	72	4	SWSE	GSI	CBM	Redstone Resources, Inc.	Franklin 34C-422					No
P18187P	12/31/1936	52	72	5	NENE	GST	STO	Gilbert Oedekoven	John #6	140	60	7	No	No
P42484W	3/28/1978	52	72	5	NENW	GST	STO	Gilbert Oedekoven	John #10	225	120	10	No	Yes
P123569W	2/22/2000	52	72	6	SWNE	GST	STO, CBM	Redstone Resources Inc.	Landeck 32C-622	252	132	25	No	Yes
P106925W	7/28/1997	52	72	6	NWSW	GST	STO, MIS, CBM	Redstone Resources, Inc	Hall 13C-622	343	171.5	15	No	Yes
P108735W	1/28/1998	52	72	6	SESW	GST	STO, CBM	Redstone Resources, Inc	Franklin 24C-622	339	162.5	20	No	Yes
P109849W	5/4/1998	52	72	6	SWNW	GST	STO, CBM	Redstone Resources, Inc.	Hall 12C-622	377	189	12	No	Yes
P109850W	5/4/1998	52	72	6	NESW	GST	STO, CBM	Redstone Resources, Inc.	Franklin 23C-622	295	143	25	No	Yes
P110630W	6/24/1998	52	72	6	NWSE	GST	STO, CBM	Redstone Resources, Inc.	Franklin 33C-622	333	202.5	7	No	Yes
P110963W	7/21/1998	52	72	6	SWSW	GST	STO, CBM	Redstone Resources, Inc.	Franklin 14C-622	437	263.5	7	No	Yes
P111689W	9/11/1998	52	72	6	SWSE	GST	STO, MIS, CBM	Redstone Resources, Inc.	Franklin 34C-622	326	224	25	No	Yes
P113421W	12/21/1998	52	72	6	NESE	GST	STO, CBM	Redstone Resources, Inc.	Franklin 43C-622	296	269.5	25	No	Yes
P115198W	4/14/1999	52	72	6	SESE	GST	STO, CBM	Redstone Resources, Inc.	Franklin 44C-622	317	291.5	25	No	Yes

## GROUNDWATER RIGHTS WITHIN 3 MILES OF THE WEST HAY CREEK LBA

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P115510W	4/16/1999	52	72	7	SWSE	GST	STO	Byron F/Marjorie Oedekoven	Perry W #1E	300	75	10	No	No
P115511W	4/16/1999	52	72	7	SESE	GST	STO	Byron F/Marjorie Oedekoven	Perry E #1W	42.1	25.11	3	No	No
P120886W	11/15/1999	52	72	7	NENW	GST	STO, CBM	Redstone Resources	Oedekoven 21C-722	370	347	25	No	Yes
P107776W	10/8/1997	52	72	7	SESW	GST	STO, CBM	Redstone Resources, Inc	Oedekoven 22C-722	365	200.5	20	No	Yes
P107777W	10/8/1997	52	72	7	NWSW	GST	STO, MIS, CBM	Redstone Resources, Inc	Oedekoven 13C-722	299	126.5	12	No	Yes
P107778W	10/8/1997	52	72	7	NWNW	GST	STO, MIS, CBM	Redstone Resources, Inc	Oedekoven 11C-722	361	154	25	No	Yes
P108734W	1/28/1998	52	72	7	SESW	GST	STO, CBM	Redstone Resources, Inc	Franklin 24C-722	265	75	15	No	Yes
P110631W	6/24/1998	52	72	7	NWSE	GST	STO, MIS, CBM	Redstone Resources, Inc.	Oedekoven 33C-722	326	161.5	10	No	Yes
P111690W	9/11/1998	52	72	7	NENE	GST	STO, MIS, CBM	Redstone Resources, Inc.	Franklin 41C-722	261.5	134	25	No	Yes
P111691W	9/11/1998	52	72	7	SENE	GST	STO, CBM	Redstone Resources, Inc.	Franklin 41C-722	284	172.5	25	No	Yes
P114989W	4/5/1999	52	72	7	SWSW	GST	STO, CBM	Redstone Resources, Inc.	Franklin 14C-722	273	212.5	25	No	Yes
P119414W	9/30/1999	52	72	8	SWNW	GST	STO, CBM	Redstone Resources	Taylor 12C-822	256	161	10	No	Yes
P122766W	1/31/2000	52	72	8	SWNE	GSI	STO, CBM	Redstone Resources, Inc.	McGee32C-822					No
P122767W	1/31/2000	52	72	8	NENE	GSI	STO, CBM	Redstone Resources, Inc.	McGee41C-822					No
P135547W	5/30/2001	52	72	8	SWNE	GSI	CBM	Redstone Resources, Inc.	Franklin 32C-822					No
P135549W	5/30/2001	52	72	8	NENE	GSI	CBM	Redstone Resources, Inc.	Franklin 41C-822					No
P135550W	5/30/2001	52	72	8	NESE	GSI	CBM	Redstone Resources, Inc.	Franklin 43C-822					No
P119224W	9/20/1999	52	72	8	NENW	GST	STO, CBM	Redstone Resources, Inc.	Taylor 21C-822	339	279.5	25	No	Yes
P103907W	9/6/1996	52	72	9	SWNW	UNA	STO	Carl/Ola Mcgee	912C-C5	220	84.7	10	No	Yes
P122768W	1/31/2000	52	72	9	SWNW	GSI	STO, CBM	Redstone Resources, Inc.	McGee 12C-922					No
P122769W	1/31/2000	52	72	9	NENW	GSI	STO, CBM	Redstone Resources, Inc.	McGee 21C-922					No
P122770W	1/31/2000	52	72	9	NESW	GSI	STO, CBM	Redstone Resources, Inc.	McGee 23C-922					No
P135543W	5/30/2001	52	72	9	NENW	GSI	CBM	Redstone Resources, Inc.	Franklin 21C-922					No
P135545W	5/30/2001	52	72	9	SWNW	GSI	CBM	Redstone Resources, Inc.	Franklin 23C-922					No
P20030P	12/31/1942	52	72	13	NWNW	GST	DOM, STO	Paul And Jane Rourke	Offutt #1	240	70	5	No	Yes
P3185P	6/30/1942	52	72	14	SWNE	GST	STO	60 Bar Ranch	60 Bar 1	105	60	3		No
P20031P	12/31/1958	52	72	14	NWNE	GST	STO	Paul And Jane Rourke	Rourke #1	90	10	5	No	Yes
35/7/567W	12/10/2003	52	72	17	SWNW	UNA	CBM	Majestic Petroleum Operations, LLC	Triton 12C-1722					No
35/8/567W	12/10/2003	52	72	17	SWSW	UNA	CBM	Majestic Petroleum Operations, LLC	Triton 14C-1722					No

## GROUNDWATER RIGHTS WITHIN 3 MILES OF THE WEST HAY CREEK LBA

Permit #	Priority	T	R	S	Q-Q	Stat.	Uses	Applicant	Facility Name	Well Depth	Stat Depth	Yld Act	Chem	Well Log
P128655W	8/22/2000	52	72	17	SWNW	GSI	CBM	Redstone Resources, Inc.	Franklin 12C-1722					No
P128656W	8/22/2000	52	72	17	SWSW	GSI	CBM	Redstone Resources, Inc.	Franklin 14C-1722					No
P83206W	8/3/1990	52	72	18	SWSW	GST	DOM	Cecle L. And Laverne L. Cook	Laverne #1	85	55	6	No	No
P141899W	1/16/2002	52	72	18	SESW	GST	STO, CBM	Majestic Petroleum Operations, LLC	Franklin 24Cr-1822	370	298	12	No	Yes
P107779W	10/8/1997	52	72	18	NWSW	GST	STO, MIS, CBM	Redstone Resources, Inc	Oedekoven 13C-1822	372	172	10	No	Yes
P108442W	12/29/1997	52	72	18	SWSW	GST	STO, CBM	Redstone Resources, Inc	Franklin 14C-1822	393	359	25	No	Yes
P108444W	12/29/1997	52	72	18	SESW	GST	STO, CBM	Redstone Resources, Inc	Franklin 24C-1822	368	159	25	No	Yes
P108446W	12/29/1997	52	72	18	NWSE	GST	STO, CBM	Redstone Resources, Inc	Franklin 33C-1822	329	126.5	25	No	Yes
P108732W	1/28/1998	52	72	18	SENW	GST	STO, CBM	Redstone Resources, Inc	Franklin 22C-1822	296	109	5	No	Yes
P108733W	1/28/1998	52	72	18	NWNW	GST	STO, CBM	Redstone Resources, Inc	Franklin 11C-1822	288	105	15	No	Yes
P110632W	6/24/1998	52	72	18	NWNE	GST	STO, CBM	Redstone Resources, Inc.	Franklin 31C-1822	270	94.5	10	No	Yes
P115519W	4/27/1999	52	72	18	SWNW	GST	STO, CBM	Redstone Resources, Inc.	Franklin 12C-1822	325	249	25	No	Yes
P116606W	7/2/1999	52	72	18	NENW	GST	STO, CBM	Redstone Resources, Inc.	McGee 21C-1822	271	210	25	No	Yes
P102546W	6/6/1996	52	72	19	NWSW	GST	STO	Byron F Oedekoven	Oedekoven #31S-1922	180	30	10	No	Yes
P21101P	1/9/1973	52	72	19	SWSW	GST	DOM	Charles R. Oedekoven	Whiteside #1	93	25	10	No	Yes
P21105P	1/9/1973	52	72	19	SWSW	GST	STO	Charles R. Oedekoven	Frank Oedekoven #1	25	20	5	No	No
P61486W	7/27/1982	52	72	19	SESE	GST	STO	Charles R. Oedekoven	Oedekoven Stock Well #1	100	10	25	No	Yes
P104559W	11/15/1996	52	72	19	SESW	GST	STO, CBM	Redstone Resources, Inc	Triton 24C-1922	404	205	20	No	Yes
P104560W	11/15/1996	52	72	19	SWSW	GST	STO, CBM	Redstone Resources, Inc	Triton 14A-1922	180	0	5	No	Yes
P107780W	10/8/1997	52	72	19	NWNW	GST	STO, MIS, CBM	Redstone Resources, Inc	Oedekoven 11C-1922	434	197	20	No	Yes
P108452W	12/29/1997	52	72	19	NWNE	GST	STO, CBM	Redstone Resources, Inc	Franklin 31C-1922	452	186.5	10	No	Yes
P122293W	12/8/1999	52	72	19	SWSW	GSI	STO, CBM	Redstone Resources, Inc.	Triton 14C-1922					No
P122294W	12/8/1999	52	72	19	SESE	GSI	STO, CBM	Redstone Resources, Inc.	Triton 44C-1922					No
P112364W	10/5/1998	52	72	19	SENE	GSE	STO, CBM	Yates Petroleum Corp.** SMC Mining Company	Isora CS #4	436	63	90	No	Yes
P112367W	10/5/1998	52	72	20	SWNW	GSE	STO, CBM	Yates Petroleum Corp.** SMC Mining Company	Olin CS #2	362	89	90	No	Yes
P112368W	10/5/1998	52	72	20	NWSW	GSE	STO, CBM	Yates Petroleum Corp.** SMC Mining Company	Olin CS #3	322	196	90	No	Yes

## GROUNDWATER RIGHTS WITHIN 3 MILES OF THE WEST HAY CREEK LBA

Permit #	Priority	T	R	S	Q-Q	Stat.	Uses	Applicant	Facility Name	Well Depth	Stat Depth	Yld Act	Chem	Well Log
P112369W	10/5/1998	52	72	20	SWSW	GSE	STO, CBM	Yates Petroleum Corp.** SMC Mining Company	Olin CS #4	282	81	90	No	Yes
P20029P	11/30/1959	52	72	23	SESE	GST	STO	Mary J. Clark	Clark #1	55	12	5	No	Yes
P112361W	10/5/1998	52	72	29	NENW	GSE	STO, CBM	Yates Petroleum Corp.** SMC Mining Company	Isora CS #1	402	50	90	No	Yes
P112365W	10/5/1998	52	72	29	NWNW	GSE	STO, CBM	Yates Petroleum Corp.** SMC Mining Company	Isora CS #5	402	112	90	No	Yes
P21106P	1/9/1973	52	72	30	NENE	GST	STO	Charles R. Oedekoven	Red Spring #1	60	30	10	No	No
P104081W	9/25/1996	52	72	30	SWNW	GST	STO, MIS, CBM	Redstone Resources, Inc	Triton 12C-3022	404.5	-1	20	No	Yes
P104082W	9/25/1996	52	72	30	NWSW	GST	STO, MIS, CBM	Redstone Resources, Inc	Triton 13C-3022	402	-1	15	No	Yes
P104083W	9/25/1996	52	72	30	NENW	GST	STO, MIS, CBM	Redstone Resources, Inc	Triton 21C-3022	436	207	10	No	Yes
P104084W	8/29/1996	52	72	30	SESW	GST	STO, MIS, CBM	Redstone Resources, Inc	Triton 24C-3022	407	-1	20	No	Yes
P104092W	9/30/1996	52	72	30	SWSW	GST	STO, MIS, CBM	Redstone Resources, Inc	Triton #14C-3022	361.5	-1	20	No	Yes
P104562W	11/18/1996	52	72	30	SESW	GST	STO, CBM	Redstone Resources, Inc	Triton 22C-3022	371	150	10	No	Yes
P104563W	11/18/1996	52	72	30	NESW	GST	STO, CBM	Redstone Resources, Inc	Triton 23C-3022	378	180	20	No	Yes
P104564W	11/18/1996	52	72	30	SWSW	GST	STO, CBM	Redstone Resources, Inc	Triton 14A-3022	124	0	0	No	Yes
P104565W	11/18/1996	52	72	30	NWSW	GST	STO, CBM	Redstone Resources, Inc	Triton 13A-3022	142	-1	0	No	Yes
P104566W	11/18/1996	52	72	30	SWNW	GST	STO, CBM	Redstone Resources, Inc	Triton 12A-3022	155	-1	0	No	Yes
P104567W	11/18/1996	52	72	30	NWNW	GST	STO, CBM	Redstone Resources, Inc	Triton 11A-3022	142	0	0	No	Yes
P104080W	9/25/1996	52	72	30	NWSE	UNA	STO, MIS, CBM	Redstone Resources, Inc	Triton 33A-3022					No
P109588W	4/9/1998	52	72	30	SWNE	GST	STO, CBM	Redstone Resources, Inc.	Oedekoven 32C2-3022	363	220.5	20	No	Yes
P112362W	10/5/1998	52	72	30	NENE	GSE	STO, CBM	Yates Petroleum Corp.** SMC Mining Company	Isora CS #2	449	92	25	No	Yes
P112363W	10/5/1998	52	72	30	SENE	GSE	STO, CBM	Yates Petroleum Corp.** SMC Mining Company	Isora CS #3	404	134	90	No	Yes
P131330W	12/1/2000	52	72	31	SWNW	GST	CBM	Redstone Resources Inc.	Triton 12D-3122	1232	685	25	No	Yes
P103043W	7/17/1996	52	72	31	SESW	GST	STO, CBM	Redstone Resources, Inc	Marquiss #24A-3122	92	0	25	No	Yes
P103183W	7/29/1996	52	72	31	SWNW	GST	STO, MIS, CBM	Redstone Resources, Inc	Oedekoven #12A-3122	126.5	-1	0	No	Yes
P103485W	8/19/1996	52	72	31	NWNW	GST	STO, MIS, CBM	Redstone Resources, Inc	Triton #11A-3122	128	-1	Unk	No	Yes
P103613W	8/29/1996	52	72	31	SESW	GST	STO, MIS, CBM	Redstone Resources, Inc	Triton #22A-3122	137	-1	0	No	Yes
P103618W	8/29/1996	52	72	31	NWSW	GST	STO, MIS, CBM	Redstone Resources, Inc	Triton #13A-3122	110.5	-1	0	No	Yes

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P104077W	9/25/1996	52	72	31	SESW	GST	STO, MIS, CBM	Redstone Resources, Inc	Caballo 24C-3122	1206	-1	25	No	Yes
P104078W	9/25/1996	52	72	31	NESW	GST	STO, MIS, CBM	Redstone Resources, Inc	Triton 22C-3122	345	-1	20	No	Yes
P104079W	9/25/1996	52	72	31	NWNW	GST	STO, MIS, CBM	Redstone Resources, Inc	Triton #11C-3122	371	162	15	No	Yes
P104528W	11/25/1996	52	72	31	SWSW	GST	STO, MIS, CBM	Redstone Resources, Inc	Triton 14C-3122	370	0	5	No	Yes
P104529W	11/25/1996	52	72	31	NENW	GST	STO, MIS, CBM	Redstone Resources, Inc	Triton 21C-3122	356	220	10	No	Yes
P104558W	11/15/1996	52	72	31	SWNW	GST	STO, CBM	Redstone Resources, Inc	Triton 12C-3122	390	124	20	No	Yes
P103045W	7/22/1996	52	72	31	SESW	UNA	STO, MIS, CBM	Redstone Resources, Inc	Landeck #13C-223					No
P122273W	11/22/1999	52	72	31	NWNW	GSI	STO, CBM	Redstone Resources, Inc.	Triton 11D-3122					No
P122274W	11/22/1999	52	72	31	SWSW	GSI	STO, CBM	Redstone Resources, Inc.	Triton 14D-3122					No
P122275W	11/22/1999	52	72	31	NENW	GSI	STO, CBM	Redstone Resources, Inc.	Triton 21D-3122					No
P122276W	11/22/1999	52	72	31	NWNE	GSI	STO, CBM	Redstone Resources, Inc.	Triton 31D-3122					No
P122277W	11/22/1999	52	72	31	SWNE	GSI	STO, CBM	Redstone Resources, Inc.	Caballo 32D-3122					No
P122278W	11/22/1999	52	72	31	NWSE	GSI	STO, CBM	Redstone Resources, Inc.	Caballo 33D-3122					No
P122279W	11/22/1999	52	72	31	SWSE	GSI	STO, CBM	Redstone Resources, Inc.	Caballo 34D-3122					No
P108964W	3/2/1998	52	72	31	SESW	GST	STO, MIS, CBM	Redstone Resources, Inc.	Marquiss 24D-3122	1206	160	10	No	Yes
P113423W	12/21/1998	52	72	31	NWSW	GST	STO, CBM	Redstone Resources, Inc.	Triton 13D-3122	1227	250	25	No	Yes
P103473W	8/9/1996	52	73	1	NESW	GST	STO, CBM	Redstone Resources, Inc	Hall #23C-123	299	73.5	25	No	Yes
P103474W	8/9/1996	52	73	1	NWSW	GST	STO, CBM	Redstone Resources, Inc	Hall #13C-123	370	127	25	No	Yes
P107781W	10/8/1997	52	73	1	SENE	GST	STO, CBM	Redstone Resources, Inc	Hall 42C-123	365	173.5	10	No	Yes
P107782W	10/8/1997	52	73	1	SESE	GST	STO, CBM	Redstone Resources, Inc	Oedekoven 22C-722	434	216	25	No	Yes
P103487W	8/19/1996	52	73	1	SWNW	UNA	STO, MIS, CBM	Redstone Resources, Inc	Hall #32C-123					No
P135553W	5/30/2001	52	73	1	SWSW	GSI	CBM	Redstone Resources, Inc.	Hall 14A-123					No
P135555W	5/30/2001	52	73	1	NESW	GSI	CBM	Redstone Resources, Inc.	Hall 23A-123					No
P135556W	5/30/2001	52	73	1	SWNE	GSI	CBM	Redstone Resources, Inc.	Hall 32A-123					No
P135559W	5/30/2001	52	73	1	NENE	GSI	CBM	Redstone Resources, Inc.	Hall 41A-123					No
P135562W	5/30/2001	52	73	1	NESE	GSI	CBM	Redstone Resources, Inc.	Hall 43A-123					No
P109040W	3/4/1998	52	73	1	SWSW	GST	STO, MIS, CBM	Redstone Resources, Inc.	Hall 14C-123	456	200	25	No	Yes

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P109049W	3/5/1998	52	73	1	NWNE	GST	STO, CBM	Redstone Resources, Inc.	Hall 31C-123	351	153	3	No	Yes
P109050W	3/5/1998	52	73	1	SEW	GST	STO, MIS, CBM	Redstone Resources, Inc.	Hall 22C-123	346	111	25	No	Yes
P109051W	3/5/1998	52	73	1	NWNW	GST	STO, MIS, CBM	Redstone Resources, Inc.	Hall 11C-123	362	90	25	No	Yes
P109278W	3/18/1998	52	73	1	NWSE	GST	STO, CBM	Redstone Resources, Inc.	Hall 33C-123	331	131	15	No	Yes
P109851W	5/4/1998	52	73	1	NENE	GST	STO, CBM	Redstone Resources, Inc.	Hall 41C-123	360	180	5	No	Yes
P116607W	7/2/1999	52	73	2	NESW	GST	STO, CBM	Redstone Resources	Landeck 23C-223	494	377	25	No	Yes
P131897W	1/3/2001	52	73	2	NESE	GSI	CBM	Redstone Resources Inc.	Hall 43 W - 223					No
P131898W	1/3/2001	52	73	2	NENE	GSI	CBM	Redstone Resources Inc.	Hall 41 W - 223					No
P131899W	1/3/2001	52	73	2	SWSE	GSI	CBM	Redstone Resources Inc.	Hall 34 W - 223					No
P131900W	1/3/2001	52	73	2	SWNE	GSI	CBM	Redstone Resources Inc.	Hall 32 W - 223					No
P131901W	1/3/2001	52	73	2	SWSW	GSI	CBM	Redstone Resources Inc.	Landeck 14W - 223					No
P131902W	1/3/2001	52	73	2	NESW	GSI	CBM	Redstone Resources Inc.	Landeck 23W - 223					No
P131903W	1/3/2001	52	73	2	SWNW	GSI	CBM	Redstone Resources Inc.	Landeck 12W - 223					No
P131904W	1/3/2001	52	73	2	NENE	GSI	CBM	Redstone Resources Inc.	Hall 41C-223					No
P118218W	8/16/1999	52	73	2	NENW	GST	STO, CBM	Redstone Resources Inc.	Landeck Fed 21C-223	498	295	25	No	Yes
P135506W	5/30/2001	52	73	2	SWNW	GST	CBM	Redstone Resources Inc.	Landeck 12A-223	170	149	10	No	Yes
P130154W	10/9/2000	52	73	2	NESW	GSI	CBM	Redstone Resources of Wyoming Inc.	Cook 23A-1223					No
P103045W	7/22/1996	52	73	2	NWSW	UNA	STO, MIS, CBM	Redstone Resources, Inc	Landeck #13C-223					No
P103178W	7/29/1996	52	73	2	SWNE	UNA	STO, MIS, CBM	Redstone Resources, Inc	Hall #32C-223					No
P103179W	7/29/1996	52	73	2	NENE	UNA	STO, MIS, CBM	Redstone Resources, Inc	Hall #41C-223					No
P103181W	7/29/1996	52	73	2	NWNE	UNA	STO, MIS, CBM	Redstone Resources, Inc	Hall #31C-223					No
P103182W	7/29/1996	52	73	2	SESE	UNA	STO, MIS, CBM	Redstone Resources, Inc	Hall #44C-223					No
P103184W	7/29/1996	52	73	2	NWSE	UNA	STO, MIS, CBM	Redstone Resources, Inc	Hall #33C-223					No
P103185W	7/29/1996	52	73	2	SWSE	UNA	STO, MIS, CBM	Redstone Resources, Inc	Hall #34C-223					No
P103186W	7/29/1996	52	73	2	NESE	UNA	STO, MIS, CBM	Redstone Resources, Inc	Hall #43C-223					No
P103475W	8/9/1996	52	73	2	NWNW	UNA	STO, MIS, CBM	Redstone Resources, Inc	Landeck #11C-223					No
P135501W	5/30/2001	52	73	2	NESE	GSI	CBM	Redstone Resources, Inc.	Hall 43A-223					No
P135508W	5/30/2001	52	73	2	SWSW	GSI	CBM	Redstone Resources, Inc.	Landeck 14A-223					No

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P135510W	5/30/2001	52	73	2	NESW	GSI	CBM	Redstone Resources, Inc.	Landeck 23A-223					No
P135557W	5/30/2001	52	73	2	SWNE	GSI	CBM	Redstone Resources, Inc.	Hall 32A-223					No
P135558W	5/30/2001	52	73	2	SWSE	GSI	CBM	Redstone Resources, Inc.	Hall 34A-223					No
P109041W	3/4/1998	52	73	2	NWNE	GST	STO, MIS, CBM	Redstone Resources, Inc.	Hall 31C-223	409	153	25	No	Yes
P109042W	3/4/1998	52	73	2	SESE	GST	STO, MIS, CBM	Redstone Resources, Inc.	Hall 34C-223	460	190.5	25	No	Yes
P109043W	3/4/1998	52	73	2	NESE	GST	STO, MIS, CBM	Redstone Resources, Inc.	Hall 43C-223	390	133	25	No	Yes
P110633W	6/24/1998	52	73	2	SWNW	GST	STO, CBM	Redstone Resources, Inc.	Landeck 12C-223	489	153.5	25	No	Yes
P79008W	1/30/1989	52	73	2	SWSW	UNA	STO	William A. Landeck	B2 9C					No
P131913W	1/3/2001	52	73	11	SWNW	GSI	CBM	Redstone Resources Inc.	Hinkes 12 W - 1123					No
P131914W	1/3/2001	52	73	11	SWSW	GSI	CBM	Redstone Resources Inc.	Hinkes 14 W - 1123					No
P131915W	1/3/2001	52	73	11	NENW	GSI	CBM	Redstone Resources Inc.	Hinkes 21A-1123					No
P131916W	1/3/2001	52	73	11	NESW	GSI	CBM	Redstone Resources Inc.	Hinkes 21W-1123					No
P131917W	1/3/2001	52	73	11	NESW	GSI	CBM	Redstone Resources Inc.	Hinkes 23A-1123					No
P131918W	1/3/2001	52	73	11	NESW	GSI	CBM	Redstone Resources Inc.	Hinkes 23W-1123					No
P131919W	1/3/2001	52	73	11	SWNE	GSI	CBM	Redstone Resources Inc.	Hall 32A-1123					No
P131920W	1/3/2001	52	73	11	SWNE	GSI	CBM	Redstone Resources Inc.	Hall 32W-1123					No
P130319W	10/12/2000	52	73	11	NESE	GST	CBM	Redstone Resources Inc.	Twenty Mile 43A-1123	323	152	12	No	Yes
P131652W	12/26/2000	52	73	11	SWNW	GST	CBM	Redstone Resources Inc.	Hinkes 12A-1123	230	130	10	No	Yes
P131921W	1/3/2001	52	73	11	NESE	GST	CBM	Redstone Resources Inc.	Twenty Mile 43 C-1123	538	489	10	No	Yes
P131651W	12/26/2000	52	73	11	SWSW	GST	CBM	Redstone Resources of Wyoming Inc.	Hinkes 14A-1123	198	124.5	5	No	Yes
P130318W	10/12/2000	52	73	11	NENE	GST	CBM	Redstone Resources of Wyoming, Inc	Hall 41A-1123	304	160	25	No	Yes
P131926W	1/3/2001	52	73	11	SWSE	GST	CBM	Redstone Resources of Wyoming, Inc	Twenty Mile 34A-1123	340	178	25	No	Yes
P108243W	11/26/1997	52	73	11	SWNW	GST	STO, CBM	Redstone Resources, Inc	Hinkes 12C-1123	425	101	12	No	Yes
P108247W	11/26/1997	52	73	11	SWSW	GST	STO, CBM	Redstone Resources, Inc	Hinkes 14C-1123	460	127	22	No	Yes
P132273W	1/17/2001	52	73	11	SWSE	GSI	CBM	Redstone Resources, Inc.	Twenty Mile 34W-1123					No
P132274W	1/17/2001	52	73	11	NENE	GSI	CBM	Redstone Resources, Inc.	Hall 41W-1123					No



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P132275W	1/17/2001	52	73	11	NESW	GSI	CBM	Redstone Resources, Inc.	Twenty Mile 43W-1123					No
P108866W	2/6/1998	52	73	11	NESW	GST	STO, CBM	Redstone Resources, Inc.	Hinkes 23C-1123	413	116	10	No	Yes
P109044W	3/4/1998	52	73	11	NENW	GST	STO, CBM	Redstone Resources, Inc.	Hinkes 21C-1123	456	143	15	No	Yes
P109045W	3/4/1998	52	73	11	SWNE	GST	STO, MIS, CBM	Redstone Resources, Inc.	Hall 32C-1123	488	173.5	25	No	Yes
P109046W	3/4/1998	52	73	11	NENE	GST	STO, MIS, CBM	Redstone Resources, Inc.	Hall 41C-1123	534	232	20	No	Yes
P109048W	3/5/1998	52	73	11	SESE	GST	STO, CBM	Redstone Resources, Inc.	Twenty Mile 44C-1123	516	169	15	No	Yes
P120894W	11/15/1999	52	73	11	SWSE	GST	STO, CBM	Redstone Resources, Inc.	Twenty Mile 34C-1123	508	385	25	No	Yes
P130156W	10/9/2000	52	73	12	SWNW	GSI	CBM	Majestic Petroleum Operations, LLC	Cook 12A-1223					No
P131321W	11/30/2000	52	73	12	SWSW	GSI	CBM	Majestic Petroleum Operations, LLC	Cook 14A-1223					No
P142623W	2/1/2002	52	73	12	SWSW	GSI	STO, CBM	Majestic Petroleum Operations, LLC	Cook 14W-1223					No
P142624W	2/1/2002	52	73	12	NESW	GSI	STO, CBM	Majestic Petroleum Operations, LLC	Cook 23W-1223					No
P108423W	12/29/1997	52	73	12	NWNW	GST	STO, CBM	Majestic Petroleum Operations, LLC	Cook 11C-1223	497	201.5	12	No	Yes
P108424W	12/29/1997	52	73	12	SWNW	GST	STO, CBM	Majestic Petroleum Operations, LLC	Cook 12C-1223	539	473	25	No	Yes
P108425W	12/29/1997	52	73	12	NWSW	GST	STO, CBM	Majestic Petroleum Operations, LLC	Cook 13C-1223	522	231	25	No	Yes
P108426W	12/29/1997	52	73	12	SWSW	GST	STO, CBM	Majestic Petroleum Operations, LLC	Cook 14C-1223	520	472	25	No	Yes
P108427W	12/29/1997	52	73	12	NENW	GST	STO, CBM	Majestic Petroleum Operations, LLC	Cook 21C-1223	429	379	25	No	Yes
P108428W	12/29/1997	52	73	12	SENE	GST	STO, CBM	Majestic Petroleum Operations, LLC	Cook 22C-1223	435	170	12	No	Yes
P141900W	1/16/2002	52	73	12	NENW	GST	STO, CBM	Majestic Petroleum Operations, LLC	Cook 21A1-1223	105	71	1	No	Yes
P141901W	1/16/2002	52	73	12	SWSE	GST	STO, CBM	Majestic Petroleum Operations, LLC	Cook 34A-1223	154	119	23	No	Yes
P142354W	1/30/2002	52	73	12	SWNW	GST	STO, CBM	Majestic Petroleum Operations, LLC	Cook 12W-1223	834	295	3	No	Yes
P130155W	10/9/2000	52	73	12	NENW	GSI	CBM	Redstone Resources of Wyoming Inc.	Cook 21A-1223					No
P108430W	12/29/1997	52	73	12	SESW	GST	STO, CBM	Redstone Resources, Inc	Cook 24C-1223	466	220.5	25	No	Yes
P108431W	12/29/1997	52	73	12	NWNE	GST	STO, CBM	Redstone Resources, Inc	Cook 31C-1223	373	136.5	10	No	Yes
P108433W	12/29/1997	52	73	12	NWSE	GST	STO, MIS, CBM	Redstone Resources, Inc	Cook 33C-1223	395	14	2	No	Yes
P108434W	12/29/1997	52	73	12	SWSE	GST	STO, CBM	Redstone Resources, Inc	Cook 34C-1223	380	357	25	No	Yes

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P108435W	12/29/1997	52	73	12	NENE	GST	STO, CBM	Redstone Resources, Inc	Cook 41C-1223	390	330	25	No	Yes
P108438W	12/29/1997	52	73	12	SESE	GST	STO, CBM	Redstone Resources, Inc	Cook 44C-1223	310	12	25	No	Yes
P129690W	9/6/2000	52	73	12	NENW	GSI	CBM	Redstone Resources, Inc.	Cook 21C2-1223					No
P33812W	6/21/1976	52	73	13	SENE	GST	DOM, STO	Cecle L. Cook	Cook #1	130	50	25	No	Yes
P67024W	4/12/1984	52	73	13	NESW	GST	DOM	Darrell Ray	Ray #1	296	134	25	No	Yes
P67063W	4/23/1984	52	73	13	NESW	GST	DOM	Kerry L. Petersen	Petersen #1	250	85	25	No	Yes
P131655W	12/26/2000	52	73	13	NENE	GSI	CBM	Majestic Petroleum Operations, LLC	Cook 41A-1323					No
P107783W	10/8/1997	52	73	13	SENE	GST	STO, CBM	Majestic Petroleum Operations, LLC	Cook 42C-1323	393	119	15	No	Yes
P110084W	5/19/1998	52	73	13	NENE	GST	STO, CBM	Majestic Petroleum Operations, LLC	Cook 41C-1323	332	90.5	25	No	Yes
P131654W	12/26/2000	52	73	13	SWNE	GST	CBM	Majestic Petroleum Operations, LLC	Cook 32A-1323	233	212	7	No	Yes
P120603W	11/5/1999	52	73	13	SENE	GST	STO, CBM	Redstone Gas Partners LLC	Cook 22C3-1323	604	583	25	No	Yes
P131890W	1/3/2001	52	73	13	SWNW	GSI	CBM	Redstone Resources Inc.	Cook 12A - 1323					No
P131649W	12/26/2000	52	73	13	SWSE	GST	CBM	Redstone Resources Inc.	Oedekoven 34A-1323	298	190	15	No	Yes
P131650W	12/26/2000	52	73	13	NESW	GST	CBM	Redstone Resources Inc.	Oedekoven 23A-1323	300	53	15	No	Yes
P131656W	12/26/2000	52	73	13	NENW	GSI	CBM	Redstone Resources of Wyoming Inc.	Cook 21A-1323					No
P107038W	8/18/1997	52	73	13	SESE	GST	MIS, CBM	Redstone Resources, Inc	Oedekoven 44C-1323	523	290	20	No	Yes
P107600W	9/8/1997	52	73	13	NESW	GST	STO, MIS, CBM	Redstone Resources, Inc	Oedekoven 23C-1323	539	247	25	No	Yes
P107601W	9/8/1997	52	73	13	SWSE	GST	STO, MIS, CBM	Redstone Resources, Inc	Oedekoven 34C-1323	585	293	20	No	Yes
P107670W	9/18/1997	52	73	13	NWNE	GST	STO, CBM	Redstone Resources, Inc	Cook 31C-1323	389	58.5	5	No	Yes
P107929W	10/22/1997	52	73	13	SESW	GST	STO, MIS, CBM	Redstone Resources, Inc	Oedekoven 24C-1323	525	230	25	No	Yes
P132276W	1/17/2001	52	73	13	SWSW	GSI	CBM	Redstone Resources, Inc.	Geiger 14A-1323					No
P132277W	1/17/2001	52	73	13	NENW	GSI	CBM	Redstone Resources, Inc.	Cook 21W-1323					No
P132278W	1/17/2001	52	73	13	NESW	GSI	CBM	Redstone Resources, Inc.	Oedekoven 23W-1323					No
P132279W	1/17/2001	52	73	13	SWNW	GSI	CBM	Redstone Resources, Inc.	Twenty Mile 12W-1423					No
P109047W	3/5/1998	52	73	13	NWNW	GST	STO, CBM	Redstone Resources, Inc.	Cook 11C-1323	536	257	20	No	Yes
P110083W	5/19/1998	52	73	13	NWSW	GST	STO, CBM	Redstone Resources, Inc.	Geiger 13C-1323	440	214	25	No	Yes

## GROUNDWATER RIGHTS WITHIN 3 MILES OF THE WEST HAY CREEK LBA

Permit #	Priority	T	R	S	Q-Q	Stat.	Uses	Applicant	Facility Name	Well Depth	Stat Depth	Yld Act	Chem	Well Log
P111695W	9/11/1998	52	73	13	SWSW	GST	STO, CBM	Redstone Resources, Inc.	Geiger 14C-1323	461	59	25	No	Yes
P103580W	8/23/1996	52	73	14	SENW	GST	DOM	Dave Janish	Janish #1	790	250	25	No	Yes
P94590W	2/18/1994	52	73	14	SESE	GST	MON	Green Valley Estates	GVE-MW2	33	22.5	0	Yes	Yes
P94853W	3/25/1994	52	73	14	SWSE	GST	STO	Kelly Hardy	Hardy A1	222	70	12	No	Yes
P8412W	3/18/1971	52	73	14	SENW	GST	STO	Maurice Morel	Morel #4	84	10	4	No	Yes
P8543P	12/31/1942	52	73	14	NWNW	GST	DOM, STO	Maurice Morel	Morel #1	185	80	3	No	No
P8545P	12/31/1915	52	73	14	NENW	GST	STO	Maurice Morel	Morel #3	4	-4	2	No	No
P120895W	11/15/1999	52	73	14	NESW	GST	STO, CBM	Redstone Resources	Twenty Mile 23C-1423	592	397	6	No	Yes
P142658W	2/7/2002	52	73	14	SWSE	GSI	CBM	Redstone Resources Inc.	Huskinson 34A-1423					No
P142659W	2/7/2002	52	73	14	SWNW	GSI	CBM	Redstone Resources Inc.	Twenty Mile 12A-1423					No
P142661W	2/7/2002	52	73	14	SWNE	GSI	CBM	Redstone Resources Inc.	Twenty Mile 32A-1423					No
P122288W	11/22/1999	52	73	14	SWSE	GST	STO, CBM	Redstone Resources Inc.	Green Valley 34C-1423	536	307	25	No	Yes
P122295W	12/8/1999	52	73	14	SWNE	GST	STO, CBM	Redstone Resources Inc.	Twenty Mile 32C-1423	511	379	24	No	Yes
P131644W	12/26/2000	52	73	14	NESW	GSI	CBM	Redstone Resources of Wyoming Inc.	Twenty Mile 23 A-1423					No
P131646W	12/26/2000	52	73	14	NENW	GSI	CBM	Redstone Resources of Wyoming Inc.	Twenty Mile 21A-1423					No
P131647W	12/26/2000	52	73	14	SWSW	GSI	CBM	Redstone Resources of Wyoming Inc.	Twenty Mile 14A-1423					No
P131648W	12/26/2000	52	73	14	SWNW	GSI	CBM	Redstone Resources of Wyoming Inc.	Twenty Mile 12A-1423					No
P131653W	12/26/2000	52	73	14	SWSE	GSI	CBM	Redstone Resources of Wyoming Inc.	Green Valley 34A-1423					No
P131643W	12/26/2000	52	73	14	SWNE	GST	CBM	Redstone Resources of Wyoming, Inc	Twenty Mile 32A-1423	370	242	25	No	Yes
P127662W	7/17/2000	52	73	14	SWNW	GSI	CBM	Redstone Resources, Inc.	Twenty Mile 12C-1423					No
P128654W	8/22/2000	52	73	14	NWNE	GSI	CBM	Redstone Resources, Inc.	Twenty Mile 31 C-1423					No
P132281W	1/17/2001	52	73	14	NENW	GSI	CBM	Redstone Resources, Inc.	Twenty Mile 21W--1423					No
P132282W	1/17/2001	52	73	14	NESW	GSI	CBM	Redstone Resources, Inc.	Twenty Mile 23W--1423					No
P132293W	1/17/2001	52	73	14	NESE	GSI	CBM	Redstone Resources, Inc.	Janisch 43A-1423					No
P132280W	1/17/2001	52	73	14	SWSW	GST	CBM	Redstone Resources, Inc.	Twenty Mile 14W-1423	884	814	25	No	Yes
P15860W	10/24/1972	52	73	14	NESE	GST	STO	Reginald Parnell	Pitt #1	102	37	60	No	Yes
P21099P	1/9/1973	52	73	23	SESE	GST	STO	Charles R. Oedekoven	Carlson #1	370	200	5	No	Yes
P149408W	2/19/2003	52	73	23	SENE	GSI	DOM, STO	Cody Joslyn	Cody # 1					No
P91376W	4/14/1993	52	73	23	SWNE	ADJ	MIS	Green Valley Estates	Morel #1	1260	370	80	Yes	Yes

## GROUNDWATER RIGHTS WITHIN 3 MILES OF THE WEST HAY CREEK LBA

Permit #	Priority	T	R	S	Q-Q	Stat.	Uses	Applicant	Facility Name	Well Depth	Stat Depth	Yld Act	Chem	Well Log
P34476W	8/10/1976	52	73	23	SENW	GST	MON	Maurice Morel** S & R Land Company**Robert Morel**Gerald Morel	Morel #1 Test Hole	1260	370	0	No	Yes
P120897W	11/15/1999	52	73	23	SWNE	GST	STO, CBM	Redstone Resources	Triton 32C-2323	689	545	12	No	Yes
P131922W	1/3/2001	52	73	23	SWNE	GSI	CBM	Redstone Resources Inc.	Triton 32 A-2323					No
P131923W	1/3/2001	52	73	23	NESE	GSI	CBM	Redstone Resources Inc.	Triton 43 A-2323					No
P137322W	7/25/2001	52	73	23	NESW	GSI	CBM	Redstone Resources Inc.	Triton Fed 32C-2623					No
P137328W	7/25/2001	52	73	23	SWSW	GSI	CBM	Redstone Resources Inc.	Twenty Mile Fed 14C-2323					No
P116611W	7/2/1999	52	73	23	NESE	GST	STO, CBM	Redstone Resources Inc.	Triton 43C-2323	657	218	25	No	Yes
P127901W	7/31/2000	52	73	23	NENW	GST	CBM	Redstone Resources Inc.	Twenty Mile 21C-2323	632	327	25	No	Yes
P131645W	12/26/2000	52	73	23	NENW	GSI	CBM	Redstone Resources of Wyoming Inc.	Twenty Mile 21A-2323					No
P132292W	1/17/2001	52	73	23	SWNW	GSI	CBM	Redstone Resources, Inc.	Twenty Mile 12A-2323					No
P108931W	2/23/1998	52	73	23	SENE	GST	STO, CBM	Redstone Resources, Inc.	Triton 42C-2323	576	308	25	No	Yes
P118851W	8/30/1999	52	73	23	NENE	GST	STO, CBM	Redstone Resources, Inc.	Green Valley 41C-2323	530	55	25	No	No
P115504W	4/16/1999	52	73	24	NENE	GST	STO	Byron F/Marjorie Oedekoven	Robb E #1E	300	75	5	No	No
P115512W	4/16/1999	52	73	24	SENW	GST	STO	Byron F/Marjorie Oedekoven	Robb W #1W	43.4	6	3	No	No
P21102P	1/9/1973	52	73	24	SESE	GST	STO	Charles R. Oedekoven	County Road #1	140	70	15	No	Yes
P21104P	1/9/1973	52	73	24	SESW	GST	DOM, STO	Charles R. Oedekoven	Headquarters #1	210	90	10	No	No
P92236W	7/13/1993	52	73	24	SENW	GST	DOM, STO	Gene And Glenda Palmer	Palmer #1	655	200	20	No	Yes
P131924W	1/3/2001	52	73	24	SWSW	GSI	CBM	Redstone Resources Inc.	Triton 14A-2423					No
P131925W	1/3/2001	52	73	24	NENW	GSI	CBM	Redstone Resources Inc.	Oedekoven 21A-2423					No
P131927W	1/3/2001	52	73	24	NESW	GSI	CBM	Redstone Resources Inc.	Oedekoven 23A-2423					No
P131928W	1/3/2001	52	73	24	NENE	GSI	CBM	Redstone Resources Inc.	Oedekoven 41A-2423					No
P131929W	1/3/2001	52	73	24	SWNE	GSI	CBM	Redstone Resources Inc.	Oedekoven 32A-2423					No
P131930W	1/3/2001	52	73	24	SWSE	GSI	CBM	Redstone Resources Inc.	Oedekoven 34A-2423					No
P131931W	1/3/2001	52	73	24	NESE	GSI	CBM	Redstone Resources Inc.	Oedekoven 43A-2423					No
P104886W	1/14/1997	52	73	24	SWSE	GST	STO, MIS, CBM	Redstone Resources, Inc	Oedekoven 34SA-2423	456	236	14	No	Yes
P104887W	1/14/1997	52	73	24	SESE	GST	STO, MIS, CBM	Redstone Resources, Inc	Oedekoven 44SC-2423	457	249	20	No	No
P106641W	7/8/1997	52	73	24	NENE	GST	STO, MIS, CBM	Redstone Resources, Inc	Oedekoven 41C-2423	466	223	25	No	Yes

## GROUNDWATER RIGHTS WITHIN 3 MILES OF THE WEST HAY CREEK LBA

Permit #	Priority	T	R	S	Q-Q	Stat.	Uses	Applicant	Facility Name	Well Depth	Stat Depth	Yld Act	Chem	Well Log
P107599W	9/8/1997	52	73	24	NENW	GST	STO, MIS, CBM	Redstone Resources, Inc	Oedekoven 21C-2423	466	197	25	No	Yes
P107737W	9/25/1997	52	73	24	NESE	GST	STO, CBM	Redstone Resources, Inc	Oedekoven 43C-2423	452	253.5	16	No	Yes
P107928W	10/22/1997	52	73	24	NESW	GST	STO, MIS, CBM	Redstone Resources, Inc	Oedekoven 23C-2423	550	285	25	No	Yes
P108421W	12/16/1997	52	73	24	NWNE	GST	STO, MIS, CBM	Redstone Resources, Inc	Oedekoven 31C-2423	540	260.5	20	No	Yes
P132294W	1/17/2001	52	73	24	SWNW	GSI	CBM	Redstone Resources, Inc.	Green Valley 12A-2423					No
P109591W	4/9/1998	52	73	24	NWSE	GST	STO, MIS, CBM	Redstone Resources, Inc.	Oedekoven 33C2-2423	439	165	20	No	Yes
P110086W	5/19/1998	52	73	24	NWNW	GST	STO, CBM	Redstone Resources, Inc.	Morel 11C-2423	519	314.5	25	No	Yes
P116619W	7/2/1999	52	73	24	SWSW	GST	STO, CBM	Redstone Resources, Inc.	Triton 14C-2423	622	468	25	No	Yes
P118850W	8/30/1999	52	73	24	SWNW	GST	STO, CBM	Redstone Resources, Inc.	Green Valley 12C-2423	570	102	25	No	Yes
P149409W	2/19/2003	52	73	24	SWNW	GSI	DOM, STO	Scott Joslyn	Scott Joslyn #1					No
P73385W	9/29/1986	52	73	25	SWSW	GST	DOM, STO	Albert L. Briggs	Briggs #1	755	300	25	No	Yes
P65773W	9/22/1983	52	73	25	SWNW		MIS	Charles E. & Cindy S. Bredthauer	Enl Bredthauer #1	705	320	25	No	Yes
P41579W	1/20/1978	52	73	25	SWNW	GST	DOM	Charles E. And Cindy S. Bredthauer	Bredthauer #1	705	350	11	Yes	Yes
P69602W	3/7/1985	52	73	25	NWNW	GST	DOM	Charles P. Sullivan	Sullivan #1	820	400	12	No	Yes
P21103P	1/9/1973	52	73	25	SESE	GST	STO	Charles R. Oedekoven	Woofter #1	210	80	10	No	Yes
P150294W	4/7/2003	52	73	25	NENW	GST	DOM	Chris Santistevan	Santistevan # 1	890	432	20	No	Yes
P110161W	5/27/1998	52	73	25	SENE	GST	DOM	Glenda H Matlack	Matlack #1	665	100	17	Yes	Yes
P154536W	5/2/2003	52	73	25	SWNW	GSM	MIS	Glory Hole Homeowners Assn.	Glory Hole #1	1200	565	70	Yes	Yes
P56385W	4/8/1981	52	73	25	SWNW	GST	DOM, STO	Helen Hafling	Pineview #2	785	300	20	No	Yes
P59551W	2/19/1982	52	73	25	NWSW	GST	DOM	Jack P. & Victoria L. Connolly	Connolly #1	800	375	25	No	Yes
P117223W	7/7/1999	52	73	25	SESE	GSE	STO, CBM	Kennedy Oil	North Kitty Fee #44-25	660	410	7	No	Yes
P137166W	7/17/2001	52	73	25	SESE	GSI	CBM	Kennedy Oil	North Kitty Fee 44-25C					No
P55199W	1/21/1981	52	73	25	NWSW			Lawrence Bruski	Bruski #1	330	160	20	No	Yes
P137323W	7/25/2001	52	73	25	NESW	GSI	CBM	Redstone Resources Inc.	Triton Fed 23C-2523					No
P143200W	3/7/2002	52	73	25	NWNW	GSI	CBM	Redstone Resources Inc.	Triton 11A2-2523					No
P129774W	9/20/2000	52	73	25	SWSE	GSI	CBM	Redstone Resources of Wyoming Inc.	Triton 34C-2523					No
P130126W	9/28/2000	52	73	25	SENE	GSI	CBM	Redstone Resources of Wyoming Inc.	Triton 22A-2523					No
P130129W	9/28/2000	52	73	25	SWNE	GSI	CBM	Redstone Resources of Wyoming Inc.	Triton 32C2-2523					No
P103615W	8/29/1996	52	73	25	NWSE	GST	STO, MIS, CBM	Redstone Resources, Inc	Triton #33A-2523	163	0	5	No	Yes

## GROUNDWATER RIGHTS WITHIN 3 MILES OF THE WEST HAY CREEK LBA

Permit #	Priority	T	R	S	Q-Q	Stat.	Uses	Applicant	Facility Name	Well Depth	Stat Depth	Yld Act	Chem	Well Log
P103616W	8/29/1996	52	73	25	SENE	GST	STO, MIS, CBM	Redstone Resources, Inc	Triton #42A-2523	178.5	-1	0	No	Yes
P103617W	8/29/1996	52	73	25	SESE	GST	STO, MIS, CBM	Redstone Resources, Inc	Triton #44A-2523	153	0	0	No	Yes
P104561W	11/15/1996	52	73	25	NESE	GST	STO, CBM	Redstone Resources, Inc	Triton 43C-2523	335	160	20	No	Yes
P106510W	6/16/1997	52	73	25	NENE	GST	STO, MIS, CBM	Redstone Resources, Inc	Triton 41C-2523	412	185	25	No	Yes
P106511W	6/16/1997	52	73	25	SESE	GST	STO, MIS, CBM	Redstone Resources, Inc	Triton 44C-2523	395	-4	0	No	Yes
P107785W	10/8/1997	52	73	25	NENW	GST	STO, CBM	Redstone Resources, Inc	Triton 21C-2523	529	255	14	No	Yes
P127661W	7/17/2000	52	73	25	NWSW	GSI	CBM	Redstone Resources, Inc.	Coleman 13C-2523					No
P114667W	3/22/1999	52	73	25	NWNW	GST	STO, CBM	Redstone Resources, Inc.	Triton 11C-2523	419	198	25	No	Yes
P114670W	3/22/1999	52	73	25	SWSW	GST	STO, CBM	Redstone Resources, Inc.	Holden 14C-2523	516	54	25	No	Yes
P111067W	7/1/1998	52	73	25	NWSW	UNA	DOM, STO	Richard Eberlein	Eberlein 1					No
P72895W	6/20/1986	52	73	25	SWSW	GST	DOM, STO	Roger & Mary Maki**Brook & Lori Bahnson**Mark Thomas	Pineview #4	790	365	25	No	Yes
P34782W	9/9/1976	52	73	25	SWSE	GST	DOM, STO	Steven R. or Georgia L. Barbour	S Barbour #1	200	120	12	No	Yes
P66876W	4/2/1984	52	73	25	SWSE	GST	DOM	Steven R. or Georgia L. Barbour	S. Barbour #2	717	350	20	No	Yes
P51185W	2/15/1980	52	73	25	SENW	GST	DOM	Susan M Moore	H H #1	660	240	20	No	Yes
P112366W	10/5/1998	52	73	25	NWNE	GSE	STO, CBM	Yates Petroleum Corp.** SMC Mining Company	Olin CS #1					No
P38967W	6/29/1977	52	73	26	NWSW	GST	DOM	Bob Leroy Johnson	Johnson Well #1	260	200	7	No	Yes
P65774W	9/22/1983	52	73	26	NESE		MIS	Bredthauer-West Home Owners Association	B-West #1	710	150	40	No	Yes
P21100P	1/9/1973	52	73	26	NENE	GST	STO	Charles R. Oedekoven	Highway #1	141	100	10	No	Yes
P65156W	8/22/1983	52	73	26	SWSE	GST	DOM	Duane Butcher	Butcher #1	790	475	10	No	No
P43866W	6/19/1978	52	73	26	SWNE	GST	DOM, STO	Edward W. & Linda K. Eldridge	Eldridge #1	325	175	12	No	Yes
P123899W	3/13/2000	52	73	26	NWSE	GSI	DOM, STO	Elliston Company	Elliston #1					No
P43864W	6/16/1978	52	73	26	SWSE	GST	DOM, STO	Horace Ray Collins	Onetia #1	442	225	10	Yes	Yes
P57369W	6/29/1981	52	73	26	NWNE	GST	DOM, STO	Orvil L. Holden	Holden #1	625	170	9	No	Yes
P36583W	3/14/1977	52	73	26	NESW	GST	DOM, STO	Raymond Podenski	Rays #2	580	475	5	No	Yes
P137321W	7/25/2001	52	73	26	SWNE	GSI	CBM	Redstone Resources Inc.	Eldridge Fed 32C-2623					No

## GROUNDWATER RIGHTS WITHIN 3 MILES OF THE WEST HAY CREEK LBA

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P137324W	7/25/2001	52	73	26	NENE	GSI	CBM	Redstone Resources Inc.	Triton Fed 41A-2623					No
P137326W	7/25/2001	52	73	26	SWNW	GSI	CBM	Redstone Resources Inc.	Twenty Mile Fed 12C-2623					No
P141402W	12/12/2001	52	73	26	NESE	GSI	CBM	Redstone Resources Inc.	Moore 43C2-2623					No
P142657W	2/7/2002	52	73	26	SWSE	GSI	CBM	Redstone Resources Inc.	Landeck 34C-2623					No
P141398W	12/12/2001	52	73	26	SWSW	GST	CBM	Redstone Resources of Wyoming, Inc	Twenty Mile 14A-2623	573	429	25	No	Yes
P109627W	4/9/1998	52	73	26	NENW	GST	STO, CBM	Redstone Resources, Inc.	Triton Federal 21C-2623	700	276	25	No	Yes
P115521W	4/27/1999	52	73	26	SWSW	GST	STO, CBM	Redstone Resources, Inc.	Twenty Mile 14C-2623	741	240	25	No	Yes
P122771W	1/31/2000	52	73	26	NESE	GST	STO, CBM	Redstone Resources, Inc.	Moore 43C-2623	639	278	25	No	Yes
P109275W	3/18/1998	52	73	35	NENW	GST	STO, MIS, CBM	Redstone Resources, Inc.	Twenty Mile 21C-3523	662	242	13	No	Yes
P115523W	4/27/1999	52	73	35	SWNW	GST	STO, CBM	Redstone Resources, Inc.	Twenty Mile 12C-3523	687	180	25	No	Yes
P116612W	7/2/1999	52	73	35	NESW	GST	STO, CBM	Redstone Resources, Inc.	Twenty Mile 23C-3523	680	198	25	No	Yes
P67073W	4/25/1984	52	73	35	NWNE	GST	STO	Twenty Mile Land Co.	Videta #1	250	84	15	No	Yes
P104527W	11/25/1996	52	73	36	SENE	GST	STO, MIS, CBM	Redstone Resources, Inc	State 42A-3623	1283	0	5	No	Yes
P106635W	6/30/1997	52	73	36	NWNW	GST	STO, CBM	Redstone Resources, Inc	State 11C-3623	500	203	12	No	Yes
P122289W	11/22/1999	52	73	36	NENE	GSI	STO, CBM	Redstone Resources, Inc.	State 41D-3623					No
P122290W	11/22/1999	52	73	36	NESE	GSI	STO, CBM	Redstone Resources, Inc.** Wy State Board of Land Commissioners	State 43D-3623					No
P122291W	11/22/1999	52	73	36	SESE	GSI	STO, CBM	Redstone Resources, Inc.** Wy State Board of Land Commissioners	State 44D-3623					No
P122296W	12/8/1999	52	73	36	NENE	GSI	STO, CBM	Redstone Resources, Inc.** Wy State Board of Land Commissioners	State 41C-3623					No
P131326W	12/1/2000	52	73	36	NENW	GST	CBM	Wy State Board of Land Commissioners** Redstone Resources Inc.	State 21D-3623	1351	823	25	No	Yes
P131327W	12/1/2000	52	73	36	SWNE	GSI	CBM	Wy State Board of Land Commissioners** Redstone Resources, Inc.	State 32D-3623					No
P131328W	12/1/2000	52	73	36	NESW	GSI	CBM	Wy State Board of Land Commissioners** Redstone Resources, Inc.	State 23D-3623					No

## GROUNDWATER RIGHTS WITHIN 3 MILES OF THE WEST HAY CREEK LBA

Permit #	Priority	T	R	S	Q-Q	Stat.	Uses	Applicant	Facility Name	Well Depth	Stat Depth	Yld Act	Chem	Well Log
P131329W	12/1/2000	52	73	36	SWSE	GSI	CBM	Wy State Board of Land Commissioners** Redstone Resources, Inc.	State 34D-3623					No
P103612W	8/29/1996	52	73	36	NENE	GST	STO, MIS, CBM	Wyo Board of Land Commissioners** Redstone Resources, Inc	State #41A-3623	129.5	0	5	No	Yes
P105071W	2/21/1997	52	73	36	NWSW	GST	STO, CBM	Wyo Board of Land Commissioners** Redstone Resources, Inc	State 13EA-3623	508	159	16	No	Yes
P105072W	2/21/1997	52	73	36	SENW	GST	STO, CBM	Wyo Board of Land Commissioners** Redstone Resources, Inc	State 22EC-3623	459	171	25	No	Yes
P105073W	2/21/1997	52	73	36	NESE	GST	STO, CBM	Wyo Board of Land Commissioners** Redstone Resources, Inc	State 43A-3623	516	135	10	No	Yes
P105074W	2/21/1997	52	73	36	NWNE	GST	STO, CBM	Wyo Board of Land Commissioners** Redstone Resources, Inc	State 31A-3623	426	177	12	No	Yes
P105076W	2/21/1997	52	73	36	SESE	GST	STO, MIS, CBM	Wyo Board of Land Commissioners** Redstone Resources, Inc	State 44A-3623	422	129	20	No	Yes
P106640W	6/30/1997	52	73	36	NWSE	GST	STO, CBM	Wyo Board of Land Commissioners** Redstone Resources, Inc	State 33C-3623	428	156	16	No	Yes
P106780W	7/18/1997	52	73	36	SENE	GST	STO, MIS, CBM	Wyo Board of Land Commissioners** Redstone Resources, Inc	State 42C-3623	408	-1	20	No	Yes
P107927W	10/22/1997	52	73	36	NENW	GST	STO, MIS, CBM	Wyo Board of Land Commissioners** Redstone Resources, Inc	State 21C-3623	491	216	20	No	Yes
P111702W	9/11/1998	52	73	36	SESW	GST	STO, CBM	Wyo Board of Land Commissioners** Redstone Resources, Inc.	State 24C-3623	461	298	25	No	Yes
P115508W	4/16/1999	53	72	31	NWNE	GST	STO	Byron F/Marjorie Oedekoven	Steiner NW #2E	210	46	5	No	No
P77546W	7/7/1988	53	72	31	SWSE	GST	STO	Frank Landeck	Landeck #12	280	80	10	No	Yes
P115517W	4/26/1999	53	72	31	NENW	GST	DOM, STO	Richard M/or Judy K Lynde	House Well #1	360	200	25	No	Yes
P130428W	10/25/2000	53	72	31	SWSE	GST	STO	William A. Landeck	Landeck # 8	564	260	25	No	Yes
P111927W	10/2/1998	53	72	32	SESW	GST	DOM	Byron F Oedekoven	Oedekoven House Well #1					No
P115505W	4/16/1999	53	72	32	SESW	GST	STO	Byron F/Marjorie Oedekoven	Steiner Yard #1E	125	65	5	No	No
P115506W	4/16/1999	53	72	32	SESW	GST	STO	Byron F/Marjorie Oedekoven	Steiner Hand Dug	40	35	5	No	No
P115509W	4/16/1999	53	72	32	SESW	GST	STO	Byron F/Marjorie Oedekoven	Steiner Yard #1W	65	35	3	No	No



## GROUNDWATER RIGHTS WITHIN 3 MILES OF THE WEST HAY CREEK LBA

Permit #	Priority	T	R	S	Q-Q	Stat.	Uses	Applicant	Facility Name	Well Depth	Stat Depth	Yld Act	Chem	Well Log
P18184P	10/31/1960	53	72	32	SENE	GST	DOM, STO	Gilbert Oedekoven	John #3	220	120	8	Yes	No
P18188P	10/31/1959	53	72	32	SWSE	GST	STO	Gilbert Oedekoven	John #7	150	80	8	No	No
P18185P	10/31/1964	53	72	33	NENW	GST	STO	Gilbert Oedekoven	John #4	180	90	3	No	No
P27251W	7/11/1974	53	72	33	SWNW	GST	DOM, STO	Gilbert Oedekoven	John #8	315	34	15	No	Yes
P61232W	6/21/1982	53	72	33	SWNW	GST	DOM, STO	Gilbert Oedekoven	John #9	800	320	20	No	Yes
P3262P	6/30/1938	53	73	36	SWSW	GST	STO	Dean W. Hall** State of Wyoming	#5 Hall	110	70	2		No
P111687W	9/11/1998	53	73	36	SESE	GST	STO, CBM	Redstone Resources, Inc.	State 44C-3633	358	198	25	No	Yes
P111701W	9/11/1998	53	73	36	SWSE	GST	STO, CBM	Redstone Resources, Inc.	Reile 34LC-3333	468	217	8	No	Yes
P111703W	9/11/1998	53	73	36	NWNW	GST	STO, CBM	Wyo Board of Land Commissioners** Redstone Resources, Inc.	State 11C-3633	332	60	25	No	Yes
P111704W	9/11/1998	53	73	36	NWSW	GST	STO, CBM	Wyo Board of Land Commissioners** Redstone Resources, Inc.	State 13C-3633	377	79	25	No	Yes
P111705W	9/11/1998	53	73	36	SENE	GST	STO, CBM	Wyo Board of Land Commissioners** Redstone Resources, Inc.	State 22C-3633	406	202.5	25	No	Yes
P111706W	9/11/1998	53	73	36	SESW	GST	STO, CBM	Wyo Board of Land Commissioners** Redstone Resources, Inc.	State 24C-3633	411	188	25	No	Yes
P111707W	9/11/1998	53	73	36	NWNE	GST	STO, CBM	Wyo Board of Land Commissioners** Redstone Resources, Inc.	State 31C-3633	305	105	25	No	Yes
P111708W	9/11/1998	53	73	36	NWSE	GST	STO, CBM	Wyo Board of Land Commissioners** Redstone Resources, Inc.	State 33C-3633	385	201.5	25	No	Yes
P111709W	9/11/1998	53	73	36	SENE	GST	STO, CBM	Wyo Board of Land Commissioners** Redstone Resources, Inc.	State 42C-3633	303	127.5	25	No	Yes

**Notes:** Wells with a "Status" code of ABA, A&C, or CAN have been eliminated from the listing provided above, as none of these well codes represent a valid current right. A double asterisk (\*\*) in the "Applicant" column represents a separator between parties where multiple parties are involved.

**Status Codes**

APP Application  
 ADJ Adjudicated  
 EXP Expired  
 GST Good Standing  
 GSI Good Standing, Incomplete  
 GSM Good Standing, Map Required  
 GSE Good Standing, Extended  
 GSX Good Standing, Extension Requested  
 UNA Unadjudicated\*

**Use Codes**

CBM Coal Bed Methane  
 DEW Dewatering  
 DOM Domestic  
 DRI Drilling  
 IND Industrial  
 IRR Irrigation  
 MIS Miscellaneous  
 MON Monitoring  
 MUN Municipal  
 RES Reservoir Supply  
 STO Stock  
 TEM Temporary  
 TST Test Well

\* Domestic, Stock, Monitor, Coal Bed Methane and some misc. wells are not adjudicated

<sup>1</sup>YldAct= Actual Yield (gpm)

**RECORD SUFFIXES ARE DENOTED AS FOLLOWS:**

- "A" Indicates adjudicated or finalized water rights and unless the right is a territorial appropriation, there will be a match in the reference column from one of the following permit types for the unadjudicated portion of the water right.
- "C" Permits are well statements of claim filed from 1947 to 1957 for wells completed prior to April 1, 1947.
- "G" Permits are well registrations filed for wells completed after April 1, 1947.
- "P" Permits are for stock and domestic use wells completed prior to May 24, 1969 and registered with the State Engineer's Office prior to December 31, 1972.
- "W" Permits are for wells with a priority date for the date of filing with the State Engineer.  
 Lands described in these copies are the water rights of record in our office and may or may not reflect the actual situation of the ground. Failure to exercise a water right for five (5) years, when water is available, may constitute grounds for forfeiture.

**Ground Water Search Area**

Township	Range	Sections
51N	72W	3, 4, 5, 6
51N	73W	1, 2
52N	72W	2-11, 14-23, 26-35
52N	73W	1-2, 11-14, 23-26, 35-36
53N	72W	31-34
53N	73W	36

Search conducted 3/21/2004

# APPENDIX G

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## ABBREVIATIONS AND ACRONYMS

BLM	Bureau of Land Management
CBM	coal bed methane
CFR	Code of Federal Regulations
COE	US Army Corps of Engineers
EIS	environmental impact statement
ESA	Endangered Species Act of 1973
FS	Forest Service
FLPMA	Federal Land Policy Management Act of 1976
FWS	Fish and Wildlife Service
LBA	lease by application
MLA	Mineral Leasing Act of 1920
OSM	Office of Surface Mining Reclamation & Enforcement
PRB	Powder River Basin
PRES	Powder River Eagle Studies
SMCRA	Surface Mining Control and Reclamation Act of 1977
T&E	threatened and endangered
TWC	Thunderbird Wildlife Consulting, Inc.
WDEQ	Wyoming Department of Environmental Quality
WDEQ/LQD	Wyoming Department of Environmental Quality/Land Quality Division
WGFD	Wyoming Game and Fish Department

## **INTRODUCTION**

On August 31, 2000, Triton Coal Company, LLC (Triton) filed an application with the Bureau of Land Management (BLM) for federal coal reserves in a tract located north of and adjacent to the Buckskin Mine in Campbell County, Wyoming. The environmental impacts of leasing this lease by application (LBA) tract are evaluated in the environmental impact statement (EIS) for the West Hay Creek Lease Application.

The purpose of this biological assessment is to provide information about the potential environmental effects that leasing the West Hay Creek LBA tract would have on federally endangered, threatened, proposed, and candidate species.

Threatened and endangered (T&E) species are managed under the authority of the Endangered Species Act (ESA) of 1973 (PL 93-205, as amended). The ESA requires federal agencies to ensure that all actions which they authorize, fund, or carry out are not likely to jeopardize the continued existence of any endangered or threatened species, or result in the destruction or adverse modification of their critical habitat.

This biological assessment was prepared to display the possible effects to endangered, threatened, experimental, proposed, or candidate wildlife or vegetative species (terrestrial and aquatic) known to occur or that may occur within the area influenced by the Preferred Alternative of the BLM. It was prepared in accordance with section 7 of the ESA.

The objectives of this biological assessment are to comply with the requirements of the ESA which states that actions of federal agencies should not jeopardize or adversely modify critical habitat of federally listed species, and to provide a process and standard by which to ensure that threatened, endangered, and proposed species receive full consideration in the decision-making process.

The Wyoming BLM has also prepared a list of sensitive species to focus species management efforts towards maintaining habitats under a multiple use mandate. The authority for this policy and guidance comes from the ESA of 1973, as amended; Title II of the Sikes Act, as amended; the Federal Land Policy and Management Act (FLPMA) of 1976; and Department Manual 235.1.1A.

## **DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES**

The Proposed Action, which is to lease the federal coal in West Hay Creek LBA tract as applied for, and three alternatives to that proposed action are analyzed in the final EIS. Under Alternative 1, which is the No Action alternative, BLM would reject the application to lease the West Hay Creek LBA tract. Alternatives 2 and 3 evaluate leasing a tract that has been modified by BLM. BLM's Preferred Alternative is Alternative 2, which is to lease a tract that includes the applied-for tract and some federal coal adjacent to that tract.

Under the Proposed Action and Alternatives 2 and 3 (action alternatives) for the West Hay Creek LBA tract, if a decision is made to hold a competitive lease sale and there is a successful bidder at that sale, a lease would be issued to the successful bidder for the federal coal included in the tract. The Proposed Action and action alternatives considered in this EIS assume that Triton would be the successful bidder if a competitive sale is held, and that the West Hay Creek LBA tract would be mined as a maintenance lease to extend the life of the adjacent existing Buckskin Mine. As a result, under the Proposed Action and the action alternatives, existing facilities and roads would be used to mine the coal included in the tract. Employment would increase from 199 to 225 with or without selection of the Preferred Alternative.

BLM does not authorize mining by issuing a lease for federal coal, but the impacts of mining the coal are considered at the leasing stage because it is a logical consequence of issuing a maintenance lease to an existing coal mine.

Under the Proposed Action and action alternatives, it is assumed that an area larger than the tract would have to be disturbed in order to recover all of the coal in the tract. The disturbances outside the coal removal area would be due to activities like overstripping, matching undisturbed topography, and constructing flood control and sediment control structures. Under the Proposed Action and action alternatives, the LBA tract lies entirely within the currently approved mine permit area for the Buckskin Mine.

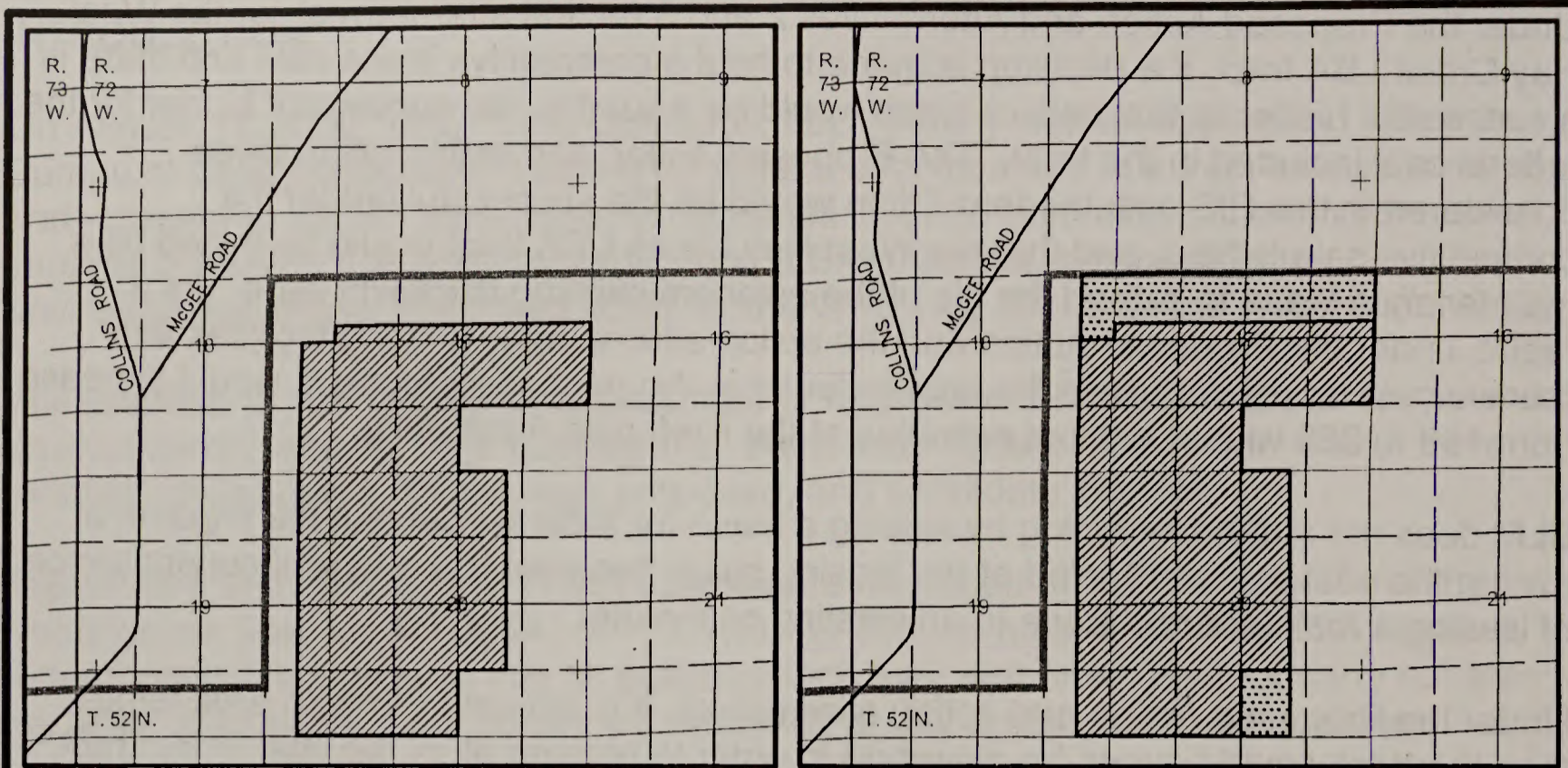
The coal mining unsuitability criteria listed in the federal coal management regulations (43 CFR 3461) have been applied to high to moderate coal development potential lands in the Wyoming Powder River Basin (PRB). None of the lands included in the West Hay Creek LBA tract under any of the alternatives considered in this EIS have been determined to be unsuitable for mining. Additional discussion follows in the Consultation to Date section.

### **The Proposed Action**

Under the Proposed Action, BLM would hold a competitive coal lease sale and issue a maintenance lease to the successful bidder for the West Hay Creek LBA tract as applied for by Triton. The tract as applied for is shown in figure G-1. The legal description of the West Hay Creek LBA tract as applied for is as follows;

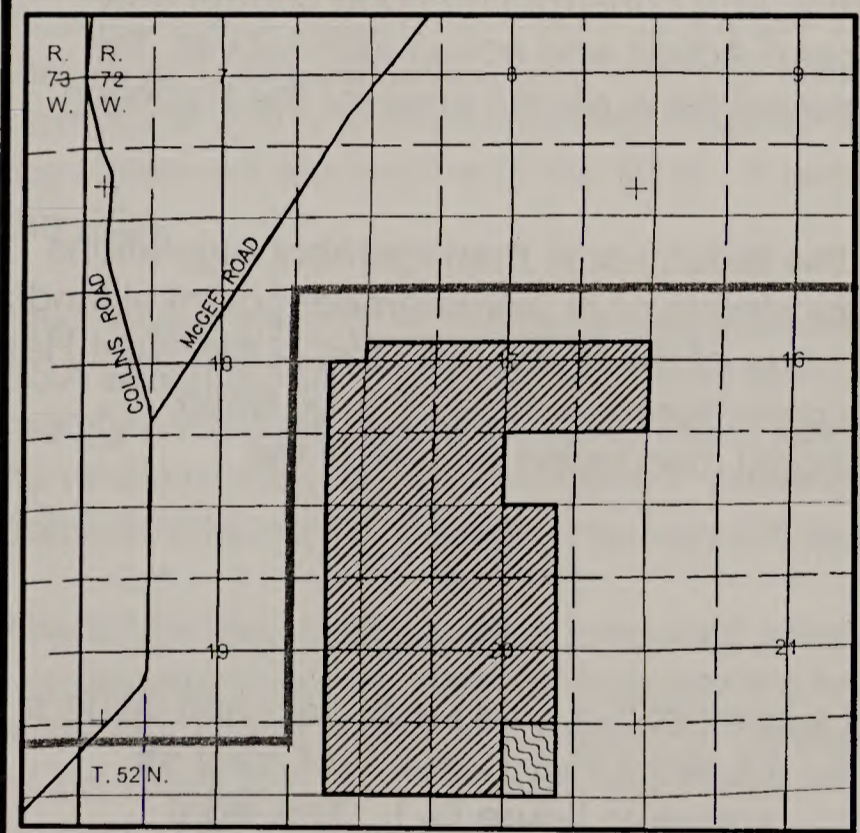
T. 52 N., R. 72 W., 6th P.M., Campbell County, Wyoming

Section 17:	Lot 5 (S2S2)	10.265
	6 (S2S2)	10.265
	7 (S2S2)	10.3475
	8 (S2S2)	10.3475
	9-14, inclusive;	247.24
Section 18:	Lot 13 (E2)	21.035
	20 (E2)	20.75

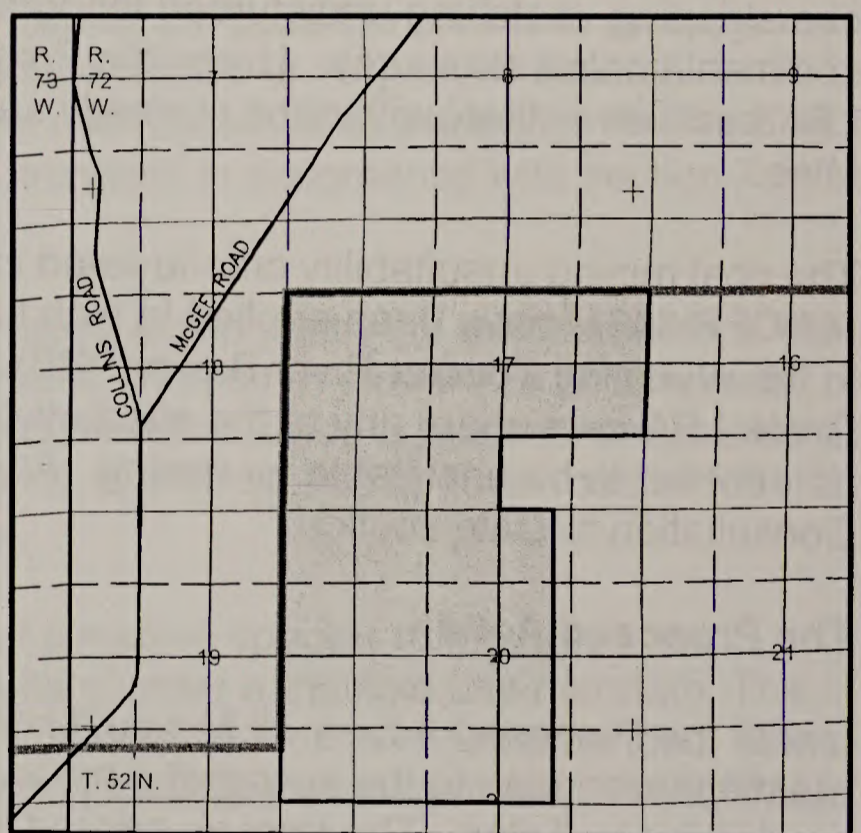


WEST HAY CREEK LBA TRACT AS APPLIED FOR  
(Proposed Action)

WEST HAY CREEK LBA TRACT ALTERNATIVE 2

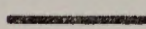
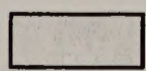
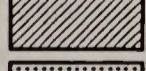
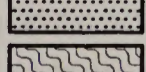
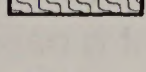


WEST HAY CREEK LBA TRACT ALTERNATIVE 3



WEST HAY CREEK LBA TRACT ANALYSIS AREA

**LEGEND**

-  BUCKSKIN MINE PERMIT BOUNDARY
-  WEST HAY CREEK LBA TRACT ANALYSIS AREA
-  WEST HAY CREEK LBA TRACT AS APPLIED FOR (Proposed Action)
-  AREA ADDED BY BLM UNDER ALTERNATIVE 2
-  AREA ADDED BY BLM UNDER ALTERNATIVE 3



SCALE: 1" = 5000'

Figure G-1. West Hay Creek LBA Tract Configurations.



Section 19:	Lot	5 (E2)	20.71
		12 (E2)	20.84
		13 (E2)	20.935
		20 (E2)	21.065
Section 20:	Lot	2 (W2, W2E2)	31.1175
		3-6, inclusive;	165.38
		7 (W2, W2 E2)	31.1325
		10 (W2, W2E2)	31.1475
		11-14, inclusive	165.52
Total:			838.0975 acres

The coal estate underlying this tract is owned by the federal government and administered by the BLM. The surface estate on this tract is owned by Triton.

Triton estimates that the tract as applied for includes approximately 145 million tons of in-place coal, and that about 130 million tons of that coal would be recoverable. If Triton acquires a lease for the tract, they anticipate mining the coal at a rate of 25 million tons per year, which would extend the life of the existing Buckskin Mine by approximately 5 years; employment would be about 225 persons.

#### **Alternative 1: No Action Alternative**

Alternative 1 is the No Action Alternative. Under the No Action Alternative, the LBA tract would not be leased, but the existing leases at the adjacent Buckskin Mine would be developed according to the existing approved mine plans. Under this alternative, the Buckskin Mine would mine its remaining reserves in approximately 12 years at an average production of 25 million tons per year and average employment would remain at 225 persons. Portions of the surface of the LBA tract will be disturbed due to overstripping to allow coal removal from existing, contiguous Buckskin Mine leases. Selection of this alternative would not preclude leasing and mining of this tract in the future, either as a maintenance tract for an existing operation or as part of a new start mine.

#### **Alternative 2: Preferred Alternative**

In evaluating the West Hay Creek coal lease application, BLM identified a study area, shown in figure G-1 as "West Hay Creek LBA Tract Alternative 2," which includes unleased federal coal to the north and adjacent to the southeast corner of the tract as applied for. The study area includes approximately 176.2 additional acres and 25 million additional tons of in-place coal.

The BLM's Preferred Alternative would add approximately 83.06 acres to the tract as applied for, including approximately 31.16 acres adjacent to the southeast corner and approximately 51.90 acres to the north (figure G-2). Triton did not include the area to the southeast in their application because their current geologic model does not indicate that any mineable coal is present. BLM is considering adding this area to the lease because, as the model becomes further defined by additional drilling information, there

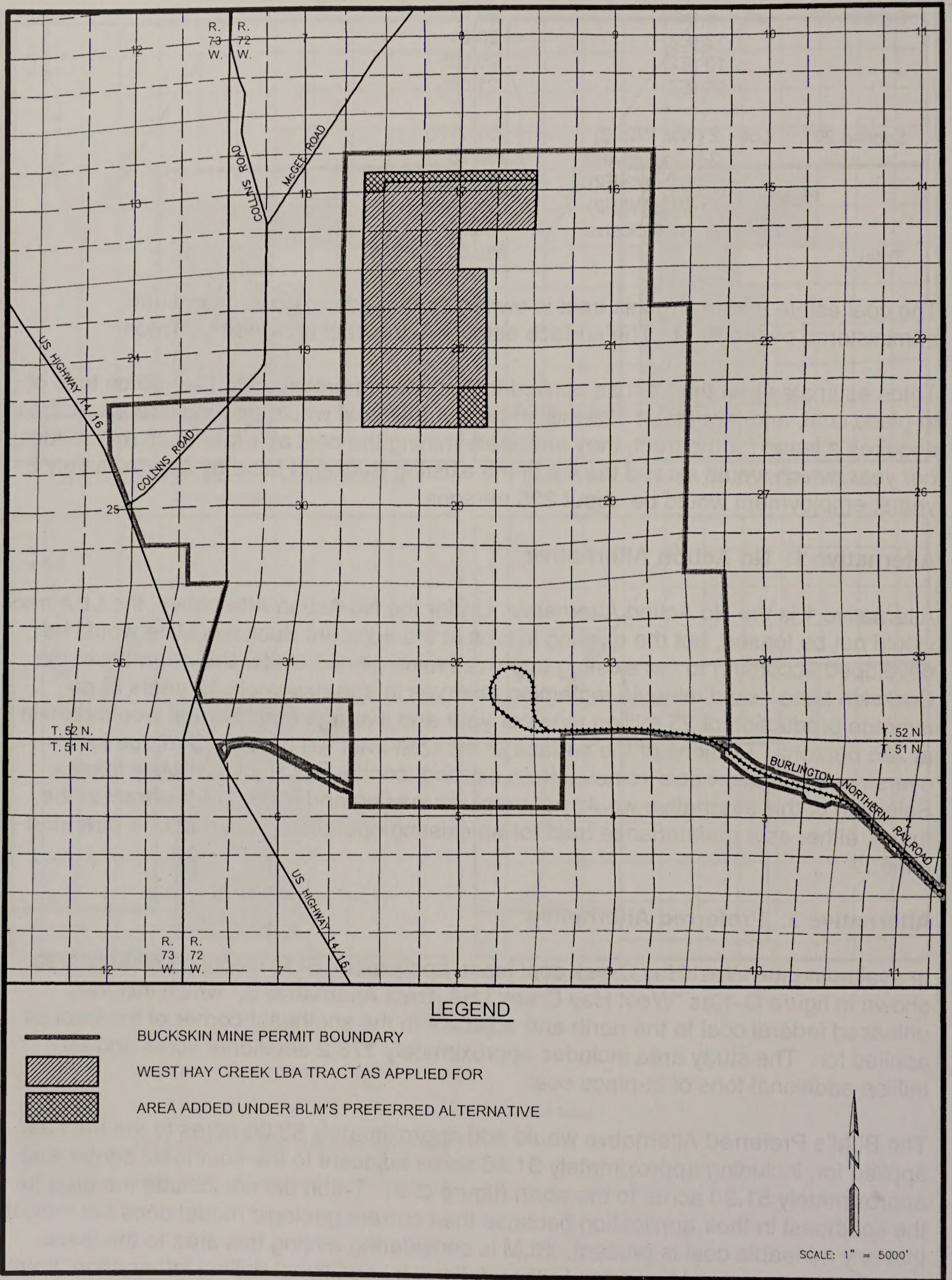


Figure G-2. West Hay Creek LBA Preferred Alternative Tract Configuration.

may be portions of the area that include mineable coal which would be bypassed if it is not leased with the surrounding coal. BLM's Preferred Alternative would also add the approximately 51.90 acres north of the tract as applied for in order to allow for more efficient coal recovery and to avoid bypassing potentially mineable federal coal.

The legal description of the West Hay Creek LBA tract under the BLM's Preferred Alternative is:

T. 52 N., R. 72 W., 6<sup>th</sup> P.M., Campbell County, Wyoming

Section 17	Lot	5 (S2)	20.53
		6 (S2)	20.53
		7 (S2)	20.695
		8 (S2)	20.695
		9-14, inclusive;	247.24
Section 18:	Lot	12 (SE4)	10.6725
		13 (E2)	21.035
		20 (E2)	20.75
Section 19:	Lot	5 (E2)	20.71
		12 (E2)	20.84
		13 (E2)	20.935
		20 (E2)	21.065
Section 20:	Lot	2 (W2, W2E2)	31.1175
		3-6, inclusive	165.38
		7 (W/2, W2E2)	31.1325
		10 (W2, W2E2)	31.1475
		11-14, inclusive	165.52
		15 (W2, W2E2)	31.1625
Total:			921.1575 acres

The coal estate underlying this tract is owned by the federal government and administered by the BLM. The surface estate on this tract is owned by Triton.

Triton estimates that the modified tract includes approximately 160 million tons of in-place coal, and that about 140 million tons of that coal would be recoverable. If Triton acquires a lease for the tract, they anticipate mining the coal at a rate of 25 million tons per year which would extend the life of the existing Buckskin Mine by approximately 6 years; employment would be about 225 persons.

### Alternative 3

Alternative 3 also considers holding a competitive coal lease sale and issuing a maintenance lease to the successful bidder for a reconfigured tract which would add 31.16 acres to the southeast corner of the tract as applied for (figure G-1). Triton did not include this area in their application because their current geologic model does not indicate that any mineable coal is present. BLM is considering adding this area to the

lease because, as the model becomes further defined by additional drilling information, there may be portions of the area that include mineable coal which would be bypassed if it is not leased with the surrounding coal.

## CONSULTATION TO DATE

The locations of the existing Buckskin Mine coal leases, the existing approved mine permit area, and the West Hay Creek LBA tracts are shown in figure G-3.

The Buckskin Mine and West Hay Creek LBA tract are included in the area evaluated for acceptability for further lease consideration as part of the coal screening process. The coal screening process is a four-part process that includes application of the coal unsuitability criteria, which are defined in 43 CFR 3461.5 and listed in appendix B of this EIS. The coal unsuitability criteria were applied to federal coal lands in Campbell and Converse counties in the early 1980s by the BLM and Forest Service (FS). Consultation with the US Fish and Wildlife Service (FWS) occurred in conjunction with the unsuitability findings under criterion 9 (Critical Habitat for Threatened or Endangered Plant and Animal Species), criterion 11 (Bald or Golden Eagle Nests), criterion 12 (Bald and Golden Eagle Roost and Concentration Areas), criterion 13 (Falcon Nesting Site(s) and Buffer Zone(s), and criterion 14 (Habitat for Migratory Bird Species). In 1993, BLM, FS, and FWS began the process of reapplying these criteria to federal coal lands in Campbell, Converse, and Sheridan Counties. The results of this analysis are included as appendix D in the 2001 *Approved Resource Management Plan for Public Lands Administered by the Bureau of Land Management Buffalo Field Office*. Appendix B of this EIS summarizes the unsuitability criteria, describes the general findings for the previous screening analyses discussed above, and presents the findings for the West Hay Creek LBA tract based on the current information.

Consultation with FWS was previously conducted for the area within the Buckskin Mine's existing approved mining permit area (figure G-3), including the entire West Hay Creek LBA tract under the Proposed Action and all of the Alternatives as part of the mining and reclamation permit approval process. The Buckskin Mine was initially permitted in 1980. In 2000, Triton acquired a lease for the Belco Exchange tract, adjacent to the Buckskin Mine, and began the process of amending their existing mine permit to include that tract. In 2002, the Buckskin Mine Hay Creek permit amendment was approved. The West Hay Creek LBA tract and anticipated disturbance area lie completely within the Buckskin Mine permit area as amended by the Hay Creek permit amendment action. A letter dated January 23, 2001, from Mike Long, FWS, Cheyenne, Wyoming, to Don Crecelius, Wyoming Department of Environmental Quality/ Land Quality Division (WDEQ/LQD), Sheridan, Wyoming, is included in the March 2002 mining plan decision document for the Buckskin Mine Hay Creek permit amendment. This letter indicates that no impacts to threatened or endangered species, or species proposed for listing, are anticipated from the Hay Creek permit amendment action, as proposed. A second letter from Mike Long, FWS, to Don Crecelius, WDEQ/LQD, indicates that the raptor and migratory birds of high federal interest plans for the Buckskin Mine Hay Creek permit amendment had been approved.

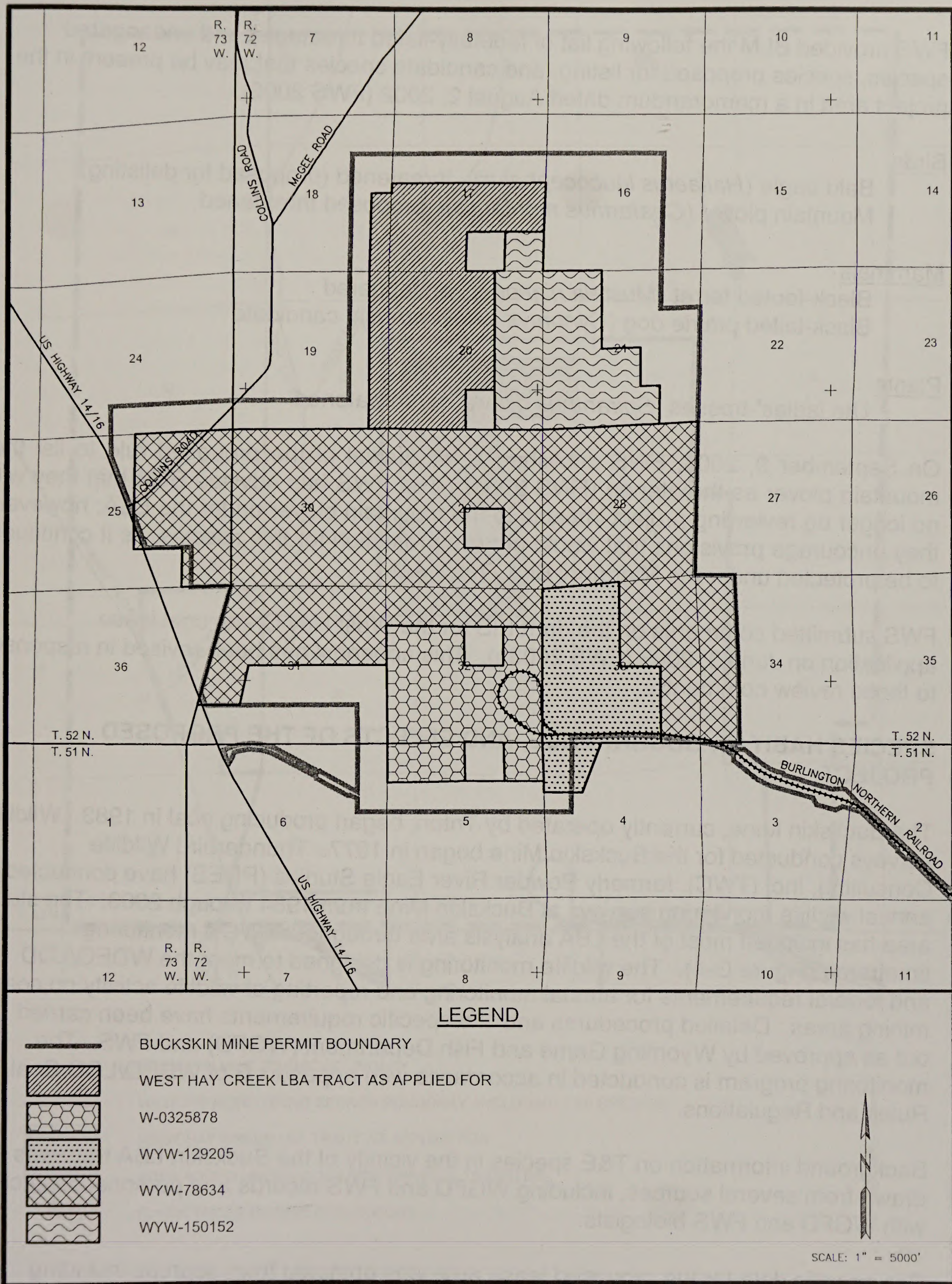


Figure G-3. Buckskin Mine Federal Coal Leases and the West Hay Creek LBA Tract as Applied For.

FWS provided BLM the following list of federally-listed threatened and endangered species, species proposed for listing, and candidate species that may be present in the project area in a memorandum dated August 2, 2002 (FWS 2002).

#### Birds

Bald eagle (*Haliaeetus leucocephalus*): threatened (proposed for delisting)  
Mountain plover (*Charadrius montanus*): proposed threatened

#### Mammals

Black-footed ferret (*Mustela nigripes*): endangered  
Black-tailed prairie dog (*Cynomys ludovicianus*): candidate

#### Plants

Ute ladies'-tresses (*Spiranthes diluvialis*): threatened

On September 9, 2003, FWS published a withdrawal of the proposed rule to list the mountain plover as threatened (FWS 2003). The FWS has advised BLM that they will no longer be reviewing project impacts to the mountain plover under the ESA; however, they encourage provisions that would provide protection for this species, as it continues to be protected under the Migratory Bird Treaty Act.

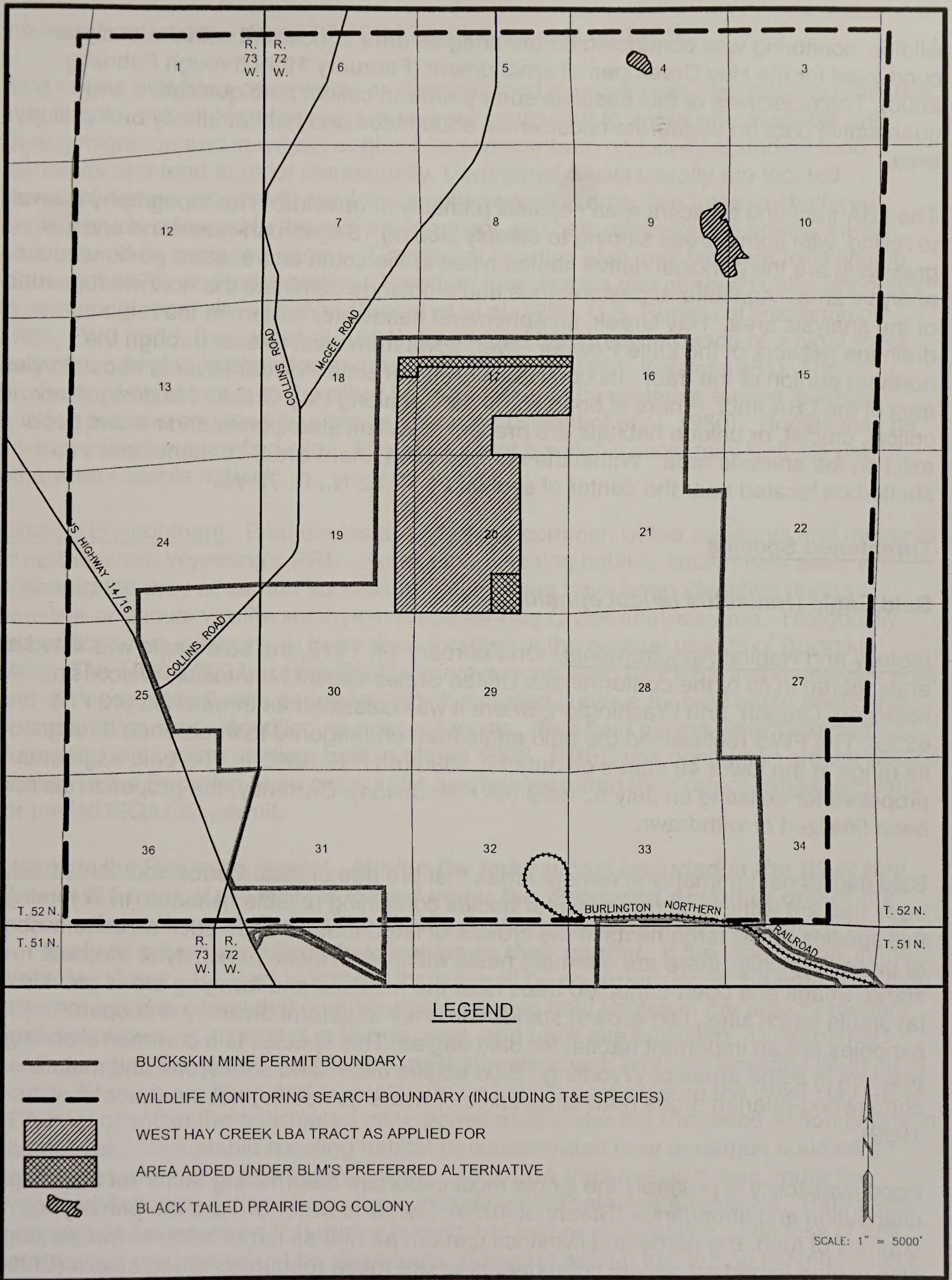
FWS submitted comments on the draft EIS for the West Hay Creek coal lease application on June 3, 2003 (FWS 2003a). This appendix has been revised in response to those review comments.

### **SPECIES HABITAT, OCCURRENCE, AND EFFECTS OF THE PROPOSED PROJECT**

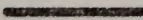




The Buckskin Mine, currently operated by Triton, began producing coal in 1983. Wildlife surveys conducted for the Buckskin Mine began in 1977. Thunderbird Wildlife Consulting, Inc. (TWC), formerly Powder River Eagle Studies (PRES) have conducted annual wildlife monitoring surveys at Buckskin Mine from 1984 through 2003. The study area has included most of the LBA analysis area throughout TWC's monitoring timeframe (Figure G-4). The wildlife monitoring is designed to meet the WDEQ/LQD and federal requirements for annual monitoring and reporting of wildlife activity on coal mining areas. Detailed procedures and site-specific requirements have been carried out as approved by Wyoming Game and Fish Department (WGFD) and FWS. The monitoring program is conducted in accordance with appendix B of WDEQ/LQD Coal Rules and Regulations.

Background information on T&E species in the vicinity of the Buckskin LBA tract was drawn from several sources, including WGFD and FWS records and personal contacts with WGFD and FWS biologists.

Site-specific data for the proposed lease area was obtained from sources including WDEQ/LQD permit applications and annual reports for the Buckskin Mine. Baseline



LEGEND

-  BUCKSKIN MINE PERMIT BOUNDARY
-  WILDLIFE MONITORING SEARCH BOUNDARY (INCLUDING T&E SPECIES)
-  WEST HAY CREEK LBA TRACT AS APPLIED FOR
-  AREA ADDED UNDER BLM'S PREFERRED ALTERNATIVE
-  BLACK TAILED PRAIRIE DOG COLONY



SCALE: 1" = 5000'

Figure G-4. T&E Animal Species Survey Areas for the West Hay Creek LBA Tract.

wildlife monitoring was conducted on the analysis area concurrent with the analysis conducted for the Hay Creek permit amendment (February 1999 through February 2000). The objectives of this baseline survey were to collect both qualitative and quantitative data on vertebrate occurrence, abundance and habitat affinity on the study area.

The LBA tract and adjacent area consists primarily of uplands. The topography is level to rolling, with some areas sloping to steeply sloping. Sagebrush-grassland and grassland are the principal native habitat types in the south and eastern portions of the analysis area. Agricultural pasturelands and croplands dominate the northwest quarter of the analysis area. Hay Creek, an ephemeral headwater stream in the regional drainage network of the Little Powder River, flows from west to east through the northern portion of the tract. Its confluence with the Little Powder River is about 3 miles east of the LBA tract. There is bottomland habitat along Hay Creek. No designated critical, crucial, or unique habitats are present. Several stockponds and natural pools exist on the analysis area. Within the analysis area, there are 37 cottonwoods in a shelterbelt located near the center of section 20, T. 52 N., R. 72 W.

### Threatened Species

#### **Bald Eagle (*Haliaeetus leucocephalus*)**

Biology and Habitat Requirements. On February 14, 1978, the bald eagle was listed as endangered in all of the conterminous United States except Minnesota, Wisconsin, Michigan, Oregon, and Washington, where it was classified as threatened (43 F.R. 6233). The FWS reclassified the bald eagle from endangered to threatened throughout its range in the lower 48 states on July 12, 1995 (60 F.R. 36000). The bald eagle was proposed for delisting on July 6, 1999 (64 F.R. 36454). Currently, the proposal has not been finalized or withdrawn.

Bald eagles nest primarily in remote areas that are free of disturbance and contain large trees that are within one mile of water bodies containing reliable fisheries. In Wyoming, this species builds large nests in the crowns of large mature trees such as cottonwoods or pines. Typically, there are alternate nests within or in close proximity to the nest stand. Snags and open-canopied trees near the nest site and foraging areas provide favorable perch sites. Old-growth stands with their structural diversity and open canopies are an important habitat for bald eagles. This species is a common breeding resident in some areas of Wyoming. Bald eagles use mixed coniferous and mature cottonwood-riparian areas near large lakes or rivers as nesting habitat (Luce et al. 1999).

Food availability is probably the single most important determining factor for bald eagle distribution and abundance (Steenhof 1976). Fish and waterfowl are the primary sources of food. Big game and livestock carrion, as well as larger rodents (prairie dogs) also can be important dietary components where these resources are available (Ehrlich et al. 1988). Bald eagles are opportunistic foragers. They prefer to forage in areas with



the least human disturbance (FWS 1978, McGarigal et al. 1991).

Bald eagles that have open water or alternate food sources near their nesting territories may stay for the winter; other eagles migrate southward to areas with available prey. During migration and in winter, eagles often concentrate on locally abundant food resources and tend to roost communally. Communal roosts usually are located in stands of mature old growth conifers or cottonwoods. Large, live trees in sheltered areas provide a favorable thermal environment and help minimize the energy stress encountered by wintering eagles. Communal roosting also may facilitate food finding (Steenhof 1976) and pair bonding. Freedom from human disturbance is also important in communal roost site selection (Steenhof et al. 1980, U.S. Bureau of Reclamation 1981, FWS 1986, Buehler et al. 1991). Continued human disturbance of a night roost may cause eagles to abandon an area (Hansen et al. 1981, Keister 1981). The proximity of night roosts to the other habitats required by wintering eagles, such as hunting perches and feeding sites, is important (Steenhof et al. 1980). Roosts may be several miles from feeding sites. The absence of a suitable roost may limit the use of otherwise suitable habitat.

Existing Environment. Bald eagles are relatively common winter residents and migrants in northeastern Wyoming's PRB. No suitable roosting habitat, known nest sites, or concentrated prey or carrion sources for bald eagles have been identified during baseline or annual wildlife surveys in the West Hay Creek analysis area. Historically, this species has infrequently been seen foraging in the general vicinity of Buckskin Mine. The 1999-2000 baseline wildlife surveys conducted by PRES in the analysis area and the accessible 2-mile perimeter, which included surveys for bald eagle nests and potential roost sites, identified no nests or roosts. Two bald eagles were recorded during those baseline studies, both in March 1999. PRES has conducted annual wildlife studies at the Buckskin Mine since 1984 and has prepared their raptor mitigation plans for the WDEQ/LQD permit.

Effects of the Proposed Project. ***Mining the federal coal included in the West Hay Creek LBA tract, if the tract is leased under the Proposed Action or one of the action alternatives, including the BLM's Preferred Alternative, may affect, but is not likely to adversely affect, bald eagles or their habitat.*** If the federal coal in the West Hay Creek LBA tract is leased, there would be an expansion in the area of human disturbance on the tract that could impact wintering bald eagles in the area. Freedom from disturbance is important in forage, nest, and roost site selection. Disturbance to nesting eagles can cause nest failure, nest abandonment, and unsuccessful fledging of young. There have been and currently are no known nest sites on the West Hay Creek LBA tract or within the anticipated mine permit area under the Proposed Action or action alternatives. No suitable roosting habitat or concentrated prey or carrion sources for bald eagles are present on the West Hay Creek LBA tract analysis area under the Proposed Action or action alternatives, including the Preferred Alternative. Bald eagle foraging habitat would be lost during mining and before reclamation. The loss of any potential prey habitat would be short-term. Foraging habitat lost during mining would be replaced during reclamation. Eagles may alter foraging patterns as they avoid active

mining areas. The potential for bald eagles to collide with or be electrocuted by electric power lines on the mine site would be minimal due to use of properly designed power lines to avoid electrocution of raptors, which is required by the Wyoming Coal Mining Rules and Regulations. Use of the roads accessing the Buckskin Mine by mine-related traffic would continue when the West Hay Creek tract is mined, which may result in vehicular collisions and roadside carcasses for up to six additional years. The presence of roadside carcasses can result in bald eagle foraging along roads, which creates the potential for road kills of foraging bald eagles to occur. The applicant has not projected an increase in employees if the West Hay Creek tract is leased and therefore an increase in the volume or frequency of traffic on roads accessing Buckskin Mine is not anticipated.

Cumulative Effects. Mineral development, including coal bed methane (CBM) development, conventional oil and gas development, and surface coal mining, is a leading cause of habitat loss within the PRB. CBM development has occurred and is proposed in the analysis area. Surface coal mining has been ongoing in the area for more than 25 years. In the *Final Biological and Conference Opinion for the Powder River Basin Oil and Gas Project*, the FWS states that they believe that "as a direct result of the construction of approximately 7,136 miles of new improved roads and 5,311 miles of overhead distribution lines, there will be direct loss of bald eagles" in the PRB (FWS 2002a).

### **Ute ladies'-tresses (*Spiranthes dilavialis*)**

Biology and Habitat Requirements. Ute ladies'-tresses was listed as threatened on January 17, 1992 due to a variety of factors, including habitat loss and modification, and hydrological modifications of existing and potential habitat areas. At the time of listing, Ute ladies'-tresses was only known from Colorado, Utah, and extreme eastern Nevada. It was next discovered in Idaho in September 1996. It is currently known from western Nebraska, southeastern Wyoming, north-central Colorado, northeastern and southern Utah, east-central Idaho, southwestern Montana, and central Washington.

Ute ladies'-tresses is a perennial herb with erect, glandular-pubescent stems 12 to 50 centimeters tall arising from tuberous-thickened roots. This species flowers from late July to September. Plants probably do not flower every year and may remain dormant below ground during drought years. The total known population of this species is approximately 25,000 to 30,000 individuals. Occurrences range in size from one plant to a few hundred individuals.

Ute ladies'-tresses occurs primarily on moist, subirrigated or seasonally flooded soils in valley bottoms, gravel bars, old oxbows, or floodplains bordering springs, lakes, rivers, or perennial streams at elevations between 1,780 and 6,800 feet (ft) in elevation (Fertig and Beauvais 1999). Suitable soils vary from sandy or coarse cobbly alluvium to calcareous, histic or fine-textured clays and loams. Populations have been documented from alkaline sedge meadows, riverine floodplains, flooded alkaline meadows adjacent to ponderosa pine, Douglas-fir woodlands, sagebrush steppe, and streamside

floodplains. Some occurrences are also found on agricultural lands managed for winter or early season grazing or hay production. Known sites often have low vegetative cover and may be subjected to periodic disturbances such as flooding or grazing. Populations are often dynamic and "move" within a watershed as disturbances create new habitat or succession eliminates old habitat (Fertig and Beauvais 1999).

The orchid is well adapted to disturbances from stream movement and is tolerant of other disturbances (grazing) that are common to grassland riparian habitats (FWS 1995). Ute ladies'-tresses colonize early successional riparian habitats such as point bars, sand bars, and low-lying gravelly, sandy, or cobbly edges, persisting in those areas where the hydrology provides continual dampness in the root zone through the growing season. The orchid establishes in heavily disturbed sites, such as revegetated gravel pits, heavily grazed riparian edges, and along well-traveled foot trails on old berms (FWS 1995). The species occurs primarily in areas where the vegetation is relatively open and not overly dense, overgrown, or overgrazed. Ute ladies'-tresses orchid is commonly associated with horsetail, milkweed, verbena, blue-eyed grass, reedgrass, goldenrod, and arrowgrass.

This species is known from four occurrences in Wyoming, within Converse, Goshen, Laramie, and Niobrara counties, all discovered between 1993 and 1997 (Fertig and Beauvais 1999). One of these occurrences is recorded from northwestern Converse County, within the Antelope Creek watershed.

Existing Environment. Potential habitat for Ute ladies'-tresses orchid was surveyed within the Hay Creek amendment baseline study area, which includes the West Hay Creek LBA tract, by Habitat Management, Inc. in 1999. The surveys were managed and conducted by Habitat Management, Inc. personnel who are recognized as being qualified to conduct Ute ladies'-tresses surveys by the FWS Colorado Field Services Office. Habitat Management, Inc. met with FWS personnel in Cheyenne, Wyoming on August 30, 1999, to discuss acceptable survey methods and practices. A total of 17.52 acres of jurisdictional wetlands were identified in the West Hay Creek LBA tract. All wetland areas and nonjurisdictional waters of the US were included in the survey area. All wet meadow wetland and lowland prairie vegetation community types were surveyed. Pedestrian surveys were completed from July 25 through August 4, 1999 and August 31 through September 3, 1999. No Ute ladies'-tresses were observed during this survey, and none have been identified during surveys for other mines in this area.

Effects of the Proposed Project. ***Mining the federal coal included in the West Hay Creek LBA tract, if the tract is leased under the Proposed Action or the action alternatives, may affect, but is not likely to adversely affect, Ute ladies'-tresses.***

Typical suitable habitat for this species is rare in the LBA tract analysis area. No individuals were located during surveys of potentially suitable habitat on the tract during blooming season in 1999. Ute ladies'-tresses individuals have not been found during surveys conducted for other surface coal mines in this area or other surveys in this area of Wyoming. Because of this plant's ability to persist below ground or above ground without flowering, single season surveys that meet the current FWS survey guidelines

may not detect populations. If undetected populations are present, they could be lost to surface-disturbing activities.

Cumulative Effects. Alterations of stream morphology and hydrology are believed to have destroyed Ute ladies'-tresses from most of its historical range (FWS 2002b). Disturbance and reclamation of streams by surface coal mining may alter stream morphology and hydrology. Water produced by CBM development and discharged on the surface may also alter stream morphology and hydrology. Jurisdictional wetlands located within the West Hay Creek LBA tract that are destroyed by mining operations would be replaced in accordance with the requirements of section 404 of the Clean Water Act, as determined by the Corps of Engineers (COE). The replaced wetlands may not duplicate the exact function and landscape features of the pre-mine wetlands. COE considers the type and function of each jurisdictional wetland that will be impacted and determines the ratio of restored wetlands to disturbed wetlands. If the COE determines that the restored wetlands will not completely replace the type and function of the original wetlands, they may require restoration of additional acres. WDEQ/LQD allows and sometimes requires mitigation of nonjurisdictional wetlands affected by mining, depending on the values associated with the wetland features.

### Endangered Species

#### **Black-footed Ferret (*Mustela nigripes*)**

Biology and Habitat Requirements. The black-footed ferret is a federally-listed endangered species. The black-footed ferret historically occurred throughout Texas, Oklahoma, New Mexico, Arizona, Utah, Kansas, North and South Dakota, Montana, Wyoming, Nebraska, and Colorado. The black-footed ferret, a nocturnally active mammal, is closely associated with prairie dogs, depending almost entirely on the prairie dog for its survival. The decline in ferret populations has been attributed to the reduction in the extensive prairie dog colonies that historically existed in the western US. Ferrets may occur within colonies of white-tailed or black-tailed prairie dogs. The FWS has determined that, at a minimum, potential habitat for the black-footed ferret must include a single white-tailed prairie dog colony greater than 200 acres, or a complex of smaller colonies within a 4.3 mile (7 km) radius circle totaling 200 acres (FWS 1989). Minimum colony size for black-tailed prairie dog is 80 acres (FWS 1989). The last known wild population of black-footed ferrets was discovered in Meeteetse, Wyoming. Individuals from this population were captured and raised in protective captive breeding facilities in an effort to prevent the species' extinction (Clark and Stromberg 1987).

Recent survey efforts in the Shirley Basin have identified a population at this former re-introduction site. This is the only known population in Wyoming. There are no prairie dog towns located within the LBA tract.

Existing Environment. The West Hay Creek LBA tract is within the historical range of the black-footed ferret, although no black-footed ferrets are presently known to occur

within northeastern Wyoming. Surveys to identify any populations of this species within the area administered by the BLM Buffalo Field Office (Campbell, Johnson, and Sheridan counties, Wyoming), including multiple years of wildlife surveys covering the Buckskin Mine and surrounding area, have been unsuccessful. This endangered species is found almost exclusively living in prairie dog colonies. The Bureau of Sport Fisheries and Wildlife estimated that there were approximately 49,000 remaining acres of black-tailed prairie dog colonies in Wyoming in 1961. Strychnine and 1080 poisoning was banned in 1972, but colonies had declined to less than the estimated 1961 levels in Wyoming in the intervening time. Increases in occupied black-tailed prairie dog habitat did occur following the ban of strychnine and 1080, but the black-tailed prairie dog population has been declining recently due to the impacts of sylvatic plague combined with loss of suitable habitat and inadequate regulatory mechanisms (FWS 2000). During the 1980s, the WGFD, in cooperation with other agencies, conducted searches for black-footed ferrets in Wyoming in the places they were most likely to be found, but these searches were not successful, according to Martin Grenier with the WGFD (Martin Grenier, personal communication, 10/14/2003). The FWS has been coordinating with the WGFD about the current and historic status of prairie dog towns throughout Wyoming and reviewing the history of black-footed ferret surveys to determine whether black-footed ferret survey guidelines should continue to be applied across the entire state. Through this process, the FWS has developed a list of blocks of habitat that are not likely to be inhabited by black-footed ferrets and for which surveys for ferrets are no longer recommended. All black-tailed prairie dog towns in Wyoming were cleared from recommendation for ferret surveys through this process (FWS 2004).

No prairie dog colonies are currently located on or within ½-half mile of the West Hay Creek LBA tract (figure G-4). No evidence of ferrets has ever been recorded by qualified biologists during general or specific surveys in the Buckskin Mine area.

Effects of the Proposed Project. ***Mining the federal coal included in the West Hay Creek LBA tract, if the tract is leased under the Proposed Action or the action alternatives, will have no effect on black-footed ferrets.*** Black-tailed prairie dog occupied habitat has declined significantly from historic estimates and the species seems to be scattered throughout its historic range in eastern Wyoming. Prior to 1972, use of strychnine and 1080 to poison black-tailed prairie dogs contributed to declines in their populations in Wyoming. Recent declines are largely attributed to sylvatic plague and are likely to continue (FWS 2000). The reductions in black-tailed prairie dog populations reduced the potential for black-footed ferret survival in northeastern Wyoming. Searches of the best remaining black-footed ferret habitat in Wyoming during the 1980s were unsuccessful in finding any ferrets. Baseline wildlife surveys and annual wildlife surveys conducted for over 25 years by mines in the area have also been unsuccessful in finding any black-footed ferrets or signs of black-footed ferrets.

Cumulative Effects. Mineral development within black-tailed prairie dog colonies is a leading cause of ferret habitat loss in the PRB. Surface coal mining tends to have more intense impacts on fairly localized areas, while oil and gas development tends to be less intensive but spread over larger areas. Oil and gas development and mining activities

have requirements for reclamation of disturbed areas as the resources are depleted. The vegetation cover in reclaimed areas may differ from undisturbed areas. Surface coal mines re-establish species in the reclamation seed mixtures in their approved WDEQ/LQD permit. The majority of the approved species are native to the area; however reclaimed areas may serve different ecosystem functions than those served by the undisturbed vegetation communities and habitats. Natural shifts in habitat composition or distribution over the long term could also increase or decrease potential habitat for prairie dogs in reclaimed areas.

Potential black-footed ferret habitat is also affected by other impacts to prairie dog populations. Plague can infect and eliminate entire prairie dog colonies (see black-tailed prairie dog discussion presented below). Poisoning and recreational shooting may locally reduce prairie dog populations, but seldom completely eliminate colonies.

### **Candidate Species**

#### **Black-tailed Prairie Dog (*Cynomys ludovicianus*)**

Biology and Habitat Requirements. The black-tailed prairie dog was added to the list of candidate species for federal listing on February 4, 2000 (FWS 2000). At that time, the FWS concluded that listing the black-tailed prairie dog was warranted but precluded by other higher priority actions to amend the lists of T&E species. No specific date for proposal for listing was given, but the FWS committed to reviewing the status of the species one year after publication of the above-mentioned notice (FWS 2000). In June 2002, FWS found that the listing proposal for the black-tailed prairie dog was still warranted but precluded (FWS 2002c). As of May 2004, FWS had not updated the finding with respect to the black-tailed prairie dog (FWS 2004a)

The black-tailed prairie dog is a highly social, diurnally active, burrowing mammal. Aggregations of individual burrows, known as colonies, form the basic unit of prairie dog populations. Found throughout the Great Plains in shortgrass and mixed-grass prairie areas (Fitzgerald et al. 1994), the black-tailed prairie dog has declined in population numbers and extent of colonies in recent years. The three major impacts that have influenced black-tailed prairie dog populations are the initial conversion of prairie grasslands to croplands in the eastern portion of its range from approximately the 1880s to the 1920s; large-scale control efforts conducted from approximately 1918 through 1972, when an executive order was issued banning the use of compound 1080; and the introduction of sylvatic plague into North American ecosystems in 1908 (FWS 2000). In Wyoming, this species is primarily found in isolated populations in the eastern half of the state (Clark and Stromberg 1987). In 2000, the FWS estimated that about 125,000 acres of black-tailed prairie dog occupied habitat exists in Wyoming (FWS 2000). Many other wildlife species, such as the black-footed ferret, swift fox, mountain plover, ferruginous hawk, and burrowing owl are dependent on the black-tailed prairie dog for some portion of their life cycle (FWS 2000).

The species is considered a common resident, using shortgrass and mid-grass habitats

in eastern Wyoming (Luce et al. 1999).

Existing Environment. Recent wildlife surveys indicate that no prairie dog colonies are present within the West Hay Creek LBA tract analysis area (Triton 2000). There is one prairie dog colony located approximately 1 mile northeast of the tract (figure G-4).

Effects of the Proposed Project. ***Mining the federal coal included in the West Hay Creek LBA tract, if the tract is leased under the Proposed Action or one of the action alternatives, will not affect the continued existence of prairie dogs.*** No prairie dog towns are currently located on the tract. Habitat where prairie dogs could establish towns would be lost during mining but would be replaced as reclamation occurs on already mined areas.

## SUMMARY OF DETERMINATIONS

Table G-1 summarizes the determinations for federally listed threatened, endangered, proposed, and candidate species in the area of the West Hay Creek LBA tract that may result from implementing the Proposed Action or action alternatives.

**TABLE G-1  
EVALUATION OF EFFECTS ON FEDERAL THREATENED, ENDANGERED,  
PROPOSED, AND CANDIDATE SPECIES IN THE AREA OF THE WEST HAY  
CREEK LBA TRACT**

Status	Name	Potential Effect
Threatened	Bald eagle ( <i>Haliaeetus leucocephalus</i> )	May affect <sup>1</sup>
	Ute ladies' - tresses ( <i>Spiranthes diluvialis</i> )	May effect <sup>1</sup>
Endangered	Black-footed ferret ( <i>Mustela nigripes</i> )	No effect
Candidate	Black-tailed prairie dog ( <i>Cynomys ludovicianus</i> )	No effect

<sup>1</sup> Not likely to adversely affect individuals or populations.

## REGULATORY REQUIREMENTS AND MITIGATION

The issuance of a federal coal lease grants the lessee the exclusive right to mine the coal, subject to the terms and conditions of the lease. Lease ownership is necessary for mining federal coal, but lease ownership does not authorize mining operations. Surface coal mining operations are regulated in accordance with the requirements of Wyoming

State regulations. The SMCRA gives the Office of Surface Mining Reclamation and Enforcement (OSM) primary responsibility to administer programs that regulate surface coal mining operations and the surface effects of underground coal mining operations. Pursuant to section 503 of SMCRA, the WDEQ developed, and in November 1980 the Secretary of the Interior approved, a permanent program authorizing WDEQ to regulate surface coal mining operations and surface effects of underground mining on nonfederal lands within Wyoming. In January 1987, pursuant to section 523(c) of SMCRA, WDEQ entered into a cooperative agreement with the Secretary of the Interior authorizing WDEQ to regulate surface coal mining operations and surface effects of underground mining on federal lands within the state. In order to get approval of this cooperative agreement, the state had to demonstrate that the state laws and regulations are no less effective than, meet the minimum requirements of, and include all applicable provisions of SMCRA.

If the West Hay Creek LBA tract is leased under the Proposed Action or action alternatives, it would be a maintenance lease for the existing Buckskin Mine, which currently has both an approved Mineral Leasing Act of 1920 (MLA) mining plan and an approved state mining and reclamation permit. In the case of maintenance leases, the existing MLA mining plan and state mining and reclamation plan must be amended to include the newly leased areas before they can be mined. The LBA tract is located within the permit area for the existing approved Buckskin Mine MLA mining plan and state mining and reclamation plan, but those plans would have to be amended to include mining the coal in the newly leased area before coal removal could occur. In order to amend the existing MLA mining plan and state mining and reclamation permit, the company would be required to submit a detailed permit application package to WDEQ and OSM before starting surface coal mining operations on the newly acquired leases. WDEQ/LQD would review the permit application package to insure that the permit application complies with the permitting requirements, and that the coal mining operation will meet the performance standards of the approved Wyoming program. If the permit application package does comply, WDEQ would issue the applicant an amended permit that would allow the permittee to extend coal mining operations onto the newly acquired leases. OSM, BLM, and other federal agencies review the permit application package to ensure it complies with the terms of the coal lease, the MLA, NEPA, and other federal laws and regulations. OSM would recommend approval, approval with conditions, or disapproval of the MLA mining plan to the Assistant Secretary of the Interior, Land and Minerals Management.

Protection of fish, wildlife, and related environmental values is required under the Wyoming Coal Mining Rules and Regulations, Chapter 4, Section (2)(r)(iii) which state:

“No surface mining activity shall be conducted which is likely to jeopardize the continued existence of endangered or threatened species listed by the State or the Secretary of the Interior or which will result in the destruction or adverse modification of designated critical habitats of such species in violation of the Endangered Species Act (16 U.S.C. 1531 et seq.). No surface mining activity shall be conducted in a manner which would result in the unlawful taking of a



bald or golden eagle, its nest, or any of its eggs. The Administrator shall consult with the State and Federal Fish and Wildlife Agencies to identify whether and under what conditions the operation may continue under this provision.”

In addition to requiring the operator to minimize disturbances and adverse impacts on fish, wildlife, and related environmental values and prohibiting any surface mining activity which is likely to jeopardize the continued existence of endangered or threatened species, the regulations require that the operator use the best technology currently available to minimize electrocution hazards to raptors; locate and operate haul and access roads to avoid or minimize impacts on important fish and wildlife species; and design fences, conveyors, and other potential barriers to permit passage of large mammals. Both the state and federal regulations require Section 7 consultation prior to approval of a mining and reclamation plan and a MLA mining plan. Additional mitigation measures to ensure compliance with the ESA can be developed when the detailed mining plan, which identifies the actual location of the disturbance areas, how and when they would be disturbed, and how they would be reclaimed, is developed and reviewed for approval. At the leasing stage, a detailed mining and reclamation plan is not available for evaluation or development of appropriate mitigation measures.

The following is a partial list of measures that the state of Wyoming has required as part of existing mining and reclamation permits in accordance with the state regulatory requirements and which are:

- avoiding bald eagle disturbance;
- restoring bald eagle foraging areas disturbed by mining;
- using raptor safe power lines;
- surveying for Ute ladies'-tresses if habitat is present;
- surveying for black-footed ferrets in prairie dogs towns potentially affected by mining.

## **CUMULATIVE IMPACTS**

If the West Hay Creek LBA tract is leased as proposed and Triton acquires and mines the coal in the West Hay Creek tract, the mining operations could contribute to cumulative effects to T&E plant and wildlife species in the PRB. Existing habitat-disturbing activities in the PRB in Wyoming and Montana include surface coal mining; conventional oil and gas and CBM development; uranium mining; sand, gravel, and scoria mining; ranching; agriculture; road, railroad, and power plant construction and operation; recreational activities; and rural and urban housing development. Mining and construction activities, agriculture, and urban development tend to have more intense impacts on fairly localized areas, while ranching, recreational activities, and oil and gas development tend to be less intensive but spread over larger areas. Oil and gas development and mining activities have requirements for reclamation of disturbed areas as resources are depleted. The net area of energy disturbance in the Wyoming PRB has been increasing. In the short term, this means a reduction in the available habitat for threatened, endangered, proposed, and candidate plant and wildlife species. In the long term, habitat is being and will continue to be restored as reclamation proceeds.

Oil and gas exploration and production have been ongoing in the PRB for more than 100 years. Conventional (non CBM) oil and gas fields are, for the most part, concentrated in the central and southern parts of the structural basin. Development of the CBM resources from the coal beds is a more recent occurrence, with CBM production in the Wyoming PRB starting in the late 1980s. According to the Wyoming Oil and Gas Conservation Commission, there were approximately 15,040 oil and gas wells producing in the Wyoming PRB as of October 2003. Most (approximately 12,530) of those wells are CBM wells, the remainder (approximately 2,510) are conventional oil or gas wells (Wyoming Oil and Gas Conservation Commission 2003). Additional wells have been drilled in the basin but have been abandoned or are not yet producing. BLM recently completed an environmental impact statement analyzing projected CBM and conventional oil and gas development in the Wyoming PRB over the next 10 years. The *Final Environmental Impact Statement and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project* (BLM 2003) analyzed the potential impacts of constructing and operating about 39,400 new CBM wells and 3,200 new conventional wells and associated facilities, starting in 2002 and continuing for 10 years. The project area for this analysis encompasses approximately eight million acres, and includes all or portions of Campbell, Converse, Sheridan, and Johnson counties in northeastern Wyoming. Total projected short-term and long-term disturbance associated with the development under the Preferred Alternative was estimated at 211,643 acres and 102,658 acres respectively. As stated previously, in the *Final Biological and Conference Opinion for the Powder River Basin Oil and Gas Project*, the FWS states that they believe that “as a direct result of the construction of approximately 7,136 miles of new improved roads and 5,311 miles of overhead distribution lines, there will be direct loss of bald eagles” in the PRB (FWS 2002a).

BLM estimates that the existing federal coal leases in the Wyoming PRB include approximately 103,615 acres. The currently pending federal coal LBA tracts (including the West Hay Creek LBA tract) include approximately 18,650 acres. The majority of the coal in the areas permitted for surface coal mining is federal, but some state and private leases are included within some of the existing mine permit areas. All of the existing federal coal leases are concentrated near the outcrop of the Wyodak coal bed, which is located along the eastern edge of the CBM project area discussed above. These active coal operations along the Wyodak outcrop had disturbed approximately 62,200 acres as of 2001. Approximately 16,100 of those acres of disturbance are occupied by “permanent” mine facilities such as roads, buildings, and coal handling facilities, which are not available for reclamation. Of the remaining 46,100 acres which represent areas of disturbance available for reclamation, approximately 24,300 acres had been reclaimed. This information is compiled from BLM lease and WDEQ/LQD mining and reclamation permit databases.

There are an estimated 9,500 additional acres of disturbance occupied by facilities indirectly associated with surface coal mining (railroad main line and electrical transmission line).

In addition to the ongoing coal leasing and mining and oil and gas development, there are other projects that are in progress or have been proposed. These projects include the Wygen II coal-fired power plant proposed near the Wyodak Mine, the Two Elk coal-fired power plant proposed near the Black Thunder Mine, and the proposed DM&E railroad line. Other power plants have been proposed in this area but have not progressed beyond very preliminary stages. Most of these proposed projects would be constructed within or adjacent to areas of current disturbance. The proposed DM&E railroad line would represent a new corridor of disturbance across the eastern PRB if it is approved and constructed.

The total acreage directly affected by surface coal mining and oil and gas development would not be disturbed simultaneously. Some of the disturbed acreage would be reclaimed or be in the process of being reclaimed as new disturbances are initiated in other areas.

There would also be cumulative effects to T&E plant and wildlife resources as a result of indirect impacts. One factor is the potential import and spread of noxious weeds around roads and facilities. Noxious weeds have the ability to displace native vegetation and hinder reclamation efforts. Control of noxious weeds is addressed in surface coal mining and reclamation plans. If weed mitigation and preventative procedures are applied to all construction and reclamation practices, the impact of noxious weeds on T&E plants and wildlife would be minimized.

In reclaimed areas, vegetation cover often differs from undisturbed areas. In the case of surface coal mines, re-established vegetation would be dominated by species mandated in the reclamation seed mixtures (approved by WDEQ). The majority of the species in the approved reclamation seed mixtures are native to the area; however, reclaimed areas may not serve ecosystem functions presently served by undisturbed vegetation communities and habitats. In the short-term in particular, species composition, shrub cover, and other environmental factors are likely to differ from pre-disturbance vegetation communities and habitats. Establishment of noxious weeds and alteration of vegetation in reclaimed areas has the potential to alter T&E plant and wildlife habitat composition and distribution.

Potential adverse effects to listed and proposed species that have occurred and would continue to occur as a result of existing and potential future activities in the PRB would include direct loss of habitat, indirect loss of habitat due to human and equipment disturbance, habitat fragmentation, displacement of bald eagle prey species and the resultant change in bald eagle foraging, and mortality caused by equipment activities, motor vehicle collisions, power line collisions, and power line electrocution. The existing mines have developed mitigation procedures, as required by SMCRA (30 CFR 816.97) and Wyoming state regulations, to protect T&E species. These procedural requirements would be extended to include mining operations on the LBA tracts, if they are leased as proposed and after required detailed plans to mine the coal and reclaim the mined-out areas are developed and approved.

## **BLM SENSITIVE SPECIES EVALUATION**

### **Introduction**

Wyoming BLM has prepared a list of sensitive species to focus species management efforts towards maintaining habitats under a multiple use mandate. The authority for this policy and guidance comes from the ESA of 1973, as amended; Title II of the Sikes Act, as amended; the Federal Land Policy and Management Act (FLPMA) of 1976; and the Department Manual 235.1.1A., General Program Delegation, Director, BLM.

The goals of the sensitive species policy are to:

- Maintain vulnerable species and habitat components in functional BLM ecosystems.
- Ensure sensitive species are considered in land management decisions.
- Prevent a need for species listing under the ESA.
- Prioritize needed conservation work with an emphasis on habitat.

### **Species Occurrence and Habitat Description**

Sensitive species were listed for the BLM Buffalo Field Office within its range. Sensitive species do or could occur on or in the area of the West Hay Creek LBA tract. Specialized habitat requirements (caves, cliffs, calcareous rock outcrops) make occupation for other sensitive species unlikely. Table G-2 lists BLM sensitive species and summarizes their habitat requirements. Please refer to the wildlife sections of Chapters 3 and 4 for additional discussion about the occurrence of and potential impacts to upland game birds, including sage grouse, raptors and Migratory Birds of Management Concern in the area of the West Hay Creek LBA Tract. Potential impacts to mountain plover are discussed below.

### **Mountain Plover (*Charadrius montanus*)**

The FWS published a proposed rule to list the mountain plover as threatened in 1999 (FWS 1999). As discussed previously, on September 9, 2003, FWS published a withdrawal of the proposed rule to list the mountain plover as threatened (FWS 2003). When the listing petition was withdrawn, the status of the mountain plover changed from a proposed threatened species under the ESA to a BLM sensitive species. Although the FWS will no longer be reviewing project impacts to the mountain plover under the ESA they have advised BLM that they encourage provisions that would provide protection for this species, as it continues to be protected under the Migratory Bird Treaty Act. The following information about mountain plover habitat and occurrence in the West Hay Creek LBA tract analysis area is based on the baseline and annual wildlife surveys that have been conducted for the Buckskin Mine.

Biology and Habitat Requirements. The mountain plover is a migratory species of the shortgrass prairie and shrub-steppe eco-regions of the arid West. This species uses

TABLE G-2  
SENSITIVE SPECIES LIST - BUFFALO FIELD OFFICE

Common Name (scientific name)	Habitat and Occurrence in West Hay Creek Analysis Area	Presence <sup>1</sup>	Project Effects <sup>2</sup>	Rationale
<b>Amphibians</b>				
Northern leopard frog ( <i>Rana pipiens</i> )	Beaver ponds, permanent water in plains and foothills	S	MIIH	Stock reservoirs & natural pools will be impacted.
Spotted frog ( <i>Rana pretiosa</i> )	Ponds, sloughs, small streams.	NP	NI	Prairie habitat not mountain.
<b>Birds</b>				
Baird's sparrow ( <i>Ammodramus bairdii</i> )	Grasslands, weedy fields. Occurrence not recorded	S	MIIH	Sagebrush cover will be affected.
Brewer's sparrow ( <i>Spizella breweri</i> )	Basin-prairie shrub. Regular breeder.	K	MIIH	Sagebrush cover will be affected.
Burrowing owl ( <i>Athene cucularia</i> )	Grasslands, basin-prairie shrub. Infrequent breeder.	K	MIIH	Grassland and shrubland habitats will be affected.
Ferruginous hawk ( <i>Buteo regalis</i> )	Basin-prairie shrub, grasslands, rock outcrops. Historical breeder.	K	MIIH	Grassland and shrubland habitats will be affected.
Greater sage-grouse ( <i>Centrocercus urophasianus</i> )	Basin-prairie shrub, mountain-foothill shrub. Occasional breeder.	K	MIIH	Sagebrush cover will be affected.
Loggerhead shrike ( <i>Lanius ludovicianus</i> )	Basin-prairie shrub, mountain-foothill shrub. Infrequently observed.	K	MIIH	Sagebrush cover will be affected.
Long-billed curlew ( <i>Numenius americanus</i> )	Grasslands, plains, foothills, wet meadows. Infrequent spring migrant.	NP	NI	Grassland & wet meadow habitats will be affected.
Northern goshawk ( <i>Accipiter gentilis</i> )	Conifer and deciduous forests.	NP	NI	Forest habitat limited to cottonwood shelterbelt.
Peregrine falcon ( <i>Falco peregrinus</i> )	Cliffs. Never recorded	NP	NI	No nesting habitat.
Sage sparrow ( <i>Amphispiza billineata</i> )	Basin-prairie shrub, mountain-foothill shrub. Never recorded	S	MIIH	Sagebrush cover will be affected.
Sage thrasher ( <i>Oreoscoptes montanus</i> )	Basin-prairie shrub, mountain-foothill shrub. Rarely observed.	K	MIIH	Sagebrush cover will be affected.
Trumpeter swan ( <i>Cygnus buccinator</i> )	Lakes, ponds, rivers	NP	NI	Suitable habitat not present.
White-faced ibis ( <i>Plegadis chihi</i> )	Marshes, wet meadows	NP	NI	Permanently wet meadows not present.
Yellow-billed cuckoo ( <i>Coccyzus americanus</i> )	Open woodlands, streamside willow and alder groves. Never recorded	NP	NI	Shrub or forest riparian habitats not present.
<b>Fish</b>				
Yellowstone cutthroat trout ( <i>Oncorhynchus clarki bouvieri</i> )	Mountain streams and rivers in Yellowstone River drainage	NP	NI	Outside species range.

Common Name (scientific name)	Habitat and Occurrence in West Hay Creek Analysis Area	Presence <sup>1</sup>	Project Effects <sup>2</sup>	Rationale
<b>Mammals</b>				
Dwarf Shrew (Sorex nanus)	Mountain foothill shrub, grasslands	S	MIIH	Sagebrush cover will be affected.
Fringed myotis (Myotis thysanodes)	Conifer forests, woodland chaparral, caves and mines	NP	NI	Habitat not present.
Long-eared myotis (Myotis evotis)	Conifer and deciduous forest, caves and mines	NS	NI	Limited cottonwood habitat.
Spotted bat (Euderma maculatum)	Cliffs over perennial water, basin-prairie shrub	NP	NI	Habitat not present
Swift fox (Vulpes velox)	Grasslands	S	MIIH	Grassland habitat will be affected.
Townsend's big-eared bat (Corynorhinus townsendii)	Forests, basin-prairie shrub, caves and mines	NS	NI	Limited cottonwood habitat.
<b>Plants</b>				
Cary beardtongue (Penstemon caryi)	Calcareous rock outcrops and rocky soil in sage, juniper, Douglas fir and limber pine communities, 5200-8500 ft.	NP	NI	Habitat not present.
Porter's sagebrush (Artemisia porteri)	Sparsely vegetated badlands of ashy or tuffaceous mudstone and clay slopes 5300-6500 ft.	NP	NI	Habitat not present.
William's wafer parship (Cymopterus williamsii)	Open ridgetops and upper slopes with exposed limestone outcrops or rockslides, 6000-8300 ft.	NP	NI	Habitat not present.

#### Notes

#### <sup>1</sup>Presence

- K** Known, documented observation within project area.
- S** Habitat suitable and species suspected, to occur within the project area.
- NS** Habitat suitable but species is not suspected to occur within the project area.
- NP** Habitat not present and species unlikely to occur within the project area.

#### <sup>2</sup>Project Effects

- NI** No impact.
- MIIH** May impact individuals or habitat but will not likely contribute to a trend towards federal listing or a loss of viability to the population or species.
- WIFV\*** Will impact individuals or habitat with a consequence that the action may contribute to a trend towards federal listing or cause a loss of viability to the population or species (trigger for a significant action as defined in NEPA).
- BI** Beneficial impact.

high, dry, shortgrass prairie with vegetation typically shorter than four inches tall. Within this habitat, areas of blue grama (*Bouteloua gracilis*) and buffalograss (*Buchloe dactyloides*) are most often used, as well as areas of mixed-grass associations dominated by needle-and-thread (*Stipa comata*) and blue grama (Dinsmore 1983).

Mountain plovers often use black-tailed prairie dog towns for breeding, nesting, and feeding. Not all prairie dog towns offer suitable habitat for mountain plover, mostly due to topographic incompatibility. There are habitats other than prairie dog towns that provide nesting, feeding, and breeding habitat for mountain plover.

The nest of the mountain plover consists of a small scrape on flat ground in open areas. Most nests are placed on slopes of less than five degrees in areas where vegetation is less than three inches tall in April. More than half of identified nests occurred within 12 inches of old cow manure piles and almost 20% were found against old manure piles in similar habitats in Colorado. Nests in similar habitats in Montana (Dinsmore 1983) and other areas (Ehrlich et al. 1988) were nearly always associated with the heavily grazed shortgrass vegetation of prairie dog colonies.

Mountain plovers arrive on their breeding grounds in late March with egg-laying beginning in late April. Breeding plovers show close site fidelity, often returning to the same territory in subsequent years. Clutches are hatched by late June, and chicks fledge by late July. The fall migration begins in late August. Most birds are gone from the breeding grounds by late September.

Existing Environment. The BLM Buffalo Field Office contracted two mountain plover nesting surveys in 2001 (Good et al. 2002, Keinath and Ehle 2001). Both contracted surveys conclude mountain plover habitat within the PRB may be sparse and fragmented (Good et al. 2002, Keinath and Ehle 2001). Much of the PRB is dominated by rolling sagebrush. Good et al. (2002) believe that bare ground and vegetation height are the limiting habitat components in the basin's prairie communities; the areas they detected mountain plovers within the PRB appeared to receive less precipitation and have greater amounts of short grass prairie than the rest of the basin. However, both surveys caution more suitable mountain plover habitat exists than they were able to survey, as they were limited to public roads (Good et al. 2002, Keinath and Ehle 2001). Mountain plover preferred habitat consists of level, open, and exceedingly grazed sites (Knopf 1996) that are generally lacking in the West Hay Creek LBA analysis area. Vegetation on and within ½-mile of the LBA area is too tall and dense to be considered suitable habitat (Triton 2002). Prairie dog towns can provide habitat for the mountain plover; however, no colonies exist within the West Hay Creek LBA area. No mountain plovers have ever been observed during annual wildlife surveys for all migratory birds of high federal interest/migratory bird species of management concern. Qualified biologists watch for all listed species and habitats that could support them while conducting all wildlife species surveys.

Effects of the Proposed Project. Mountain plover have not been observed in the vicinity of the LBA tract during wildlife surveys conducted for the Buckskin Mine that began in 1977. Typical suitable habitat for this species is not currently located on the tract. Therefore, mining the federal coal included in the West Hay Creek LBA tract will not impact mountain plover individuals or the species

Cumulative Effects. Mineral development is likely to have both beneficial and detrimental effects on mountain plover. Mining activities tend to have more intense impacts on fairly localized areas. Oil and gas development tends to be less intensive but spread over larger areas. Surface disturbance within suitable habitat will likely result in short-term habitat loss in areas to be reclaimed, and permanent or long-term loss where roads and permanent or long-term facilities are located. Power poles, conveyors, and other structures are likely to provide perch sites and hiding cover for mountain plover predators. Vehicle traffic may occasionally run over mountain plovers or their nests. Mineral development may benefit plovers where surface disturbance provides bare ground and reduces shrub cover (Dechant et al. 2001).

Oil and gas development and mining activities have requirements for reclamation of disturbed areas as resources are depleted. In reclaimed areas, vegetation cover often differs from disturbed areas. For surface coal mines, re-established vegetation would be dominated by species mandated in the reclamation seed mixtures approved by WDEQ/LQD. The majority of the approved plant species are native to the area; however, reclaimed areas may not serve ecosystem functions presently served by undisturbed vegetation communities and habitats, particularly in the short term, when species composition, shrub cover and other environmental factors are likely to be different. Shifts in habitat composition or distribution following reclamation could increase or decrease potential habitat for prairie dogs in this area, which could lead to an increase or decrease in potential habitat for mountain plovers.



## **CREDENTIALS OF SURVEY PERSONNEL**

### **Thunderbird Wildlife Consulting, Inc. of Gillette, Wyoming**

#### **Gwyn McKee**

Ms. McKee obtained a Master of Science degree in Wildlife Ecology from the University of Missouri-Columbia. She has accumulated more than 16 years of professional experience, with the last nine in Wyoming. Ms. McKee has skills that include planning and conducting surveys for a variety of terrestrial and aquatic species, summarizing data, and preparing technical reports for private, state, and federal agencies. Ms. McKee is considered qualified by all state and federal agencies to conduct T&E and other wildlife surveys within the region. Those qualifications include surveys for mountain plovers and their habitat, and certification by the FWS to conduct black-footed ferret surveys.

#### **Kort M. Clayton**

Mr. Clayton earned a Masters of Science degree in Biology from the University of Saskatchewan. He has been professionally involved with wildlife issues in the Northern Great Plains for over 10 years. Since 1998, Mr. Clayton has focused on wildlife inventories, clearances, impact analysis, mitigation, and applied research related to energy developments in the PRB of Wyoming and Montana. Those experiences include surveys for most vertebrate taxa in the region, sage grouse research, raptor mitigation projects, and clearance surveys for several federally listed species.

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State Office.

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# APPENDIX H

## COMMENT LETTERS ON THE DRAFT WEST HAY CREEK EIS AND RESPONSES TO THOSE LETTERS

Comment on Draft EIS West Hay Creek - W2 W151631

Major concern is the impact of the proposed project on the riparian habitat. The project area is located in the riparian habitat of the West Hay Creek. The project area is located in the riparian habitat of the West Hay Creek. The project area is located in the riparian habitat of the West Hay Creek.

The project area is located in the riparian habitat of the West Hay Creek. The project area is located in the riparian habitat of the West Hay Creek. The project area is located in the riparian habitat of the West Hay Creek.

We are concerned about the impact of the proposed project on the riparian habitat. The project area is located in the riparian habitat of the West Hay Creek. The project area is located in the riparian habitat of the West Hay Creek.

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Michael R. Olson  
President

# Majestic

Petroleum Operations, LLC  
P.O. Box 580 Story, WY 82842  
(307)683-2755 FAX (307)683-3136

BUREAU OF LAND  
MANAGEMENT  
CASPER FIELD OFFICE

03 APR 10 AM 10:53

April 7, 2003

Bureau of Land Management  
Casper Field Office, Attn: Patricia Karbs  
2987 Prospector Drive  
Casper, WY 82604

Re: Comments on Draft EIS West Hay Creek - WYW151634

Dear Sirs:

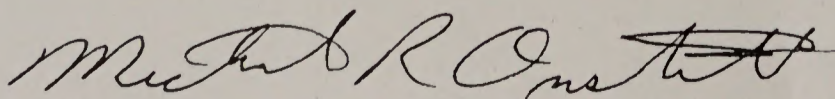
The following comments apply to Chapter 4, Geology and Minerals, specifically the CBM reserves in the LBA Tract:

Majestic Petroleum is the current Operator of 10 CBM wells located in Section 18, T52N, R72W, 5 CBM wells located in Section 19, T52N, R72W, 3 CBM wells located in Section 17, T52N, R72W and 4 CBM wells located in Section 20, T52N, R72W. Majestic strongly disagrees with the estimated reserves and economic life listed on Page 4-6 of the EIS (54,800 mcf and 2.5 years). Majestic's wells in Section 18 have already produced an average of 74,114 mcf in over 4 years with many years of economic production remaining. Our wells in Section 19 have averaged 79,141 mcf in over 5 years. The wells in Sections 17 and 20 are only 10 months old, but have already averaged over 20,000 mcf per well.

Majestic's consulting Reservoir Engineering firm has estimated an average ultimate total recovery of nearly 125,000 mcf per well for the wells located in Sections 18 and 19 with economic lives as long as 20 years, but averaging 10 years. One well is projected to recover 328,000 mcf!

We ask the BLM to review your reserve and economic life estimates in light of the above listed data. We would be willing to share our consultant's analysis with the BLM to assist in the review and will be available to discuss these issues at your convenience. Given the fact that our gas leases pre-date the coal leases in most of this area, we feel that Majestic and our mineral owners should be compensated for any lost reserves we are unable to produce due to removal of the coal. We are also concerned about the potential loss of the leases on our deeper rights due to our inability to operate during mining operations.

Sincerely,



Michael R. Onstott  
President



## Response to Majestic Petroleum Operations, LLC. Letter

The BLM Wyoming State Office's Reservoir Management Group (RMG) prepared "Review of Coalbed Methane (CBM) Geology, Production and Economics, West Hay Creek LBA Draft Environmental Impact Statement" (November 2002). The purpose of the study was to evaluate the CBM reservoir, production and reserves in the coal seam(s) that would be mined within the LBA tract. The study was based primarily on production decline analyses from existing CBM wells and generalized volumetric analysis of the CBM reservoir. Study data and methodology are described in the original report.

At the time the study was prepared many of the CBM wells in the area lacked sufficient production for decline analysis so not all wells were used. RMG prepared a model decline analysis that included CBM wells located near or adjacent to the LBA tract, and some wells located farther west in adjacent sections in T. 52 N., R. 73 W. This analysis showed estimated average reserves of 132,000 mcf for a typical well and an average six-year economic well life (based on 40-acre spacing).

As requested in the comment letter from Majestic Petroleum Operations, LLC, RMG reviewed the reserve and economic life estimates in light of the data included in that letter. The values originally reported by RMG are reasonably comparable to the estimates provided by Majestic, which also included wells located some distance from the tract and active mining. RMG believes that, due to reservoir depletion, estimates that include decline analysis from wells not adjacent to the tract will probably overestimate the reserve volumes.

RMG's reservoir analyses show that mine dewatering has resulted in a "regional" lowering of the water table in the mined seam(s) and, consequently, a decline in hydrostatic pressure within the mined seam(s) near the mines. Where the hydrostatic pressure has declined sufficiently, CBM gas has been allowed to desorb from these coals and escape from the reservoir(s). As a result, the CBM reservoirs near the active mine are probably depleted relative to the original/undisturbed reservoir encountered farther west. Additionally, a more specific decline analysis by RMG, based solely on wells located in section 18, T. 52 N., R. 72 W., yielded estimated average reserves of approximately 54,800 mcf with a 2.5 year average economic well life. RMG considers these estimates to be the most representative of reserves within the LBA tract.

Additional CBM production might have been reported between the time that RMG prepared its estimates (November 2002) and the time that Majestic prepared its comments (April 2003), which could affect decline-based reserve estimates. It is also possible that some of the production cited in Majestic's comment letter could be from lower seams that will not be subject to mining. It is not possible to evaluate these factors and the necessity for adjustments, if any, without an extensive study of current data as well as the consultant's study. Due to existing time constraints, RMG did not undertake additional studies.

The EIS discloses the environmental and socioeconomic impacts of issuing leases for the federal coal in the LBA tract, including the presence of potentially affected private and federal oil and gas leases within the LBA tract (figure 3-15 and table 3-10 in chapter 3) and the existence of ancillary facilities to support oil and gas production. It identifies that, in order for the coal to be mined, oil and gas development must be curtailed, which would affect current CBM wells as well as the timing and potentially the feasibility of developing any remaining undrilled 40-acre spacing units. Appendix D lists the stipulations that are included on coal leases in the Powder River Basin, which includes stipulations addressing multiple mineral development and oil and gas/coal resources. The EIS also discusses BLM Instruction Memorandum No. 2003-253, which addresses BLM policy on conflicts between coal and CBM development. In accordance with this memorandum, royalty incentives can be offered to CBM operators who agree to accelerate production in order to recover the natural gas while simultaneously allowing uninterrupted coal mining operations. In addition, this memorandum also states that it is the policy of the BLM to encourage oil and gas and coal companies to resolve conflicts between themselves; and when requested, the BLM will assist in facilitating agreements between the companies.

It is our understanding that Triton Coal and Majestic currently own and cojointly produce gas in the West Hay Creek area. Both have developed a working relationship that will be essential to resolve any issues of CBM gas and coal removal within the West Hay Creek area. We also understand that proposals have been made by both companies to allow resolution of any joint production issues. Triton Coal has stated that they intend to allow immediate gas production from the area and has paid for infrastructure and access to allow this production.

Dean Varney

BUREAU OF LAND  
MANAGEMENT  
CASPER FIELD OFFICE

03 APR 11 AM 10:55

From: "Dean Varney"  
To: "Patricia Karbs" <wymail@blm.gov.>  
Sent: Wednesday, April 09, 2003 5:12 PM  
Subject: Coal Lease  
April 10, 2003  
Lena H. Tharp Varney  
HC 67 Box 223  
Lusk, WY. 82225

Attn. Patricia Karbs at Casper

In response to the Draft for the West Hay Creek Coal Lease Application, I have a few comments and questions.

I own 40 acres of coal in Township 52 North - Range 72 West - 6 P.M. - Section 29 NW1/4, SE1/4. This has been leased to Triton Coal for a VERY long time.

WHY should Triton Coal be allowed to lease more coal rights when they have leases which they have not developed in earlier periods?

Can the "Powers that Be" explain to me WHY Triton is going around this acreage to lease Federal coal land from BLM? I have been unable to receive a competent answer from Triton.

Please refer this to SOMEONE who can respond.

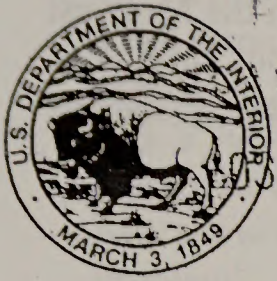
Thank you very much.

Phone: 1-307-334-2182

*Lena H. Tharp Varney*  
Mrs. Lena H. Tharp Varney

Response to Dean and Lena Varney Letter

In response to Mr. and Mrs. Varney's letter, Triton Coal Company representatives recently met with the Varney's and explained the mine plan for the Buckskin Mine. The 40-acre Varney coal lease is in an area of higher overburden ratio with adjacent geologic faulting. Buckskin's mine plan is to continue to follow the lower ratio coal outcrop to remain competitive with other PRB mines. Under Buckskin's current mining projections, they would likely mine a portion of the Varney lease in the next 10 years.



United States Department of the Interior  
BUREAU OF LAND MANAGEMENT  
CASPER FIELD OFFICE  
NATIONAL PARK SERVICE  
INTERMOUNTAIN REGION

MAY 19 AM 9:49

12795 West Alameda Parkway  
PO Box 25287  
Denver, Colorado 80225-0287



IN REPLY REFER TO:  
DES-03/0019

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

May 14, 2003

RE: Subject: Comments on Bureau of Land Management's Draft Environmental Impact Statement for the West Hay Creek Coal Lease Application, Campbell County, Wyoming

Dear Ms. Karbs:

Thank you for the opportunity to review the Draft Environmental Impact Statement (DEIS) for the West Hay Creek Coal Lease Application. The National Park Service provides the following comments to you for your consideration. These comments reflect the concerns of a number of National Park units, particularly those located in the Midwest Region.

The pace of resource and other development in the Powder River Basin and elsewhere in the West has increased substantially. Several Midwest Region parks are located downwind of this development, including class I air quality areas at Wind Cave, Badlands, and Theodore Roosevelt National Parks.

We understand Wyoming will analyze the impacts of coal mining related to this lease area during the permitting process. We also understand these coal-mining operations, by themselves, may not have a pronounced impact on air quality in Midwest Region parks. However, the National Park Service has become increasingly concerned about the cumulative air quality impacts of the many individual air pollution sources on Federal, State, and private lands appearing upwind of these parks. While the incremental impacts of any given activity, such as the coal leases in question, may be negligible, the additive effects of many such activities may indeed be significant. We continue to be concerned by our reading of this analysis that appears to consider the number of current and reasonably foreseeable impacts to air quality as "limited."

We encourage the BLM, and by extension the State of Wyoming, to continue to consider the incremental air quality degradation that will be caused by these 39,400 new coal leases. But we encourage the BLM to also take a hard look at the cumulative impacts of these leases added to the activities associated with the existing 15 coal mines and the 12,000 operating and permitted coal bed methane (CBM) wells. We also encourage the consideration of other activities and facilities in the region (i.e., coal-fired generation plants) to which this additional degradation will be added. Again, we understand incremental impacts of mine development tend to be relatively minor, but the cumulative impacts from the likely outcome of

mining, increasing energy production, is the greatest threat to the class I air quality areas in the Midwest Region. We have great concerns over what we feel are existing and increasing impacts to our air quality resulting from energy development, and we will continue to monitor the development of these resources.

### Specific Comments

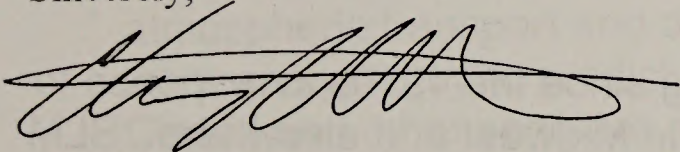
Following are some specific comments with regards to the DEIS:

1. On page 3-17, the DEIS states, "Air quality conditions in rural areas are likely to be very good, as characterized by limited air pollution emission sources (few industrial facilities and residential emissions in the relatively small communities and isolated ranches) and good atmospheric dispersion conditions, resulting in relatively low air pollutant concentrations". The DEIS also states that there are 15 coal mines, 12,000 CBM wells that have been drilled or are permitted for drilling, and 39,400 proposed private, state, and federal CBM wells with associated ancillary facilities; however, these sources are not included in the above-definition of "limited air pollution emissions sources". All existing and planned emission sources should be included the description of the existing environment, in which case, we do not feel that the area has limited air pollution emission sources or relatively low air pollutant concentrations. By not including all of the emission sources in the description of the current conditions, the document does not accurately portray the existing environment. Without an accurate portrayal of the current conditions, impacts to air quality including cumulative effects cannot be properly analyzed.
2. On page 3-13, the DEIS describes how the mountainous western topography is particularly important in channeling pollutants along valleys and blocking the flow of pollutants toward certain areas. The DEIS also states the topography of the area as being, "...primarily rolling plains and tablelands of moderate relief (with occasional valleys, canyons, and buttes)". We would like to point out that much of the project area is fairly flat with a topographic change in elevation of less than 240 feet (4100 to 4340 feet). As such, with few significant topographic features in the area, the emissions from the proposed project will move in the direction of the prevailing air currents, and will not be trapped by topography. We feel that the DEIS does not accurately identify the topographic nature of the area, and misrepresents the fact that the terrain will protect areas downwind from the potential effects of increased pollution emissions. Using the average annual wind speed documented in the DEIS at 10.3 mph, pollutants from the Powder River Basin will reach Wind Cave National Park in approximately 10-11 hours. This illustrates that the emissions from the proposed project and other projects in the area will have an almost immediate effect on the air quality at this park as well as nearby national park units. This is of great concern to the National Park Service.
3. On page 3-14-17, the DEIS states that WDEQ has an extensive network of air quality monitors throughout the state of Wyoming and the data from these monitors, "...are used to pro-actively arrest or reverse trends towards air quality problems." The DEIS then states on page 3-20, "The relatively flat trend in particulate emissions from 1980 through 1998 is due in large part to the Wyoming Air Quality Program that requires the best available control technology (BACT) at all permitted facilities." However, the data given throughout this analysis indicate, "Concentrations increased from 33.9  $\mu\text{g}/\text{m}^3$  in 1998 to 55.3  $\mu\text{g}/\text{m}^3$  in 1999 and continued to increase at a slightly slower pace in 2000. There were no major fires in the region during this time. The increases in coal production over those two years (2.3% per year and 13.9 mmtpy over the two-year period) and associated overburden production (9.5% per year and 135 mmbcy over the two-year period) were not larger than the two-year increases during some of the previous 18 years, but the particulate concentration increase was much larger than in previous years."

Given this, we feel that the data do not represent a "relatively flat trend" in particulate emissions from 1980 through 1998. According to these data, the TSP average ( $\mu\text{g}/\text{m}^3$ ) was 33.0 with 1999 and 2000 averaging 55.7  $\mu\text{g}/\text{m}^3$ . This represents a 68.8% increase in TSP. From 1989 to 1998 (10 years) PM10 averaged 15.4  $\mu\text{g}/\text{m}^3$ . In 1999 and 2000, PM10 averaged 22.5  $\mu\text{g}/\text{m}^3$ , an increase of 46.1%. If the data are used to "proactively arrest or reverse trends towards air quality problems", and these data show substantial increases, then how does WDEQ define what constitutes an air quality problem? The DEIS suggests that some of the best technology is in place for monitoring air quality in Wyoming which we support; however, the DEIS does not describe how these documented pollution increases have been addressed.

Again, we appreciate the opportunity to review the subject document and provide these comments. If you have any questions about these comments please contact Cheryl Eckhardt, Intermountain Regional Office, Planning and Compliance at 303-969-2851, or Nick Chevance, Midwest Regional Office, Planning and Compliance, 402-221-7286.

Sincerely,



Cheryl Eckhardt  
NEPA/106 Specialist, IMRO

cc:

Nick Chevance, MWRO  
Steve Cinnamon, MWRO  
David Pohlman, MWRO  
Dale Morlock, WASO  
Linda Stoll, WICA  
William Supernaugh, BADL  
Sandy Dingman, BADL  
Valerie Naylor, THRO  
John Reber, IMRO  
Chris Turk, IMRO

## Response to USDI, National Park Service Letter

The West Hay Creek LBA EIS evaluates leasing the LBA tract as a maintenance lease to an existing coal mine, which plans to mine the coal at currently permitted rates using existing facilities. BLM has eight other pending maintenance coal lease applications, five of which were considered in the *Final South Powder River Basin Coal EIS*, which was released to the public in December 2003. The remaining two pending maintenance coal lease applications will be evaluated in future NEPA analyses. All of these federal coal tracts have been applied for by existing mines in the basin and, if they are leased, they would be mined by those existing mines. As a result they would represent continuations of, not additions to, ongoing mining activities at currently active coal mines in the Wyoming Powder River Basin (PRB). The *Final EIS and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project*, which was completed in January 2003, analyzed the impacts of drilling 39,400 new CBM wells in the Wyoming PRB in addition to the 12,000 wells that were drilled or permitted when the EIS was prepared.

Coal production in the PRB has been steadily increasing since the 1970s in response to increasing demands for electrical power generation in the Midwest and elsewhere. BLM also has concerns about existing and increasing air quality impacts resulting from energy development in the PRB. In order to help us evaluate the potential impacts of future actions more effectively, the Wyoming BLM is currently starting work on a two-year technical study to assess current coal development, develop projections of expected future development, and develop data and modeled projections of the effects of projected surface coal mining in the Wyoming PRB for use in analyzing the impacts of leasing and mining the two remaining pending LBA tracts. Briefings on this study were held with state and federal agencies last fall. Please contact Mike Karbs with the BLM Casper Field Office for more information on this study.

### **Responses to Specific Comments**

1. The referenced statement, which is found on page 3-21 of the FEIS, is a broad description of general air quality in rural areas of the PRB, where development and associated monitoring are not yet present. The areas where the surface coal mines are located and where most of the CBM development has occurred to date in the PRB are somewhat concentrated on the eastern flank of the PRB, where the coal is the shallowest and most accessible. There has been extensive air quality monitoring, specifically particulate and NO<sub>2</sub> emissions, in this area, which is discussed on pages 3-18 and 3-22 and shown in Figure 3-6 of the FEIS. The values presented as background concentrations in Table 3-2 of the EIS reflect the existing environment, including all of the existing emission sources, as determined by the monitoring data. The projected impacts of the proposed additional 39,400 CBM wells are addressed in the cumulative air quality section of Chapter 4.
2. The DEIS does describe the regional topography ("mountainous western United States"), the topography in the PRB ("primarily rolling plains and tablelands of



moderate relief (with occasional valleys, canyons and buttes), and the topography of the West Hay Creek LBA tract ("an area of elevated ridges broken by minor drainages with an elevation ranging from 4,100 to 4,340 feet" (DEIS page 3-13). The EIS does not describe the LBA tract as mountainous and does not state, in either the air quality section of Chapter 3 or of Chapter 4, that the terrain in the area of the LBA tract will protect areas downwind from the potential effects of increased pollution emissions. It does discuss, on pages 4-55 through 4-70 in the FEIS, the air quality impact analysis prepared for BLM by Argonne National Laboratory, for which air pollutant dispersion modeling was performed using the EPA CALPUFF and the CALMET models to quantify potential cumulative air quality impacts from existing and proposed development in the PRB. The existing development includes the coal mines and existing CBM wells; the proposed development includes the proposed 39,400 CBM wells. This modeling project evaluated potential impacts for the years when the overlapping impacts of oil and gas development, and coal and other development were estimated to be the greatest. The FEIS (pages 4-63 and 4-64) explains that meteorological information was assembled to characterize atmospheric transport and dispersion and that potential CO and NO<sub>x</sub> emissions were analyzed by to predict potential far-field impacts at 29 mandatory federal PSD Class I and other sensitive areas in Wyoming, Montana, North and South Dakota, and Nebraska, including Wind Cave National Park; maximum predicted cumulative far-field impacts under the development that were predicted by this modeling are shown in table 4-9. The FEIS also discusses potential visibility impacts to Class I areas, including Wind Cave National Park, predicted by this modeling project (pages 4-65 through 4-69, tables 4-11 and 4-12). The statement describing the regional topography as mountainous has been removed from chapter 3 because it is more descriptive of the area included in the cumulative air quality impact analysis, discussed in the Cumulative Impact section of Chapter 4, than it is of the area of the West Hay Creek LBA tract.

3. In the EIS, the term "relatively flat trend" is used to describe the monitored particulate concentrations from 1980 through 1998 as compared to the increase in mining activity (i.e. coal produced and overburden moved) during that same time period. The term "relatively flat trend" is not used to describe the increase in particulate concentrations recorded by monitoring after 1998. The EIS describes the particulate concentration increase following 1998 as "much larger" than had occurred during the previous 18 years, although the increase in coal and overburden production was not comparably larger (FEIS page 3-24). In the FEIS, particulate control measures are discussed on pages 3-26, NO<sub>x</sub> control measures are discussed on pages 3-28 and 3-29. Table 4-3 summarizes the required mitigation and monitoring measures. These measures are required by regulation and are considered to be part of the Proposed Actions and Alternatives 2 and 3. These requirements, mitigation plans, and monitoring plans are in place for the No Action Alternative, as part of the current approved mining and reclamation plan for the existing Buckskin Mine. If the West Hay Creek LBA tract is leased, these requirements, mitigation plans, and monitoring plans would be included in the mining and reclamation plan revision that would be required for the LBA tract if it is

leased. This mining and reclamation plan would have to be approved before mining could occur on the tract, regardless of who acquires the tract.

DAVE FREUDENTHAL  
GOVERNOR

THE STATE



OF WYOMING

STATE CAPITOL  
CHEYENNE, WY 82002

MAY 29 AM 10:19

# Office of the Governor

May 27, 2003

Patricia Karbs  
United States Department of the Interior  
Bureau of Land Management  
Casper Field Office  
2987 Prospector Drive  
Casper, Wyoming 82604

**Re: West Hay Creek Coal Lease Application-DEIS  
State Identifier Number: 2002-114**

Dear Ms. Karbs:

This office has reviewed the referenced Draft Environmental Impact Statement on behalf of the State of Wyoming. This Office also distributed the referenced document to all affected state agencies for their review, in accordance with State Clearinghouse procedures. Attached are comments from the Wyoming Game and Fish Department and the Department of Environmental Quality.

At this time this office has no objection to the proposed action provided the attached state agency comments are duly considered.

Please continue to provide this office with either (3) three hard copies or electronic copy (submit to [SPC@state.wy.us](mailto:SPC@state.wy.us)) of continued information for review and distribution to interested agencies. Thank you for the opportunity to comment.

Sincerely,

A handwritten signature in black ink that reads "Tracy J. Williams".

Tracy J. Williams  
Policy Analyst

TJW  
Enclosures: (2)

Wyoming Game and Fish Department  
Department of Environmental Quality (air)

H-13

WYOMING

GAME AND FISH DEPARTMENT

BUREAU OF LAND MANAGEMENT  
CASPERS FIELD OFFICE



Dave Freudenthal, Governor

Brent Manning, Director

"Conserving Wildlife - Serving People" 03 APR 25 AM 10:52

April 23, 2003

WER 320.02

Bureau of Land Management

Casper Field Office

Draft Environmental Impact Statement

West Hay Creek Coal Lease Application

Campbell County

Patricia Karbs

Bureau of Land Management

Casper Field Office

2987 Prospector Drive

Casper, WY 82604

Dear Ms. Karbs:

The staff of the Wyoming Game and Fish Department has reviewed the Draft

Environmental Impact Statement for the West Hay Creek Coal Lease Application within the

Casper Field Office area. We offer the following comments.

Terrestrial Considerations:

The Draft Environmental Impact Statement has adequately identified the terrestrial wildlife resources in the Affected Environment section, and has adequately disclosed the Environmental Consequences of the No Action and Action Alternatives.

Aquatic Considerations:

The Department finds this Draft Environmental Impact Statement (DEIS) generally lacking in adequate aquatic fauna information in order to assess potential impacts, except for one private reservoir. This may be due to a comment on page 3-55 that indicates fish surveys were not required during the baseline study by the Wyoming Game and Fish Department and Wyoming Department of Environmental Quality - Land Quality Division. We are not aware of comments from our agency that made this determination.

The Department does not have sufficient fish or amphibian data on the Hay Creek drainage to advise on potential impacts, but suggest that the applicant conduct such an inventory. Although Hay Creek may be ephemeral in certain reaches of the drainage, its importance to

03 APR 25 AM 10:52

native fish species present in the Little Powder River needs to be assessed. On page 4-19, the DEIS states that increased erosion, sedimentation and possible channel diversion, as well as anticipated increases in coal bed methane water discharge (page 4-79) will occur. This statement suggests that these impacts could disrupt spatial and temporal native fish species distribution in Hay Creek and downstream to the Little Powder River. Maintaining connectivity where these species occur, even if only seasonally, as on ephemeral sections, could affect how these species use the Little Powder drainage for portions of their life cycle.

As noted, we do not have current fish species data on Hay Creek. However, Patton (1997) found several species in the Little Powder River at four sites surveyed, including flathead chub, fathead minnow, goldeye, longnose dace, sand shiner, western silvery minnow, stonecat, white sucker, carp, green sunfish, northern redhorse sucker, and plains minnow. All of these species except the carp and green sunfish are native to the drainage. The Department has categorized the western silvery minnow as a Status 1 species. Status 1 species are physically isolated and/or exist at extremely low densities throughout their range, and habitat conditions are declining or vulnerable. Therefore, the Department has been directed by the Commission to recommend that no loss of habitat function occur. Some modification of the habitat may occur, provided that habitat function is maintained (i.e. the location, essential features, and species supported are unchanged). The Department has categorized the goldeye as a Status 2 species. Status 2 species are populations that are physically isolated and/or exist at extremely low densities throughout their range, and habitat conditions appear to be stable. Presence of some of these species or seasonal use of Hay Creek due to its tributary connection to the Little Powder River might be expected. Therefore, Hay Creek should be assessed, and potential impacts addressed.

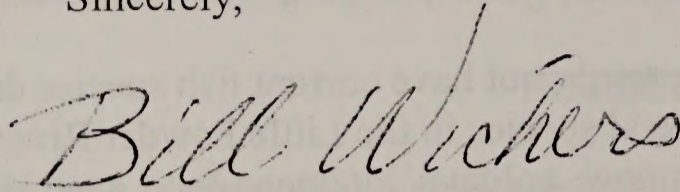
Finally, in Table 4-3, page 4-35, we recommend that mitigation stipulations be included for disturbance areas in the Hay Creek drainage for fish species once assessments are made. Mitigation measures that might be considered include 1) no net loss of stream channel habitat or water quality used by these species, 2) maintaining connectivity of the drainage with the Little Powder River, and 3) baseline and post mining (at a minimum) fish presence and distribution surveys in the monitoring plan. During fish species and habitat assessments, we recommend amphibian surveys be conducted as well, and all species and habitat data shared with the Wyoming Game and Fish Department.

BUREAU OF LAND  
MANAGEMENT  
CASPER FIELD OFFICE

03 APR 25 AM 10:52

Thank you for the opportunity to comment.

Sincerely,



BILL WICHERS  
DEPUTY DIRECTOR

BW:TC:as

cc: Julie Kozlowski-State Clearinghouse  
USFWS

Literature Cited

Patton, Timothy M. 1997. Distribution and status of fishes in the Missouri River drainage in Wyoming: implications for identifying conservation areas. Doctoral dissertation in Zoology and Physiology, University of Wyoming, Laramie, WY. 173pp.

## Response to Wyoming Game and Fish Department Letter

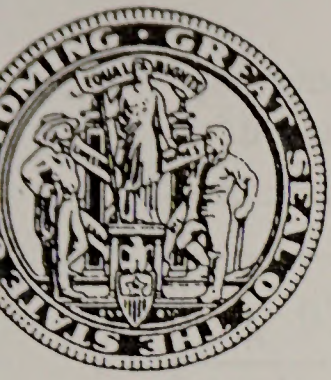
1. Wildlife monitoring for the Buckskin Mine is designed to meet WDEQ/LQD and federal requirements for annual monitoring and reporting of wildlife activity on coal mining areas. Detailed procedures and site-specific requirements have been carried out as approved by WGFD and FWS. The monitoring program is conducted in accordance with appendix B of WDEQ/LQD Coal Rules and Regulations. Baseline wildlife monitoring was conducted from February 1999 through February 2000 on the West Hay Creek LBA tract analysis area concurrent with an analysis conducted for a permit amendment for the Buckskin Mine. Powder River Eagle Studies (now Thunderbird Wildlife Consulting) submitted a proposed scope of work for wildlife baseline studies on the Buckskin Mine expansion area, which proposed no fish or benthic sampling due to the absence of perennial streams in the study area, to Mr. Vern Stelter with the WGFD for review in May of 1999. In response, Powder River Eagle Studies received a letter from Tom Collins, WGFD, dated May 18, 1999, concurring with the Buckskin baseline study proposal as written. Triton received a letter from Gregg Arthur, WGFD, dated December 23, 2003, recommending that WDEQ consider the consultation by Buckskin Mine with WGFD regarding the temporary diversion of Hay Creek to be complete and recommending approval of the temporary diversion.
2. The FEIS includes the available information on the aquatic species that have been observed during annual wildlife surveys conducted for the Buckskin Mine in this drainage

As discussed above, the wildlife baseline studies conducted to date have been approved by WGFD and WDEQ. If Triton acquires a lease for the West Hay Creek LBA tract, it would be a maintenance lease for the Buckskin Mine, which has an approved mining and reclamation permit. The approved Buckskin Mine permit area includes the West Hay Creek LBA tract, but Triton would be required to modify their existing mining and reclamation permit to include removing coal from the West Hay Creek LBA Tract before mining operations, including disturbance that would affect Hay Creek, could occur. Mitigation and monitoring plans that are specific to the new lease would be developed at that time. Surface coal mining operations in the State of Wyoming are regulated by the WDEQ/LQD, which must approve the mining and reclamation permits before mining can occur. If the existing monitoring requirements for aquatic species are not adequate, then WGFD could review the proposed plans for wildlife monitoring and address the deficiencies when the permit application package for proposed coal mining and reclamation on the West Hay Creek LBA Tract is submitted for approval by WDEQ/LQD.

3. The mitigation requirements summarized in Table 4-3 in the West Hay Creek EIS are part of the existing mining and reclamation plans for surface coal mines in the Powder River Basin that have been submitted to and approved by WDEQ/LQD.

The mitigation requirements are developed during the mining permit review and approval process, and changes or additions to those requirements could be made when the permit application package for proposed coal mining and reclamation on the West Hay Creek LBA Tract is submitted to WDEQ for review and approval.





The State  
of Wyoming

03 MAY 29 AM 10:19



# Department of Environmental Quality

e Freudenthal, Governor

Herschler Building • 122 West 25th Street • Cheyenne, Wyoming 82002

<b>ADMIN/OUTREACH</b> (307) 777-7758 FAX 777-3610	<b>ABANDONED MINES</b> (307) 777-6145 FAX 777-6462	<b>AIR QUALITY</b> (307) 777-7391 FAX 777-5616	<b>INDUSTRIAL SITING</b> (307) 777-7368 FAX 777-6937	<b>LAND QUALITY</b> (307) 777-7756 FAX 777-5864	<b>SOLID &amp; HAZ. WASTE</b> (307) 777-7752 FAX 777-5973	<b>WATER QUALITY</b> (307) 777-7781 FAX 777-5973
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May 13, 2003

Through: Tracy Williams, Wyoming Office of Federal Land Policy

Ms. Patricia Karbs  
Bureau of Land Management  
Casper Field Office  
2987 Prospector Dr.  
Casper, WY 82604

RE: West Hay Creek Coal Lease Application Draft Environmental Impact Statement

Dear Ms. Karbs:

The Air Quality Division of the Wyoming Department of Environmental Quality has reviewed the Draft Environmental Impact Statement for the West Hay Creek Coal Lease Application. The Air Quality Division has noted some concerns regarding disclosure within the air quality analyses used in this Draft EIS. The Division believes that there is not adequate disclosure of the differences between the air quality permit analysis and the Wyoming PRB Oil and Gas EIS air quality analysis. In addition, there is not adequate disclosure of the WEDQ-AQD permit analysis for the Buckskin Mine. Attached you will find the Air Quality Division's specific comments.

During review of this document the Division found incorrect references to the Wyoming Air Quality Standards and Regulations (WAQSR). As of October 29, 1999, the entire set of WAQSR were restructured from one chapter into thirteen chapters. Attached is a guide to the restructuring of the WAQSR. A copy of the most current WAQSR is available on our website (<http://deq.state.wy.us/aqd>).

If you should have any questions regarding the comments, please feel free to contact this office.

Sincerely,

Dan Olson  
Administrator Air Quality Division

Cc: Darla Potter, Air Quality Division  
Cara Casten, Air Quality Division

West Hay Creek Coal Lease Application Draft EIS Comments	
Page, Paragraph, Sentence*	Comments
ES-15; Table ES-2	Please put units on the "Maximum Modeled Concentration" column and the "PSD Class I Increment" column.
3-17; 3 <sup>rd</sup> P	The NO <sub>2</sub> monitors in the east PRB are part of a cooperative effort by the WDEQ and the coal mines. The monitors are officially run by the coal mines. Please remove "WDEQ" from the first sentence.
3-20; 5 <sup>th</sup> P; 1 <sup>st</sup> S	Concentrations of which constituent? Please clarify the first sentence by specifying the type (size) of particulate these concentrations correspond to.
3-26; 3 <sup>rd</sup> P; Last S	The sentence states, "Visual Range monitoring in the Bridger Wilderness Area shows that one can see more than 70 miles 70% of the time". Please document the source of these statistics.
4-14; Last P; 4 <sup>th</sup> S	As of October 29, 1999, the entire set of Wyoming Air Quality Standards and Regulations were restructured from one chapter into thirteen chapters. The restructuring was only a rearrangement of the existing regulations. The Division did not make any changes or additions in the content of the existing regulation beyond basic introductions and cosmetic changes to the newly organized chapters. Therefore, the reference to section 24 should now read Chapter 6, Section 4. A guide to the WAQSR restructuring is attached. Please see the website ( <a href="http://deq.state.wy.us/aqd">http://deq.state.wy.us/aqd</a> ) for a copy of the most current regulations.
Chapter 4: General	<p>Impacts to air quality are discussed in two separate sections in Chapter 4, Direct and Indirect Impacts of Action Alternatives and Cumulative Impacts. The Direct and Indirect Impact of Action Alternatives section uses the Buckskin Mine air quality permit analysis (MD-707) to disclose potential air quality impacts of the proposed action and alternatives (page 4-11 to 4-14). The Cumulative Impacts section uses the "Wyoming PRB Oil and Gas Project EIS" air quality analysis to represent cumulative impacts of proposed development in the Powder River Basin (pages 4-48 to 4-65).</p> <p>The Division believes that there is not adequate disclosure of the differences between these two analyses. Specifically, the EIS should explain the difference in the purpose and use of two different background concentrations for PM<sub>10</sub> in the analyses.</p> <p>The Buckskin Mine air quality permit (MD-707) uses a background PM<sub>10</sub> concentration of 15 µg/m<sup>3</sup>. The permit analysis is considered to be more relevant to the coal leasing aspect of the EIS. In the permit analysis, emission from the coal mine and all other sources</p>

\* P = Paragraph, S = Sentence

	<p>in the area are added to this background, regardless of when it was permitted or built.</p> <p>The "Wyoming PRB Oil and Gas Project EIS" uses a PM<sub>10</sub> background concentration of 17 µg/m<sup>3</sup>. The air quality analysis in the PRB Oil and Gas EIS is intended to focus on oil and gas leasing and then cover, on a broad basis, other sources in the area including coal mines. The background concentrations are recently monitored values and are intended to represent all sources permitted before a specified date. The analysis is then built on any sources constructed or modified after that date. Therefore, the analysis only looks at projected mine increases. The PM<sub>10</sub> background concentration used in the PRB Oil and Gas EIS is from monitoring conducted in Gillette, and was used as the background for the entire Powder River Basin.</p>
4-60; Table 4-10	Please put units on the "Maximum Modeled Concentration" column and the "PSD Class I Increment" column.
Appendix E	The Division believes there is not adequate disclosure of the WDEQ-AQD permit analysis for the Buckskin Mine. The Appendix should include a section that discusses the process, methodology and assumptions of the permit analysis to back up the results presented in Chapter 4.

03 MAY 29 AM 10:19  
OFFICE OF THE ATTORNEY GENERAL  
COURT REPORTER

WAQS&R RESTRUCTURING PLAN May 12, 2003 rev.

03 MAY 29 AM 10:19

Chapter 1: Common provisions

New Section #	Title	Old Section #
1	Introduction to common provisions	--
2	Authority	1
3	Definitions	2
4	Diluting and concealing emissions	18
5	Abnormal conditions and equipment malfunction	19
6	Credible Evidence	--

Chapter 2: Ambient Standards

New Section #	Title	Old Section #
1	Introduction to ambient standards	--
2	Ambient standards for particulate matter	3
3	Ambient standards for nitrogen oxides	10a
4	Ambient standards for sulfur oxides	4a
5	Ambient standards for carbon monoxide	12a
6	Ambient standards for ozone	8
7	Ambient standards for hydrogen sulfide	7a
8	Ambient standards for suspended sulfates	6
9	Ambient standards for fluorides	11
10	Ambient standards for lead	26

BUCKLE UP LAND  
 ENVIRONMENTAL  
 PROTECTION DIVISION

CASPT

03 MAY 29 11:12 AM '14

11	Ambient standards for odors	16
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Chapter 3: General Emission Standards

New Section #	Title	Old Section #
1	Introduction to general emission standards	--
2	Emission standards for particulate matter	14
3	Emission standards for nitrogen oxides	10b(excluding 10b(vi))
4	Emission standards for sulfur oxides	4c-g
5	Emission standards for carbon monoxide	12b
6	Emission standards for VOCs	9
7	Emission standards for hydrogen sulfide	7b
8	Emission standards for asbestos	29

Chapter 4: State Performance Standards for Existing Sources

New Section #	Title	Old Section #
1	Introduction to state performance standards for existing sources	--
2	Existing sulfuric acid production units	4b,5a
3	Existing nitric acid manufacturing plants	10(b)(vi)
4	Existing municipal solid waste landfills	35
5	Existing hospital/ medical/ infectious waste incinerators	37

Chapter 5: National Emission Standards

New Section #	Title	Old Section #
1	Introduction to national emission standards	--
2	New source performance standards	22
3	National emission standards for hazardous air pollutants	33(all but h)

Chapter 6: Permitting Requirements

New Section #	Title	Old Section #
1	Introduction to permitting requirements	--
2	Permit requirements for construction, modification and operation	21
3	Operating permits	30
4	Prevention of significant deterioration	24
5	Permit requirements for construction and modification of NESHAPs sources	33h
6	Permit requirements for case-by-case MACT determinations	36
7	Clean air resource allocation expiration	27

Chapter 7: Monitoring Regulations

New Section #	Title	Old Section #
1	Introduction to monitoring regulations	--
2	CEM requirements for existing sources	23

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3	Compliance Assurance Monitoring	--
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Chapter 8: Non-attainment Area Regulations

New Section #	Title	Old Section #
1	Introduction to non-attainment area regulations	--
2	Sweetwater County particulate matter regulations	25
3	Conformity of general federal actions to state implementation plans	32
4	Transportation conformity	31

Chapter 9: Visibility Impairment/PM Fine Control

New Section #	Title	Old Section #
1	Introduction to visibility impairment and PM fine control	--
2	Visibility	28

Chapter 10: Smoke Management

New Section #	Title	Old Section #
1	Introduction to smoke management	--
2	Open burning restrictions	13
3	Woodwaste burners	15

Chapter 11: National Acid Rain Program

1	Introduction to national acid rain program	--
2	Acid rain program	34

Chapter 12: Emergency Controls

New Section #	Title	Old Section #
1	Introduction to emergency controls	--
2	Air pollution emergency episodes	20

Chapter 13: Mobile Sources

1	Introduction to mobile sources	--
2	Motor vehicle pollution control	17

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## Response to Wyoming Department of Environmental Quality Letter

The air quality sections in the FEIS have been revised in response to comments received from Wyoming Department of Environmental Quality Air Quality Division (WDEQ/AQD) as well as from the Environmental Protection Agency. WDEQ/AQD provided BLM with information about air quality regulations and program procedures as well as corrections to the air quality sections during the revision process. Through this process, we believe that the WDEQ/AQD comments on the Draft West Hay Creek EIS have been addressed.



# United States Department of the Interior

FISH AND WILDLIFE SERVICE

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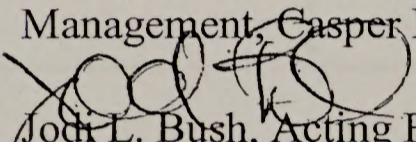
**Ecological Services  
4000 Airport Parkway  
Cheyenne, Wyoming 82001**

In Reply Refer To:  
ES-61411/W.02/WY7073

June 3, 2003

## Memorandum

To: Nancy Doelger, Environmental Protection Specialist, Bureau of Land Management, Casper Field Office, Casper, Wyoming

From:  Jodi L. Bush, Acting Field Supervisor, U.S. Fish and Wildlife Service, Wyoming Field Office, Cheyenne, Wyoming

Subject: Comments on the West Hay Creek Draft Environmental Impact Statement

This responds to your requests for comments on the West Hay Creek Draft Environmental Impact Statement (DEIS) dated March 27, 2003, received in the Wyoming Field Office on March 28. The DEIS analyzes the impact of the sale and issuance of a lease for approximately 840 acres and 145 million tones of in-place Federal coal reserves located in Campbell County, Wyoming.

## GENERAL COMMENTS

1 The U.S. Fish and Wildlife Service (Service) does not believe that the DEIS and Appendix G provide an adequate assessment of the effects of coal mining once these tracts are leased. The Bureau of Land Management (Bureau) defers discussion of the effects to endangered, threatened, proposed and candidate species, and migratory birds to future consultations between the Service and the Wyoming Department of Environmental Quality, Land Quality Division (WDEQ/LQD) which acts as the Office of Surface Mines' (OSM) representative for section 7 consultation. However, the Bureau is the only agency with discretionary authority to issue a coal lease. Once these leases are issued the lessee has the right to mine the coal. Therefore, we recommend that the Bureau determine the effects to listed and proposed species, if any, of all future actions which are reasonably certain to occur as a result of these leasing actions, prior to their issuance.

### Threatened and Endangered Species

2 The Bureau should work with the Service in developing surveys, impact minimization measures and conservation measures for all Federally listed species. Section 7(a)(1) of the Endangered Species Act of 1973 (Act), as amended, (50 CFR 402) authorizes the Bureau to use their programs to further the conservation and recovery of threatened and endangered species. Therefore, we encourage the Bureau to incorporate measures for the conservation of listed species into the lease stipulations.

## SPECIFIC COMMENTS

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3  
Page ES-10, Executive Summary: The Executive Summary states that “no T&E species or potential habitat was found on the tract for the bald eagle...”. However, coal bed methane (CBM) development is occurring on the West Hay Creek Lease-by-Application (LBA) tract. The Bureau’s final Biological Assessment (BA) for the Powder River Basin Oil and Gas Project states that increased traffic, road kills and carrion, resulting from CBM activities, potentially increases vehicle collision hazard to bald eagles”. In the Services’s biological and conference opinion for the Powder River Basin Oil and Gas Project (USFWS 2002), page 28, it states “the Service believes that as a direct result of the construction of approximately 7,136 miles of new improved roads and 5,311 miles of overhead distribution lines, there will be direct loss of bald eagles”. Because increased traffic, road kills and carrion can attract bald eagles to otherwise unsuitable habitats the Service recommends that the cumulative effects section analyze the impact of CBM development on and near the LBA tract. In addition, the EIS should require that the raptor proof construction techniques as outlined in *Suggested Practices For Raptor Protection on Power Lines. The State of the Art* (Avian Power Line Interaction Committee 1996) are used and monitor these in order to ensure compliance.

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Page 1-3, Introduction: The DEIS states that this document will be used by OSM to make decisions related to the approval of the Mineral Leasing Act of 1920 (MLA) mining plans for these tracts... The DEIS does not fully analyze the potential impacts of all phase of mining that are likely to occur if these leases are issued. The Service recommends using *An Environmental Guide To Western Surface Mining Part Two: Impacts, Mitigation and Monitoring* (Moore and Mills 1977). This document is an excellent reference for identifying all the phases of mining operations which should be analyzed in the leasing Environmental Impact Statement (EIS).

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Page 2-19, Table 2-3, Summary Comparison: The DEIS indicates that most impacts to wildlife habitat from the proposed action and the alternatives would be moderate and short term. However, on page 4-84 of the DEIS it states “Coal mining activity does cause long-term disturbance to (sage grouse) nesting habitat”. Additionally, on page 4-21 of the DEIS it indicates that up to 100 years will be required to restore sagebrush to pre-mining densities. The Service disagrees with the Bureau’s assessment that impacts to wildlife habitat would be moderate and short term. The EIS analysis should clearly identify the amount and type of sage grouse habitat (lek, nesting, brood rearing) affected, both in the short and long-term, by this project.

6  
Page 3-47, Threatened, Endangered and Candidate Plant Species: The DEIS states “ no Federally listed threatened, endangered, or candidate plant species are known to occur within the analysis area. The analysis area was surveyed in 1999 for threatened, endangered, or candidate (plant) species using the Wyoming Rare Plant Field Guide (Thorne 1994) as their reference”. The Service’s Recommendations and Guidelines for Ute Ladie’s-Tresses Orchid (*spiranthes diluvialis*) Recovery and Fulfilling Section 7 Consultation Responsibilities (USFWS 1995) would be a more through and appropriate reference for conducting a survey for this orchid. Surveys for any threatened, endangered, proposed or candidate species should be coordinated with the Service’s Wyoming Field Office to ensure that appropriate survey methods are used.

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Page 3-50, Game Birds: The DEIS does not mention that the sage grouse has been petitioned for listing under the Act because of rangewide population declines. Please include the following information in your discussion of sage grouse:

The Service has received several petitions to list the greater sage-grouse (*Centrocercus urophasianus*) under the Act. The causes for the greater sage-grouse range wide decline are not completely understood, and may be influenced by local conditions. However, habitat loss and degradation, as well as loss of population connectivity are important factors (Braun 1998, Wisdom et al. 2002). Any activities that result in loss of sagebrush, or degrade important sage-grouse habitats, should be closely evaluated for their impacts to sage grouse.

Greater sage-grouse are dependent on sagebrush. Population and habitat analyses suggest that wintering habitat can be as limiting as mating and breeding habitats. Therefore, you should work with the local Wyoming Game and Fish biologist to identify important greater sage-grouse habitats within the project area, and appropriate mitigative measures to minimize potential impacts from the proposed project. The Service recommends surveys and mapping of important greater sage-grouse habitats where local information is not available. The results of these surveys should be used in project planning, to minimize potential impacts to this species. No project activities that may exacerbate habitat loss or degradation should be permitted in important habitats.

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In Wyoming, anecdotal information, from several sources in Wyoming, suggests that greater sage-grouse populations are negatively affected by construction (energy development) activities, especially those that degrade important sagebrush habitat, even when mitigative measures are implemented (Braun 1998, Lyon 2000). There is some evidence that grouse populations do repopulate areas developed for resource extraction after reclamation for the species (Braun 1987). However, there is no evidence that populations attain their previous levels and reestablishment of sage grouse in a reclaimed area may take 20-30 years, or longer (Braun 1998). Therefore, this project should be carefully evaluated for long-term effects on the greater sage-grouse, since reclamation may not restore populations to pre-activity levels. The Bureau should ensure this activity does not exacerbate greater sage-grouse declines on either a local, or range-wide level.

In 2000, the U.S. Forest Service, the Bureau, and the Service signed a Memorandum of Understanding with the Western Association of Fish and Wildlife Agencies to conserve the greater sage-grouse and its habitat. This Memorandum of Understanding outlined the participation of Federal and State wildlife agencies, including the Wyoming Game and Fish Department, in greater sage-grouse conservation, and these commitments should be considered in project planning in sage-grouse habitat. Additionally, unless site-specific information is available, greater sage-grouse habitat should be managed following the guidelines by Connelly *et al.* 2000.

Page 4-25, Wildlife: The DEIS States "losses (of migratory birds) would also occur when habitat disturbance coincides with egg incubation and rearing of young". The Service would like to remind the Bureau that the Migratory Bird Treaty Act, 16 U.S.C. 703, enacted in 1918, prohibits

the taking of any migratory birds, their parts, nests, or eggs except as permitted by regulations and does not require intent to be proven. Section 703 of the Act states, "Unless and except as permitted by regulations ... it shall be unlawful at any time, by any means or in any manner, to ... take, capture, kill, attempt to take, capture, or kill, or possess ... any migratory bird, any part, nest, or eggs of any such bird...". The Bald and Golden Eagle Protection Act, 16 U.S.C. 668, prohibits knowingly taking, or taking with wanton disregard for the consequences of an activity, any bald or golden eagles or their body parts, nests, or eggs, which includes collection, molestation, disturbance, or killing.

Work that could lead to the take of a migratory bird including an eagle, their young, eggs, or nests (for example, if you are going to construct roads, or power lines in the vicinity of a nest), should be coordinated with our office before any actions are taken. Removal or destruction of such nests, or causing abandonment of a nest could constitute violation of one or both of the above statutes. Removal of any active migratory bird nest or nest tree is prohibited. For golden eagles, inactive nest permits are limited to activities involving resource extraction or human health and safety. Mitigation, as determined by the local Service field office, may be required for loss of these nests. No permits will be issued for an active nest of any migratory bird species, unless removal of an active nest is necessary for reasons of human health and safety. Therefore, if nesting migratory birds are present on, or near the project area, timing is a significant consideration and needs to be addressed in project planning.

The EIS should identify mitigation measures that would avoid the take of migratory birds and their nests. One measure to reduce the effects of mining on nesting migratory birds would be to restrict the removal of surface vegetation during mining to the non-nesting season (August 15 - March 31). The Service recommends that this measure be included in the Bureau's Special Stipulations found in Appendix D.

Page 4-80, Wetlands: The DEIS states that "during mining and before replacement of wetlands, all wetland functions would be lost. The replaced wetlands may not function in the same way as the pre-mine wetlands did". The Service recommends that in lieu of site-specific studies to determine the functions and values of the wetlands being affected, a wetland mitigation ratio of at least 1.5:1 be used (USFWS 1997). The higher mitigation is recommended for the following reasons (King and Adler 1991):

1. time is required for the created or restored wetland to replace the functions lost in the natural wetlands.
2. the functions performed by wetlands created or restored in the future are not equal, in terms of present worth, to the impacted wetlands
3. created or restored wetlands cannot always provide full replacement of functions even if they are considered successful.
4. created or restored wetlands do not always function as expected so there is a need for some margin of safety to replace lost functions.

5. the higher mitigation ratio addresses our above concerns and is consistent with the Service mitigation policy, and the Service's Region 6 mitigation guidelines.

In addition, the need for minimum ratios of greater than 1:1 for created or restored wetlands is recognized by the Environmental Protection Agency (EPA) in their regional draft guidelines, in the 1990 MOA between EPA and the U.S. Army Corps of Engineers regarding determination of mitigation under the Clean Water Act Section 404(b)(1) and in compensatory mitigation issue papers published in August 1994, by the Baltimore District of the U.S. Army Corps of Engineers.

Due to the high failure rate of mitigation projects, and of created wetlands in particular, we request that the mitigation plan include goals and objectives, success criteria, and monitoring of sufficient duration to determine if the mitigation is successful.

10 Page 4-84, Wildlife: The DEIS states that "... should not significantly affect regional sage grouse populations because few vital sage grouse wintering areas or leks have been, or are planned to be disturbed". However, in the same paragraph the DEIS states "coal mining does cause long-term disturbance to nesting habitat. Because sage grouse populations throughout Wyoming have been declining over the past several years, this impact could be significant to local population when evaluated with the cumulative impacts of all energy-related development occurring in the area". Based on the information presented in table 3-8, page 3-42, approximately 60 -70 percent of the analysis area is suitable habitat for the sage grouse. The EIS analysis should clearly identify the amount and type of sage grouse habitat (lek, nesting, brood rearing) affected by this project.

Page D-1, Appendix D, Bureau Special Stipulations: The header states "BLM will attach the following special stipulations to the West Hay Creek LBA tract if it is leased: . . .". However, the Bureau does not identify a single special stipulation for endangered, threatened, proposed or candidate species, or migratory birds or wildlife. The Service recommends that all measures to minimize the affects to listed species developed during the section 7 consultation for the West Hay Creek Leasing Project be incorporated as lease stipulations. In addition the Service recommends that the following stipulation be attached to each of the LBA tracts:

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- All suitable habitat for threatened and endangered species on Federal lands within the lease tracts that is disturbed during mining will be reclaimed in kind at a 1:1 ratio during reclamation. If reclamation cannot restore suitable habitat then conservation easements will be acquired on the closest existing habitat for threatened and endangered species from willing landowners.

Title Page, Appendix G: The Service is unclear if Appendix G is to serve as the BA to meet the Bureau requirements pursuant to section 7(a)(2) of the Act (50 CFR §402.13). The DEIS and Appendix G do not currently provide adequate information on the effects of the proposed action and alternatives on endangered, threatened, proposed and candidate species. The Service recommends that if it is the Bureau's intention that Appendix G function as the BA for the West Hay Creek Leasing it include the following information:

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1. a clear description of the project, including any interrelated/interdependent actions and cumulative effects;
  2. a description of the specific area potentially affected by the action;
  3. the current status, habitat use, and behavior of threatened and endangered species in the project area;
  4. discussion of the methods used to determine the information in item 3;
  5. direct and indirect impacts of the project to threatened and endangered species, including impacts of interrelated and interdependent actions;
  6. an analysis of the effects of the action on listed and proposed species and their habitats including cumulative impacts from Federal, State, or private projects in the area;
  7. measures that will reduce or eliminate adverse impacts to threatened and endangered species;
  8. the expected status of threatened and endangered species in the future (short and long term) during and after project completion;
  9. determination of "is likely to adversely affect" or "is not likely to adversely affect" for listed species;
  10. determination of "is likely to jeopardize" or "is not likely to jeopardize" for proposed species;
  11. Alternatives to the proposed action considered, a summary of how impacts of those alternatives on listed and proposed species would differ from the proposed action, and the reasons for not selecting those alternatives;
  12. citation of literature and personal contacts used in the assessment.

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Page G-7, Appendix G, Ute ladies'-tresses: The DEIS states "Habitat Management, Inc. surveyed the analysis area between April through October 1999 for threatened, endangered, or candidate plant species". However, the DEIS does not provide additional information regarding who conducted the surveys, the timing of the surveys, the area covered and if Ute ladies'-tresses was the specific target of the surveys. Review of Appendix D8 - Vegetation, Hay Creek Amendment Area: Vegetation Baseline Study on file at the WDEQ/LQD offices does not identify the specific dates of surveys for the Ute ladies'-tresses orchid, if suitable habitat was present, or if all potentially suitable habitat for this orchid was surveyed. The Ute ladies'-tresses orchid can only be reliably found and identified when it is flowering, which typically occurs sometime during the period from mid-July through mid-September (USFWS 1995). Additionally, this orchid has the ability to remain dormant (without above ground growth) for at least 1 year. The Service recommends that the EIS include additional information on all surveys conducted on these LBA tracts and any additions proposed in alternatives in the EIS. Furthermore, the Service recommends that multiple surveys be conducted in areas of moderate to high potential habitat quality during the flowering season (July 20 - August 31, 2003), if they have not already been conducted.

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Page G-9, Appendix G, Regulatory Requirements and Mitigation: The DEIS and Appendix G state that "As part of the application and approval process for MLA mining plans and the State mining and reclamation permits, coal lessees are required to conduct additional surveys and other evaluations as needed to ensure compliance with the Endangered Species Act. The FWS will again be consulted during the permit application review process". As stated in the Service's

letter of May 28, 2002, issuance of a new coal lease is a discretionary Federal action, and therefore, the Bureau should consult with the Service if the issuance of the lease may negatively affect a listed species or jeopardize a proposed species. This consultation should include all future reasonably foreseeable actions which will occur as a result of this leasing decision. If there may be adverse affects to species protected by the Act, as a result of leasing, or subsequent coal mining and reclamation activities, the Bureau must address those impacts at this time. The ultimate responsibility for section 7 compliance for Federal actions remains with the Federal agency.

15 Page G-10, Cumulative Impacts: The DEIS identifies that there are direct effects that will result from the issuing of this coal lease for sale but does not adequately address the direct, indirect or cumulative effects of all development occurring in the Powder River Basin. The EIS should fully disclose the direct and indirect effects of all aspects of the project as well as the cumulative impacts of past (as of December, 2002 there were 21,899 oil and gas wells in the Powder River Basin of Wyoming, (Marvel 2003), and coal mining has disturbed 54,000 acres), present (the impacts of the Powder River Basin Oil and Gas Project and the Montana Statewide Oil and Gas Project) and reasonably foreseeable future actions (the impacts of four to six new power plants and connecting high voltage distribution lines have been proposed for the Powder River Basin); regardless of who is responsible for those actions.

The Service appreciates the opportunity to comment on this DEIS. If you have any questions regarding this letter or your responsibilities under the Act, please contact Bradley Rogers of my staff at the letterhead address or phone (307) 772-2374, extension 25. In your response, please refer to (W.02/WY7073).

## REFERENCES

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- Wyoming Rare Plant Technical Committee. 1994. Wyoming Rare Plant Field Guide. Wyoming Natural Diversity Database, Laramie, Wyoming
- cc: BLM, Wyoming State Office, Cheyenne, WY (J. Carroll)  
 EPA, Denver, CO (D. Allen)  
 FWS, NEPA Coordinator, FWS, Denver, CO (C. Young-Dubovsky)  
 WGFD, Statewide Habitat Protection Coordinator, Cheyenne, WY (T. Collins)  
 WGFD, Non-Game Coordinator, Lander, WY (B. Oakleaf)

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## Response to US Fish and Wildlife Service Letter

1. Several years ago, the Wyoming BLM State Director directed BLM Wyoming field offices to complete section 7 consultation with the FWS prior to issuing new federal coal leases. From the time that decision was made to the issuance of the Draft West Hay Creek coal lease application EIS, no new federal coal leases have been issued in the state. Since the issuance of the draft West Hay Creek EIS, BLM has completed section 7 consultation on five LBA tracts in Campbell and Converse counties in the Powder River Basin and intends to complete section 7 consultation on the West Hay Creek LBA tract prior to making a decision on leasing the West Hay Creek LBA tract.
2. Threatened and Endangered Species. Following discussions with the FWS, OSM, FS, and WDEQ/LQD, BLM has begun attaching a stipulation concerning threatened and endangered species to federal coal leases in Wyoming (appendix D, stipulation (c) of this FEIS).

### **Specific Comments**

3. The referenced statement on page ES-10 of the DEIS summarizes the "Habitat and/or Occurrences" discussion for the bald eagle found in appendix G of the DEIS; it is based on the results of baseline and annual wildlife surveys conducted for the Buckskin Mine. The discussion of potential cumulative wildlife impacts has been revised in chapter 4 and appendix G of the FEIS to include the information provided in your comments.

The Wyoming Coal Mining Rules and Regulations, Chapter 4, Section 2(r)(i) require that each surface coal mine operator shall, "to the extent possible using the best technology currently available and consistent with the approved postmining land use, minimize disturbance and adverse impacts on fish, wildlife, and related environmental values, and achieve enhancement of such resources where practicable" and that those activities shall include properly constructing, locating and operating roads and powerlines, including proper design of powerlines to avoid electrocution of raptors.

The Wildlife section in chapter 4 of the EIS references the approved raptor mitigation plan for the Buckskin Mine, which is part of the approved mining and reclamation permit. Use of raptor-safe power lines, based on the best technology currently available, is part of the mining and reclamation permit for the mine, as required by law. If the West Hay Creek LBA Tract is leased to Triton, the raptor mitigation plan would be amended to include the newly leased tract as required by FWS and WDEQ/LQD, and the existing mining and reclamation permit would be amended to include mining operations on the LBA tract.

4. The EIS analyzes the impacts of leasing a maintenance tract to an existing mine, based on the observed impacts that have occurred and the knowledge that has

been gained from mining and reclamation practices, mitigation measures, and monitoring of surface coal mining operations, which have been conducted in the Powder River Basin for 30 years. The OSM is a cooperating agency on this EIS and has been a cooperating agency on previously prepared EISs analyzing the impacts of leasing federal coal in the basin. OSM has reviewed this EIS and previously prepared EISs to ensure that the analyses are adequate for their needs when the MLA mining plans are evaluated for approval by the Assistant Secretary of the Interior. Your comments did not specifically identify impacts that have been omitted in this and the previous leasing EISs prepared for the Wyoming PRB. We would suggest scheduling a meeting, to include OSM, to discuss additional information that you have identified which should be included in future coal leasing EISs.

5. The FEIS has been revised to include additional information on sage grouse occurrence on the LBA tract and the potential impacts to sage grouse.
6. Additional information regarding the surveys for Ute ladies'-tresses is included in appendix G of the FEIS. Habitat Management, Inc. conducted a survey for Ute ladies'-tresses within the Buckskin Mine Hay Creek permit amendment baseline study area in 1999. Wayne Erickson and Kenneth Carlson of Habitat Management, Inc. managed and were involved in conducting the studies. Both Mr. Erickson and Mr. Carlson have letters from the FWS Colorado Field Services Office recognizing them as qualified to conduct surveys for Ute ladies'-tresses. Other members of the survey team included Dr. Don Hazlett and Mr. Steve Viert of Cedar Creek Associates, Inc., who are both recognized as qualified to conduct Ute ladies'-tresses habitat assessment and surveys by FWS. Pedestrian surveys of all potential habitats were conducted from July 25 through August 4, 1999 and August 31 through September 3, 1999. The survey team met with FWS personnel in Cheyenne on August 30, 1999 to discuss currently acceptable Ute ladies'-tresses survey methods and practices. All wet meadow wetland and lowland prairie vegetation community types were surveyed.
7. The information provided in your comments has been added to the sage grouse discussion in the FEIS.
8. The referenced discussion of potential impacts to displaced songbirds on page 4-25 of the DEIS has been revised in the FEIS to address migratory bird species of management concern in Wyoming.

As discussed in the EIS, the Buckskin Mine has an existing mine has an approved raptor mitigation plan, which is subject to FWS review and approval before the mining and reclamation plan is approved. If Triton acquires a lease for the West Hay Creek LBA tract, the existing plan for the Buckskin mine would have to be amended to include mining operations in the tract prior to initiation of mining activities on those areas. Any nest that will be impacted by mining operations must be relocated in accordance with the approved raptor mitigation plan, after

special use permits are secured from FWS and WGFD. The Buckskin Mine has previously completed this process on the existing Buckskin leases. All active raptor nests within the mine permit area are protected further by buffer zones. Mine-related disturbances for the existing approved mining operations are not allowed to encroach in the near vicinity of any active raptor nest from March until hatching, and disturbances near raptor nests containing nestlings is strictly limited to prevent danger to, or abandonment of, the young.

BLM does not attach stipulations to lease documents for the purpose of regulating how or when mining operations are conducted because:

- a) such stipulations would not be effective or enforceable since the lease document does not authorize or regulate mining operations;
  - b) there are federal and state regulations in place that do direct how surface coal mining operations will be conducted on federal and nonfederal coal leases and there are agencies that are authorized to enforce those regulations. Specifically, as discussed in the "Regulatory Authority and Responsibility" section of the EIS, SMCRA gives the authority for administering programs that regulate surface coal mining operations and surface effects of underground coal mining operations to the OSM. In Wyoming, WDEQ has entered into a cooperative agreement with the Secretary of the Interior to regulate surface coal mining operations and surface effects of underground mining on nonfederal and federal lands within the state;
  - c) stipulations apply only to the specific federal lease to which they are attached, while mining operations for a single mine can occur on multiple federal and nonfederal leases as well as on areas within the mining permit that are not leased for coal removal but may be disturbed as a result of mining operations; and
  - d) stipulations attached to a specific lease cannot readily be changed to incorporate new information or better technology. Stipulations on federal coal leases can only be changed when the lease is readjusted, which is every 20 years. A mining and reclamation permit applies to the entire mining operation and must be renewed periodically, at which time new information and mitigation measures can be incorporated.
9. As discussed in the EIS, the COE reviews all surface coal mining and reclamation permits. COE requires mitigation of all impacted jurisdictional wetlands in accordance with section 404 of the Clean Water Act. They approve the plans for wetland restoration and the number of acres to be restored. COE considers the type and function of each jurisdictional wetland that will be impacted and may require restoration of additional acres if the type and function of the restored wetlands will not completely replace the type and function of the original wetland.

The wetland mitigation plan approved by COE becomes part of the WDEQ mining permit.

10. Additional information about sage grouse habitat affected by the project has been added to the direct and direct impact discussion earlier in chapter 4. Potential cumulative impacts to sage grouse as a result of all anticipated activity in this area are discussed in the wildlife portion of the Cumulative Impact section in chapter 4 of the EIS.
11. As discussed in response 2, above, following discussions with the FWS, OSM, FS, and WDEQ/LQD, BLM is attaching a stipulation concerning threatened and endangered to future federal coal leases in Wyoming (see appendix D, stipulation (c) of this FEIS).

As discussed in response 8 above, BLM does not attach stipulations designed to regulate how or when mining operations are conducted to lease documents because the lease document does not authorize or regulate mining operations.

12. Appendix G of the FEIS has been revised, based on written comments from and oral discussions with FWS that have taken place since the DEIS was published. The revised appendix has been provided to USFWS for further comment and consultation for the West Hay Creek LBA tract will be completed prior to issuance of a decision for the tract.
13. Additional information about the techniques, timing, and results of surveys conducted for Ute ladies'-tresses on the tract is included in appendix G of the FEIS and discussed in response 6 above.
14. As indicated above in responses 1 and 12, section 7 consultation with the FWS will be completed prior to issuance of a lease for the West Hay Creek LBA tract. As discussed in appendix G, consultation is required under the Wyoming Coal Mining Rules and Regulations and the FWS/OSM agreement and FWS will again be consulted during the permit application review process.
15. The FEIS has been revised to address this comment although not all of the past and present activity referenced in the comment letter would have impacts that are or would be directly or indirectly cumulative to the actions considered in this EIS. The existing federal coal leases in the PRB occupy approximately 108,011 acres in Campbell and Converse counties, which represents approximately 1.9% of the combined area of these two counties. If the West Hay Creek LBA tract is leased under BLM's Preferred Alternative, approximately 921 additional acres would be added and the acres of leased federal coal in the PRB would increase by approximately .009%. Most of the direct and indirect impacts that would be related to mining this lease tend to be localized in the area of mining, with the primary exceptions being some of the cumulative air quality, groundwater quantity, and transportation impacts, which are addressed in the "Cumulative Impacts" section in chapter 4 of the EIS. The West Hay Creek LBA tract would be leased as a

maintenance tract for the existing mine; as a result, it represents a continuation of existing mining activity and associated impacts in the Powder River Basin, not new mining development and associated new impacts.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 8

999 18<sup>TH</sup> STREET - SUITE 300

DENVER, CO 80202-2466

<http://www.epa.gov/region08>

03 JUN 23 2003

JUN 19 2003

Ref: 8EPR-N

Nancy Doelger  
Casper Field Office  
Bureau of Land Management  
2987 Prospector Drive  
Casper, WY 82600

Re: West Hay Creek Coal Lease Application  
DEIS

Dear Ms. Doelger:

The Environmental Protection Agency -- Region 8 has reviewed the *Draft Environmental Impact Statement for the West Hay Creek Coal Lease Application*. The DEIS assesses the environmental impacts of a lease by application (LBA) tract known as the West Hay tract potentially to the Buckskin Mine operated by Triton Coal Company, LLC within the Wyoming Powder River coal basin. We submit the following comments in accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act.

We appreciated the multi-agency coal meeting held earlier this year regarding coal leasing in the Powder River Basin and some of the specific issues for this EIS. We hope these types of discussions will continue and would welcome any further opportunities to discuss our comments on this and future coal mining EISs.

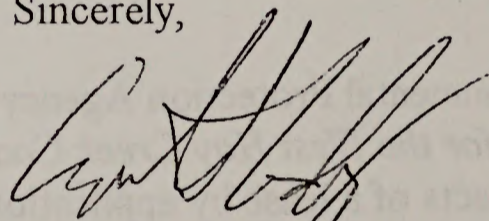
EPA's main concern is air quality in the Powder River Basin (PRB). These coal mines are some of the many sources in the PRB contributing to air quality degradation. EPA has been working closely with the BLM and Wyoming DEQ through the PRB Coalbed Methane EIS to address air quality concerns in the Basin. Although the Wyoming DEQ has by statute, the authority and responsibility to implement air quality mitigation, BLM should use the FEIS to disclose all mitigation for air quality impacts regardless of BLM's jurisdiction (CEQ 40 Questions #19b). The FEIS should outline the regulatory and nonregulatory processes that are underway to address air concerns through the PRB EIS process, as well as include all mitigation under BLM jurisdiction. In particular, since the PRB Coalbed methane Record of Decision has been issued, BLM, Wyoming DEQ, as well as EPA and others have agreed to participate in several working groups that will address the cumulative impacts to air quality in the PRB.

EPA also has concerns about the impacts of nitrogen dioxide emissions from blasting activities and whether or not existing mitigation is sufficient. EPA is also concerned about wildlife impacts to raptors, sage grouse and the long-term implications of coal mining on wetlands in the basin. We are particularly concerned whether or not the 17.5 acres of jurisdictional wetlands and the 7.6 acres of nonjurisdictional playa wetlands within the West Hay LBA will be mitigated with timely and appropriate wetland replacement of equal value.

Based on the procedures EPA uses to evaluate the potential effects of proposed actions and the adequacy of the information in the DEIS, the proposed alternative will be listed in the Federal Register in the category EC-2 (EC - Environmental Concerns, 2 - Insufficient Information). This rating means that the review identified environmental impacts that should be avoided in order to fully protect the environment and the DEIS does not contain sufficient information to thoroughly assess environmental impacts that should be avoided to fully protect the environment. Please see the following detailed comments for specifics on our environmental and information concerns.

We appreciate your interest in our comments. If you have any further questions, please contact Wes Wilson of my staff at (303) 312-6562.

Sincerely,



Cynthia Cody  
Director, NEPA Program  
Office of Ecosystems Protection  
and Remediation

Enclosure: EPA Region 8 Detailed Comments, West Hay Creek, 6 pages

cc: with enclosure

- Dan Olsen, Wyoming DEQ, Cheyenne
- Floyd McMullen, OSM, Denver
- Chandler Peter, Corps of Engineers, Cheyenne
- Jeff Sorkin, Forest Service, Denver



## Environmental Protection Agency - Region 8 Detailed Comments West Hay Creek

1. Air Modeling Discrepancies The DEIS combines information from two separate and incompatible air quality analyses: (1) The Air Quality Analysis for the Wyoming and Montana CBM EIS, and (2) permit analysis by the Wyoming DEQ for the Buckskin mine. Unfortunately, the two air quality analyses use different techniques, which in some cases are incompatible. The direct  $PM_{10}$  impacts from the coal mine permit analysis of  $21.9 \mu\text{g}/\text{m}^3$  is greater than the cumulative impact of  $4 \mu\text{g}/\text{m}^3$  presented in the CBM analysis. Cumulative impacts include: the sum of direct and indirect impacts from the proposed project, and impacts from all other current and reasonably foreseeable activities. Obviously, the cumulative impacts from the mine, plus other sources, cannot be less than the direct impact of the mine alone.

The following sections describe some of the discrepancies between the analyses.

- a. Inconsistent Use of Background  $PM_{10}$  Concentration BLM's Powder River CBM EIS uses a background annual  $PM_{10}$  level of  $17 \mu\text{g}/\text{m}^3$ ; the West Hay Coal Draft EIS states that this is also the background assumed for this EIS on page 3-18, Table 3-2. In contrast, the DEQ air permit, also presented in the West Hay DEIS analysis for the Buckskin Mine uses a background level of  $15 \mu\text{g}/\text{m}^3$ .
- b. Inconsistency in Air Quality Analysis Results The CBM analysis assumes the higher background level, and includes more sources than the Wyoming DEQ permit analyses, but results in lower concentration predictions.

The  $PM_{10}$  cumulative impact of  $21 \mu\text{g}/\text{m}^3$  from the CBM analysis (background plus current and all other reasonably foreseeable development) is clearly incompatible with a direct impact of this permitted mine of  $21.9 \mu\text{g}/\text{m}^3$ , and a cumulative impact of mining plus background of  $36.9 \mu\text{g}/\text{m}^3$ . If both of these results are to be presented in the same EIS, some effort to reconcile these contradictory predictions must be made. Since the Wyoming DEQ predictions are more relevant for the subject DEIS, the Air Quality Appendix should mention this analysis, and preferably emphasize the mine analysis over the Coal Bed Methane analysis which does not represent near field mine impacts as accurately as does the DEQ permit analysis. The cumulative impacts presented should be modified to show a background of  $17 \mu\text{g}/\text{m}^3$ , a direct impact of  $21.9 \mu\text{g}/\text{m}^3$ , and contributions from other (i.e., CBM sources).

2. Wyoming DEQ Permit Analysis The DEQ analysis process is not described adequately in the Air Quality appendix. We suggest the Final EIS consider these two differing air quality analyses (the cumulative impact analysis is BLM's recent Coal Bed Methane Powder River RMP EIS and the State of Wyoming air permit for mines) and integrate the results.

3. Cumulative Impacts Above the PSD Class II Increment The maximum cumulative annual  $PM_{10}$  impact presented in the Wyoming DEQ permit analyses is  $21.9 \mu\text{g}/\text{m}^3$  (page 4-15). This exceeds the PSD Class II allowable increment for annual  $PM_{10}$  of  $17 \mu\text{g}/\text{m}^3$ . This impact should be reported in table 4-8, Cumulative Impacts. The State's reasoning behind this permitted level should be discussed (i.e., only some stated fraction of the mine emissions consume increment based on the actual emission in the baseline year of 1997, and this portion of emissions when combined with other new actual and permitted emissions, results in less than  $17 \mu\text{g}/\text{m}^3$  of cumulative impact).
4. Page 4-11 refers to information from upwind and downwind monitors. The wind rose on page 3-15 shows a bimodal wind pattern, with two predominant directions out of the northwest and the southeast. Upwind and downwind are somewhat ambiguous terms with this bimodal wind pattern. This terminology could be changed to "downwind" and "crosswind" to more accurately describe the monitor placement.

## **Nitrogen Dioxide**

Nitrogen Dioxide Some progress has been made by the State and the mining industry in reducing the risk to local residents and travelers from the discharge of nitrogen dioxide from mining blasts. However, releases of nitrogen dioxide are still of concern because of the toxicity of the gas at relatively low levels, the large percentage of the population with respiratory conditions which would render them sensitive to  $NO_2$ , and the lack of a technical method to reliably prevent  $NO_2$  generation.

There are several areas that should be addressed more fully to disclose potential impacts and determine if additional mitigation may be needed. The FEIS should be revised to:

- a. Use a concentration of nitrogen dioxide in analyzing the risk and developing mitigation which will prevent adverse health effects, including sensitive members of the population,
  - b. Identify receptors that may be impacted by nitrogen dioxide releases (e.g., residences, public roads, bus stops, etc.),
  - c. Describe more fully the actions and implementation procedures that the mines and the State have already implemented to reduce  $NO_2$  releases from blasting.
5. Safe Concentrations of Nitrogen Dioxide As discussed in the DEIS, EPA recommends that concentrations not exceed 0.5 ppm to protect sensitive members of the public. Similarly the NIOSH recommendation, which is applicable only to workers, is a limit of 1 ppm based on a 15 minute exposure that should not be exceeded at any time during the workday. The NIOSH recommendation is only for adult, healthy workers, during the workday. It is not designed to protect the general public, which includes infants, the elderly and other sensitive members of the population. The OSHA permissible exposure limit is 5 ppm, determined as a ceiling value. This means that the concentration must not be exceeded during any part of the workday, as measured instantaneously. This value was developed for workers, considering not just their health, but their remuneration and costs to industry to implement the standard. It is not protective of the general public (as described above for the NIOSH recommendation), and is

inappropriate for those who are involuntarily exposed to toxicants. The Immediately Dangerous to Life or Health (IDLH) concentration is 20 ppm.

In reviewing the DEIS, it appears that less protective criteria were used in analyzing the impacts and in developing mitigation. The Thunder Basin Coal Company's study of developing safe setback distances for blasting activities recommended a criteria of 8 ppm NO<sub>2</sub> and it appears that the setback study used 5 ppm (based on a 10 minute average), exceeding EPA's and NIOSH recommendations, and OSHA limits. The impact analysis for this new LBA needs to assess if there is still a potential for nitrogen dioxide levels to exceed 0.5 ppm on public roads, residences or other public access areas. The BLM and OSM need to ensure that public health is protected from mining operations. We recommend that the blasting setback distances be recalculated using 0.5 ppm.

6. Nitrogen Dioxide Concentrations Pages 4-8 through 4-11, summarize information on nitrogen dioxide emissions from an April 2000 study prepared by the Wyoming Mining Association. The last line on page 4-9 states "The maximum 15 minute average valid values observed for each of the six monitors ranged from 0 to 1.65 ppm NO<sub>2</sub>." Since 2000, additional monitoring has been conducted that shows nitrogen dioxide levels exceeding levels of concern. For example in the *Black Thunder Mine Report for Development of Safe Setback Distances for Blasting Activities at the Black Thunder Mine*, dated July 2002, the 10-minute average for NO<sub>2</sub> ranged from nondetectable to 20.4 ppm (IDLH = 20 ppm). We assume that the 20.4 ppm (overburden shot # 198202) value was measured in an area that was not accessible to the public. However, the wide range of concentrations demonstrates that nitrogen dioxide concentrations are highly variable and may reach levels which could adversely affect health. Of more concern, are several of the monitoring events which measured concentrations exceeding the health recommendations several thousand feet from the mining blasts. Appendix J of the report lists 5.5 ppm NO<sub>2</sub> at 5,267 feet (cast # 844), 2.1 ppm at 5,368' (cast # 860), and 16.5 ppm at 2,186' (cast # 887). This section in the FEIS should be revised to more fully reflect the range of known nitrogen dioxide emissions. If the data are available, this section should also incorporate the changes in nitrogen dioxide emissions since this mine began developing new blasting methods to reduce nitrogen dioxide emissions.
7. Affected Environment for Nitrogen Dioxide Emissions The FEIS needs to identify the residences, roads and other potential avenues of exposure to nitrogen dioxide. The FEIS should describe the potential risks to people living or traveling in this area. Are there any additional residences or school bus stops in this area? Could the public traffic along either McGee Road or Collins Road west of the West Hay LBA area be affected by blasting?
8. Mitigation for Nitrogen Dioxide Emissions According to page 3.25, the Buckskin Mine has already implemented voluntary measures to reduce NO<sub>2</sub> emissions, primarily by limiting the size of individual shots to control emissions. Because the measures are voluntary, mines may choose not to implement the mitigation measures. The FEIS needs to disclose the impacts for both scenarios. It should also be noted that the measures for the mines do not include a prohibition of blasting when conditions are unfavorable (large blast, wet conditions, weather

inversions, little wind, wind direction towards residences/road, etc.). The existing mitigation merely requires notification and monitoring. We recommend that a stipulation be added to the lease prohibiting blasting when conditions are unfavorable. The mines would then need to analyze the size of blasts in conjunction with weather conditions and potential public exposure, to prevent exceedances of the EPA and NIOSH recommended toxicity levels.

## **Cumulative Impacts**

9. Direct & Indirect Impact Analysis Vs. Cumulative Impacts In the DEIS, there are some inconsistencies between the direct and indirect impact analysis and the cumulative impact sections. This is understandable as the majority of the cumulative impact sections were taken from the PRB Coalbed Methane EIS and the direct and indirect analyses were prepared specifically for this EIS. These inconsistencies become an issue for resources which are substantially affected by cumulative impacts. For several of these resources, the direct and indirect impacts predicted in the DEIS are likely to be different from the actual impacts because of expected changes to the resource as a result of other activities (e.g., the wells that are predicted to be affected or unaffected by coal mining may already be dry because of coalbed methane production). The relative magnitude of direct and indirect impacts may also change as a result of cumulative impacts (e.g., wildlife habitat) or there may be synergistic impacts from the coal mines and other development (e.g., noxious weeds).

We recommend that the impact sections for resources that are substantially impacted by cumulative impacts be reevaluated to determine how the impacts will overlap in time and for the resource as a whole. For example, does the timing of maximum impact from other activities (e.g., coalbed methane) coincide with the peak of impacts from coal mining? Are any resources impacted by coal mining approaching sustainability limits because of cumulative impact levels? The relationship between project and cumulative impacts might be more easily understood if the FEIS were to combine the Environmental Consequences and Cumulative Impact sections to more clearly disclose the overall condition or impacts on each resource. The following comments explain our concerns in more detail and on a resource specific basis.

10. Groundwater Cumulative Impacts By analyzing coal mining drawdown independently of the larger drawdown predicted from coalbed methane, the EIS predicts a relatively limited number of wells will be impacted by drawdown instead of the large number predicted as a result coalbed methane development. Although the cumulative impacts section eventually discusses these issues, the direct and indirect analysis also needs to reflect the condition of the resource that will be likely during coal mining. The DEIS states that the mine operator would be required to replace water supply wells if they are impacted by mining. However, for wells impacted by coalbed methane, a surface owner and the CBM operator must come to an agreement for water well monitoring and mitigation on a case-by-case basis. How will the obligation for well replacement be implemented for wells that are impacted both by mining and coalbed methane?

11. Cumulative Impacts, Reasonably Foreseeable Future Actions The cumulative impact analysis should include additional coal and energy development activities. The reasonably foreseeable future activities list on page 4-5 only looks at projects with firm plans. However, it is apparent from the history of the area, current trends, existing infrastructure, and coal and other energy reserves; that coal mining and energy development will continue to expand. For example, the 16 active coal mines are in a row from north of Gillette to the David Johnston mine. It appears likely that these mines will continue to grow and fill in some of the area between the existing mines. Given the large areal extent of energy development in this area, there is a strong potential for permanent large-scale impacts for habitat (fragmentation, loss of vital habit) ground water, riparian ecosystems, wetlands and noxious weeds. Areawide air and water quality impacts will also be significant.

This broader cumulative impact analysis should also factor in the success of reclamation/mitigation plans for various resources. Mining reclamation works well for restoring some aspects of resources such as grazing livestock and wildlife, and visual aesthetics. Other resource values may take a long time to return to a full function or may not be restorable at all (e.g., wetlands, groundwater, unique habitats).

12. Noxious Weeds Noxious weeds are an increasingly difficult problem in the Powder River Basin. It appears that with coalbed methane development, noxious weeds will be an increasingly greater problem. We note in particular that there are already several weeds identified in the grazing section which are on Wyoming's restricted list – poverty weed or on other states' lists of noxious weeds – such as cheatgrass. Especially if the drought continues, this area will be at increased risk of cheatgrass/fire cycles forcing out even more desirable plant species. The FEIS could address what additional mitigation is needed to control the spread of noxious weeds and what types of programs are being developed on an area wide basis to prevent the spread of seeds along roads via mining/construction/drilling equipment.

## **Wetlands**

13. Wetlands Mitigation As noted on page 4-20, Buckskin Mine has completed a wetlands inventory that was approved by the Corps of Engineers in April 2001. According to that inventory, 17.5 acres of jurisdictional wetlands exist within the West Hay Creek LBA analysis area. Since the surface is not federally-owned, the DEIS states that replacement mitigation of jurisdictional wetlands on privately owned surface may occur in accordance with agreements with the private landowners. This infers that mitigation may not take place if it is contrary to the landowners interests. We request that BLM directly assist the Corps to locate suitable replacement wetland sites regardless of the interests of the private land owners so that Federal land might be made available for wetlands replacement if private land is not available for any reason. The wetlands mitigation plan needs to be amended to compensate for the temporal loss, if any, of wetlands values during and following mining. As noted in the DEIS, wetlands obviously cease to function during the 10 to 20 years of mining. However, wetlands fed by groundwater will not regain function until the ground water table recovers. We recommend that additional mitigation be established to compensate for the long-term loss of wetland values. The mitigation plans for previous or current reclamation may provide good

locations for increasing wetlands in the area. Alternatively, the mine may want to improve other wetlands damaged by over grazing, poorly constructed roads or off-road vehicle damage on or off federally-owned lands. If this kind of mitigation is applied, mitigation ratios may need to be as high as 8:1 to compensate for equal values. We also request that all mitigation involve a commitment to perpetual management.

14. Mitigation of Non-jurisdictional Wetlands It is not clear from the DEIS if all non-jurisdictional wetlands impacts will be mitigated. Executive Order 11990 requires that all Federal Agencies protect wetlands. The wetlands protection provisions of E.O. 11990 to apply to all wetlands (i.e., jurisdictional and non-jurisdictional). The second paragraph on page 4-20 discusses playa type wetlands which are no longer be identified as jurisdictional waters. Since these wetlands have sandy soil conditions, standing water does not remain for long periods. The final EIS should also recognize that playas with sandy soils act as important recharge zones. For example, some studies have indicated that recharge into the Ogallala aquifer under playas exceeds three inches per year while recharge in the surrounding uplands occurs at the only .004 to .03 inches per year. The remainder of the paragraph implies that reclamation costs may be a factor in determining whether or not non-jurisdictional wetlands will be restored. There are approximately 7.6 acres of playa features included in the LBA analysis area that are not jurisdictional and therefore not subject to the COE's permit and replacement criteria. The DEIS states that Triton may continue to establish playa features within the reclaimed topography especially if no special segregation of the soils in the existing playas would be needed. Will Triton, or the successful bidder on the LBA, replace these playa features to compensate for their loss and will the company segregate the soils for this purpose? The FEIS should clarify if all non-jurisdictional wetlands will be mitigated.

## Wildlife

15. The analysis for wildlife impacts should be based on the habitat needs of the species of concern, rather than the specific boundaries of the mines and lease tracts. There also needs to be sufficient analysis to understand the impacts of the LBA decision. For example, on page 4-24, the DEIS states that there are no sage grouse leks on the West Hay Creek LBA, there are nesting areas in the area and recent sage grouse activity nearby. It is not clear if these nesting areas are important to the sage grouse population or if there are sufficient numbers of leks nearby to sustain the population. By looking at sage grouse habitat on a component by component basis and mainly on LBA and mining properties, the impacts of the LBA decisions are not apparent on the health and sustainability of the grouse population in this area.

**Environmental Protection Agency Rating System for Draft Environmental Impact Statements  
Definitions and Follow-Up Action\***

**Environmental Impact of the Action**

**LO - - Lack of Objections**

The Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

**EC - - Environmental Concerns**

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

**EO - - Environmental Objections**

The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

**EU - - Environmentally Unsatisfactory**

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

**Adequacy of the Impact Statement**

**Category 1 - - Adequate**

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

**Category 2 - - Insufficient Information**

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

**Category 3 - - Inadequate**

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

\* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.

## Response to Environmental Protection Agency Letter

In order to respond more accurately to some of your comments, BLM consulted the WDEQ, which has, by statute, the authority and responsibility to implement air quality mitigation in the PRB, as you stated in your cover letter. Both the Air Quality and Water Quality Divisions of WDEQ provided information on their regulatory programs, including monitoring data and mitigation measures, and this information has been used to revise the FEIS in response to your comments.

### Responses to Detailed Comments

1. **Air Modeling Discrepancies.** The EIS presents information obtained from two air quality impact analyses prepared for different purposes using different modeling techniques and assumptions. A discussion of the differences between the models and assumptions used for the regional air quality impact analysis and the mine-specific air quality impact analyses in the Wyoming PRB has been added to the FEIS.
  - a. The background concentrations used in each analysis were not selectively chosen to give predictions less than NAAQS. The differences are discussed below and this information has been included in the FEIS.

The WDEQ/AQD air quality permit analyses use a background PM<sub>10</sub> concentration of 15 µg/m<sup>3</sup>, which WDEQ/AQD has chosen as representative of background ambient air quality in the area without activity (i.e., prior to the operation of the coal mine sources). In the WDEQ/AQD air quality permit analyses, potential emissions corresponding to the entire maximum production level from the coal mine undergoing permitting and other coal mines in the area are added to this background concentration, regardless of when the coal mine was permitted or constructed.

The cumulative air quality impact analysis prepared to evaluate the impacts of proposed CBM development in Wyoming and Montana uses a background PM<sub>10</sub> concentration of 17 µg/m<sup>3</sup>, which is a recently monitored value that is used as representative of all sources operating as of a specified date (i.e., prior to the addition of more sources). The 17 µg/m<sup>3</sup> background PM<sub>10</sub> concentration was monitored in Gillette and is used as the background for the entire PRB, including existing coal mining operations, as of the specified date. The Wyoming and Montana cumulative air quality impact analysis was based on inventorying and modeling impacts from sources permitted and constructed after the date corresponding to the monitored background concentration. Using this approach, only the projected production increases at the coal mines, not the entire permitted production, are included in the Wyoming and Montana cumulative air quality impact analysis.



- b. The Wyoming and Montana cumulative air quality impact analysis includes a combined project area of more than 33,000,000 acres, and focuses on oil and gas and coal bed methane development in northeastern Wyoming and southeastern Montana. That analysis considers other sources in the area, including surface coal mines and sources from adjacent states, on a broad cumulative basis.

The WDEQ/AQD air quality analyses cover much smaller areas (several thousand acres), focus on specific surface coal mining operations at the surface coal mines in the Wyoming PRB, and consider potential overlapping impacts from adjacent surface coal mining operations.

The differences in the air quality analyses methodologies include, but are not limited to:

*Different models*

- The ISCLT model is used for the WDEQ/AQD air quality permit analyses – annual only
- CALPUFF is used for the Wyoming and Montana cumulative air quality impact analysis

*Different emissions inventories for the coal mines*

- Total mine production is used for the WDEQ/AQD air quality permit analyses
- Projected production increases after a specified date are used for the Wyoming and Montana cumulative air quality impact analysis

*Different mine boundary representations for the coal mines*

- The lands necessary to conduct mining (LNCM) boundary is used for the WDEQ/AQD air quality permit analysis
- Representative rectangular areas are used for the Wyoming and Montana cumulative air quality impact analysis

*Different background PM<sub>10</sub> concentrations (see 4.a. above)*

Given these substantial differences in methodology and scope, a direct comparison of the results of these two analyses is probably not meaningful. It is not unexpected that the concentrations predicted by a WDEQ/AQD air quality permit analysis, which is a near-field analysis covering a small area in detail, is higher in localized areas than those predicted by the Wyoming and Montana

cumulative air quality impact analysis, which is a broad cumulative analysis covering a substantially larger area using a different methodology. The EIS includes the methodology and results of the WDEQ/AQD analyses in the "Direct and Indirect Impacts" section for air quality. This section covers the direct and indirect impacts of the action being considered, which is leasing additional coal in a specific tract to an existing mine in the PRB. The discussion of the WDEQ/AQD analysis process has been expanded in the FEIS. The cumulative air quality analysis presented in the "Cumulative Air Quality Impact" section and in appendix E was prepared for the Wyoming *Final EIS and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project* and the Montana *Final Statewide Oil and Gas EIS and Proposed Amendment of the Powder River and Billings RMPs*. These documents will be referred to as the Wyoming Oil and Gas EIS and the Montana Oil and Gas EIS in the following discussions. The cumulative air quality impact analysis represents a much broader estimate of the potential regional air quality impacts as a result of all development in the PRB. This modeled assessment of potential air quality impacts includes a number of assumptions, which are both over- and under-conservative in nature, and it generalizes impacts due to its nature and scope, but it does represent the most comprehensive air quality analysis that has been conducted for northeast Wyoming and southeastern Montana to date.

2. Wyoming DEQ Permit Analysis. The air quality appendix in the EIS pertains to the cumulative impact analysis only and has been labeled accordingly in the FEIS. Additional discussion of the WDEQ/AQD air quality permit analysis process has been added to the air quality discussion in chapters 3 and 4 of the FEIS.
3. Cumulative Impacts Above the PSD Class II Increment. It is not correct to compare the concentrations predicted by the WDEQ/AQD air quality permit analyses to the PSD increments. As indicated in the Regulatory Framework portion of the Air Quality Section of Chapter 3 of the EIS, surface coal mining operations in the PRB are not currently affected by the PSD regulations for two reasons: surface coal mines are not on the EPA list of 28 major emitting facilities for PSD regulation, and point-source emissions from individual mines do not exceed the PSD emissions threshold of 250 tons per year. Fugitive emissions are not included in the definition of potential emissions except for certain specified source types [40 CFR 52.21, (b)(1)(iii)]. Mining related fugitive emissions are exempt from the applicability determination.
4. The discussion has been revised in the FEIS.

**Nitrogen Dioxide.** According to information provided by WDEQ/LQD, the mines have been able to reduce the number of shots that produce nitrogen dioxide (NO<sub>2</sub>) and the amount of NO<sub>2</sub> produced per shot by using different blasting agents, different additives, different initiation systems and sequencing, bore hole liners, and smaller casts blasts. They have not been able to eliminate NO<sub>2</sub> production due to the variety of factors that

can contribute to incomplete combustion of the explosives. Two consecutive blasts using the same product and procedures often produce dramatically different results.

- a. The EIS identifies that there is no short-term exposure standard at either the state or national level for nitrogen dioxide and identifies the NIOSH, OSHA, and EPA short-term exposure criteria. Without an established short-term exposure standard which can be enforced, BLM has not identified a concentration for analyzing risk and developing mitigation that could be implemented by the appropriate regulatory agencies.
  - b. Potential receptors that could be impacted by NO<sub>2</sub> releases related to blasting would include public highways, occupied dwellings, school bus stops, and other publicly accessible facilities. The roads that pass through the LBA area are county roads, although a portion of US 14-16 is located nearby. The locations of public roads, occupied dwellings, school bus stops, and publicly accessible facilities in the area are shown in figure 3-17 in the FEIS.
  - c. Many of the mines in the Wyoming PRB have instituted voluntary measures to reduce the risk of public exposure to intermittent, short term releases of NO<sub>2</sub> when large blasts are planned, and WDEQ has required several mines to institute additional such measures. These measures, as well as the some of the blasting procedures that some of the mines have been using to try and reduce NO<sub>2</sub> emissions during blasting, are described in the FEIS in the air quality section of chapter 3.
5. Safe Concentrations of Nitrogen Dioxide. As discussed above, the FEIS includes the short-term exposure criteria identified by NIOSH, OSHA, and EPA, but recognizes that there is no short-term numerical exposure standard for NO<sub>2</sub> at either the federal or state level. According to WDEQ/LQD, with one exception, the mitigation measures being implemented in the PRB are not dependent on a numerical standard, but are administrative controls designed to prevent NO<sub>2</sub> from reaching receptors. The exception is the Eagle Butte Mine, which is required to use a set back distance that is based on a numerical exposure limit.
6. Nitrogen Dioxide Concentrations. The Wyoming Mining Association Study that is summarized in the West Hay Creek EIS was designed to monitor NO<sub>2</sub> levels in publicly accessible areas and, accordingly, sites were selected for this study based on public accessibility and proximity to mining activities. The Black Thunder study referenced in your comment letter was designed to collect NO<sub>2</sub> concentration data for a modeling study and, accordingly, the monitors were located as close to the blasts as feasible in order to collect the necessary data. These locations were in areas that are both inaccessible to the public and cleared of employees during blasting activities. The actual NO<sub>2</sub> measurements recorded in the Black Thunder study ranged from non-detectable to 21.4 ppm. The high value was measured 361 feet from the blast. In the FEIS, this discussion has been expanded to include more information and to clarify the differences between

the two blasting studies and to discuss some of the changes in nitrogen dioxide emissions since the mines began developing new blasting methods.

7. Affected Environment for Nitrogen Dioxide Emissions. The locations of public highways, occupied dwellings and school bus stops in the area of the LBA tract are shown in figure 3-17 in the FEIS. As indicated in the EIS, phone notification of workers and neighbors prior to blasting is both a voluntary and required measure that some mines have implemented when large blasts are planned. This includes occupants of nearby residences. WDEQ/LQD requires some mine operators to close public roads when blasting operations occur nearby, mainly for issues such as fly rock and the startle factor.
8. Mitigation for Nitrogen Dioxide Emissions. The voluntary measures that some mines have instituted to ensure that the general public is not exposed to NO<sub>2</sub> as a result of blasting activities are not part of the mining and reclamation permits for these mines. WDEQ/LQD has pursued voluntary measures in order to allow operators to develop new mitigation measures that can be effectively used to address the problems. The mines can choose to discontinue the voluntary measures. However, exposure of the public to blasting clouds containing NO<sub>2</sub>, with or without voluntary control measures, will trigger enforcement action, including permit requirements designed to control public exposure to NO<sub>2</sub> by the WDEQ/LQD. Several mines in the basin currently have permit requirements designed to control public exposure to NO<sub>2</sub> as a result of past reports of public exposure to blasting clouds from those mines. Those mines are required to monitor weather conditions before blasting and close roads when appropriate to protect the public

The BLM does not authorize mining operations by issuing a lease and BLM is not authorized to approve the mining and reclamation plan, which does regulate how mining operations are conducted on the federal leases. BLM does not attach stipulations designed to regulate how mining operations are conducted to lease documents because:

- a) such stipulations would not be effective or enforceable since the lease document does not authorize or regulate mining operations;
- b) there are federal and state regulations in place that do direct how surface coal mining operations will be conducted on federal and nonfederal coal leases and there are agencies that are authorized to enforce those regulations. Specifically, as discussed in the "Regulatory Authority and Responsibility" section of the EIS, SMCRA gives the authority for administering programs that regulate surface coal mining operations and surface effects of underground coal mining operations to the OSM. In Wyoming, WDEQ has entered into a cooperative agreement with the Secretary of the Interior to regulate surface coal mining operations and

surface effects of underground mining on nonfederal and federal lands within the state;

- c) lease stipulations are specific to the federal lease to which they are attached. Mining operations for a single mine can and generally do occur on multiple federal and nonfederal leases as well as on areas within the mining permit that are not leased for coal removal but may be disturbed as a result of mining operations. The mining and reclamation permit applies to the entire mining operation; and
- d) stipulations attached to a specific lease cannot readily be changed to incorporate new information or better technology. Stipulations on federal coal leases can only be changed when the lease is readjusted, which is every 20 years. A mining and reclamation permit applies to the entire mining operations and must be renewed periodically, at which time new information and mitigation measures can be incorporated.

## Cumulative Impacts

9. Direct and Indirect Impact Analysis vs. Cumulative Impacts. The cumulative air quality, surface water, and groundwater impact analyses were prepared for the Wyoming Oil and Gas EIS and/or the Montana Oil and Gas EIS, but potential impacts from approved surface coal mining activities were considered in those analyses. The Wyoming and Montana Oil and Gas EIS analyses were designed to consider the estimated timing of maximum overlapping impact from CBM development, which will peak during the time of maximum drilling activity, with ongoing surface coal mining activities, which have been and are predicted to continue to increase gradually. In the case of the West Hay Creek EIS, the action that BLM is considering approving is leasing the federal coal resource to an existing mine in the Wyoming PRB. Adding new acreage to an existing mine does not result in the introduction of new impacts; it extends impacts that are already occurring. In the case of the West Hay Creek LBA tract, the applicant does not propose to increase production beyond the currently permitted level. BLM recognizes that the direct and indirect impacts predicted in the EIS may be altered by changes to some of the resources as a result of other activities.

When BLM began analyzing the impacts of leasing federal coal under the regulations at 43 CFR 3425 (Leasing on Application) in the Wyoming PRB, a conscious decision was made to separate the discussion of predicted direct and indirect impacts to resources from the discussion of predicted cumulative impacts to resources in order to differentiate between the two analyses, and to ensure that we considered each in our leasing documents. We agree that it could be beneficial to eliminate the duplication and confusion that results from discussing each resource separately in the affected environment, direct and indirect impact, and cumulative impact sections.

10. Groundwater Cumulative Impacts. The federal action that is being analyzed in this EIS is leasing of the federal coal included in the West Hay Creek LBA tract, under the assumption that, if the coal is leased, it will be mined by the adjacent existing Buckskin Mine. The intent of the direct and indirect impact analysis in the EIS is to disclose the direct and indirect impacts of leasing and mining the federal coal in the tract. If that action is not approved, there may be impacts to groundwater as a result of other activities, which are disclosed in the cumulative impact section of the EIS. They will not be a direct or indirect result of approval of the action being considered in this EIS.

According to WDEQ/LQD, coal mines are required to replace water supply wells if the mine activities have impacted the well to the extent that the well no longer fulfills its intended purpose. When water wells have been impacted by both coal mining operations and CBM development, WDEQ/LQD's approach is to try and determine the amount of impact caused by the mining operation. The mine's responsibility for replacement of the well depends on the amount of impact caused by the mine. There have been cases where both the mine and the CBM operator have shared in the cost of replacing a water supply well.

11. Cumulative Impacts, Reasonably Foreseeable Future Actions. The purpose of an EIS is to disclose the potential impacts of a specific proposed federal action so that a decision maker can make an informed decision. That decision should consider the potential impacts of a proposed project when combined with other reasonably foreseeable development in an area. The West Hay Creek EIS cumulative impact analysis includes the projects that BLM has identified as reasonably foreseeable. The analysis assumes increases in coal production based on existing approved mining and reclamation permits and proposed changes in those permits. Assumed levels of CBM production are based on the Wyoming and Montana oil and gas EISs, which is the best available estimate of the levels of CBM and conventional oil and gas development for the next 10 years. Other projects are considered based on their likelihood of completion.

There are currently 13 active and 2 inactive existing mines located in three groups or pods that extend from north of Gillette, Wyoming, to south of Wright, Wyoming. One group of mines is located north and northeast of Gillette, one group of mines is located between Gillette and Wright, and the third group of mines is located east and south of Wright. [The Dave Johnston Mine referenced in your comments, which is located much further south (near Glenrock, Wyoming), has ended mining operations, and is now in the process of reclaiming areas of disturbance.] It is likely that existing mines within the three groups will continue to lease coal adjacent to their existing operations if the coal in those areas can be economically recovered and sold. It is not likely that the area between the groups of mines will be filled in because the coal deposits do not form one continuous thick mineable unit stretching from north of Gillette to south of Wright. The coal splits into thinner beds and the quality of the coal deteriorates in the areas between these groups of mines. That is why there are no existing mines in those

areas and why the existing mines are not leasing in those areas, even though the overburden in those areas is thinner than the overburden in the tracts that have been applied for, which would make the coal much more economical to recover. When it was active, the Dave Johnston mined coal from entirely different, younger coal beds.

BLM has started work on a two-year technical study to assess current coal development, develop projections of expected future development, and develop data and modeled projections of the effects of projected surface coal mining in the Wyoming PRB for use in evaluating the impacts of leasing and mining the two remaining pending LBA tracts. Briefings on this study were held for state and federal agencies, including EPA and WDEQ, in November 2003. Please contact Mike Karbs with the BLM Casper Field Office for more information on this study.

12. Noxious Weed Control. The "Vegetation" section of the cumulative impact analysis has been expanded to describe measures that are being required outside of the coal mine permit area to address noxious weeds. A plan for controlling noxious weeds is included in the mining and reclamation plan permit for each mine, including the Buckskin Mine, as discussed in the EIS.
13. Wetlands Mitigation. To the extent that the 17.5 acres of jurisdictional wetlands identified on the LBA tract analysis area would be affected by mining, the COE would have to approve a wetland mitigation plan prior to approval of the surface coal mining and reclamation permit revision for the West Hay Creek LBA tract. COE requires mitigation of all impacted jurisdictional wetlands in accordance with section 404 of the Clean Water Act, and determines the number of acres to be restored. COE considers the type and function of each jurisdictional wetland that will be impacted and may require restoration of additional acres if the type and function of the restored wetland will not completely replace the type and function of the original wetland. The wetland mitigation plan approved by COE becomes part of the WDEQ mining permit.
14. Mitigation of Nonjurisdictional Wetlands. Restoration of nonjurisdictional wetlands is not regulated by COE under section 404 of the Clean Water Act. Replacement of nonjurisdictional wetlands may be required by the surface management agency, if the surface estate is federally owned, or by the surface owner, if the surface estate is not federally owned. BLM requires restoration of all impacts to wetlands on BLM-administered surface; however, there is no BLM-administered or other federally-administered surface estate included in the West Hay Creek LBA tract, or in this area. WDEQ/LQD requires the restoration of some nonjurisdictional wetlands, depending on the values (importance to wildlife) associated with the wetland. WDEQ requires restoration of playas if they have hydrologic significance. Additional discussion of nonjurisdictional wetlands mitigation has been included in the FEIS.

15. Additional information has been added to the discussions of sage grouse and other species in the wildlife sections of the FEIS.





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