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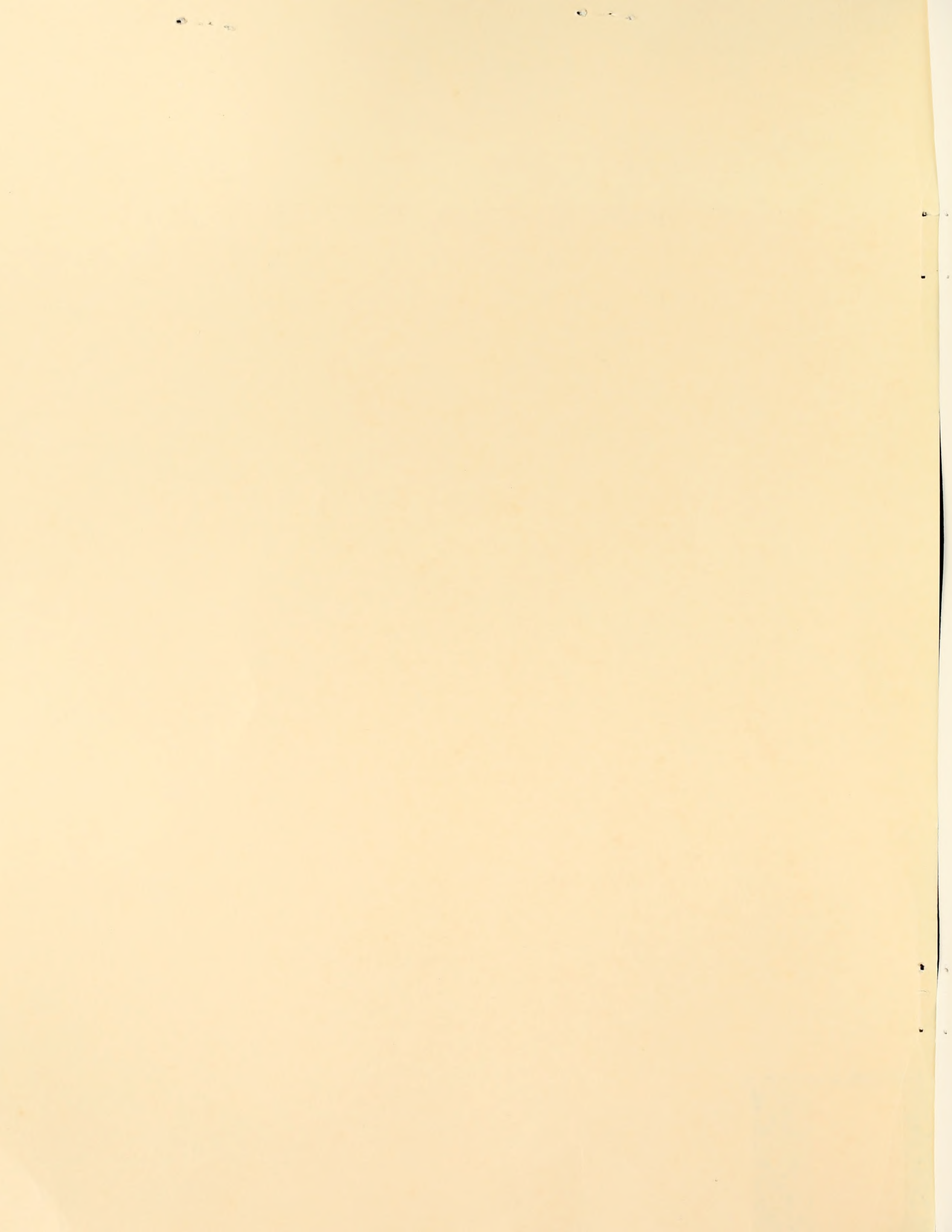
**ENVIRONMENTAL ASSESSMENT FOR
NORTHERN CHEYENNE EXCHANGE:
GREENLEAF-MILLER CREEK COAL AREA**

In Rosebud County, Montana

May 3, 1983

U.S. Department of the Interior
Bureau of Land Management
Miles City District Office
Powder River Resource Area

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Rosebud County, Montana

This Environmental Assessment was prepared by

U.S. Department of the Interior
Bureau of Land Management
Powder River Resource Area
Miles City District Office
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May 3, 1983

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ENVIRONMENTAL ASSESSMENT FOR
NORTHERN CHEYENNE EXCHANGE
GREENLAW-MILLER GREEN COAL AREA

Residual Change Matrix

The Environmental Assessment Report is prepared by

U.S. Department of the Interior
Bureau of Land Management
1015 North Lincoln Street
Denver, Colorado 80202
303-733-7000

May 2, 1982

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EA-MT-020-73-3-78

DECISION RECORD

**ENVIRONMENTAL ASSESSMENT FOR
NORTHERN CHEYENNE EXCHANGE:
GREENLEAF-MILLER CREEK COAL AREA**

This environmental assessment (EA) was prepared in accordance with the Federal Coal Management Program and in compliance with 43 CFR 3400 and 30 CFR 1500. The EA also develops mitigation measures (stipulations) which will be incorporated into the noncompetitive lease issued to Peabody Coal Company. The Department of the Interior has signed an agreement with Peabody Coal Company to issue a lease in exchange for a lease on the Northern Cheyenne Reservation by December 1, 1984.

ALTERNATIVES CONSIDERED

- A. Proposed Action: Issue a noncompetitive lease in the area selected by Peabody Coal Company to satisfy the terms of the Northern Cheyenne Exchange legislation.
- B. No action (no leasing).
- C. Issue a certificate of bidding rights to obtain federal coal leases at competitive sale.

DECISION AND RATIONALE

DECISION: Accept the proposed action with the stipulations attached.

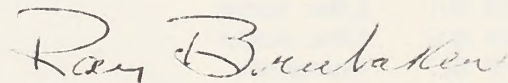
RATIONALE: Passage of the "Northern Cheyenne Indian Exchange Legislation" (PL 96-401) provided for cancellation of certain leases within the Northern Cheyenne Indian Reservation and negotiations with parties holding such leases for noncompetitive leases for federal coal off the reservation. Peabody Coal Company qualified under this law and signed an agreement with the Secretary of the Interior to exchange their reservation leases for a noncompetitive coal lease of 130 million tons of coal in the Greenleaf-Miller Creek area.

Because the decision to lease is made by the law cited, the Secretary of the Interior has no discretion in considering issue of a coal lease. He is further constrained by the cancellation agreement with the company to the Greenleaf-Miller Creek area because the law requires the area unlikely to be mined, unless incorporated into an existing mining unit, controlled by the company. Bidding rights would be issued only if the area were found to be unacceptable for coal leasing.

MITIGATION: The stipulations developed for this noncompetitive lease are attached.

CONCLUSION

I find this document to be an adequate assessment of the proposal and an EIS is not required. I recommend selection of the proposed action. The cumulative effects of a lease will be described in an Environmental Impact Statement to be written by the Montana Department of State Lands before a permit to mine can be issued.



Ray Brubaker

Attachment: Stipulations

LEASE STIPULATIONS

Criteria 7 and 15 were found to apply in the affected area. Before mining can occur, the following stipulations would have to be met.

Criterion 7 — those 12 sites found eligible to the National Register are found unsuitable for mining. An exception to allow mining of these sites will be applied, provided mitigative measures (avoidance, stabilization and protection or data recovery of cultural resource values) are implemented prior to mine plan approval. These sites are as follows:

24 RB 696	Buffalo jump, alignments
24 RB 718	Tipi rings, artifacts
24 RB 719	Buried materials
24 RB 727	Homestead
24 RB 728	Lithic scatter artifacts
24 RB 729	Tipi rings, artifacts
24 RB 735	Tipi rings, artifacts
24 RB 736	Tipi rings
24 RB 753	Multicomponent occupation
24 RB 755	Tipi rings, artifacts
24 RB 825	Bison kill
24 RB 837	Homestead

A determination of NRHP eligibility must be made for those 24 sites needing further information. Those sites found eligible will be declared unsuitable. The exception will be applied to these sites as specified in the preceding paragraph. The 24 sites are:

24 RB 403	Rock constructs
24 RB 704	Historic dugout
24 RB 721	Homestead
24 RB 722	Homestead
24 RB 737	Tipi rings
24 RB 743	Lithic scatter, tools
24 RB 745	Lithic scatter, tools
24 RB 746	Lithic scatter, tools
24 RB 754	Homestead
24 RB 759	Homestead
24 RB 760	Lithic scatter, tools
24 RB 767	Lithic scatter, tools
24 RB 770	Homestead
24 RB 771	Homestead
24 RB 772	Homestead
24 RB 774	Homestead
24 RB 796	Homestead
24 RB 798	Tipi rings, artifacts
24 RB 799	Tipi rings, artifacts
24 RB 801	Lithic scatter
24 RB 802	Lithic scatter
24 RB 827	Homestead
24 RB 834	Petroglyph
24 RB 836	Petroglyph

Criterion 15 — Three sharp-tailed grouse leks and surrounding nesting habitat are identified as suitable for mining provided the following conditions are met:

“The stipulation on these leks and the surrounding nesting cover will require Peabody Coal Company to show, and the State of Montana to agree, that all or stipulated methods of mining will not have a significant long term impact on the area-wide sharp-tailed grouse habitat. Reclamation and management of reclamation areas must also provide suitable postmining habitat. These lands would then be considered suitable for mining. If the State of Montana does not agree that reclamation and management of reclaimed lands would provide suitable postmining habitat, the lek and surrounding lands will be excluded as unsuitable. This stipulation does not preclude the Montana Department of State Lands from enforcing its selective denial and unsuitability process.”

INTRODUCTION

PURPOSE AND NEED

On October 9, 1980, the "Northern Cheyenne Indian Exchange Legislation," (PL 96-401) was passed. This act provided for the cancellation of certain coal leases within the Northern Cheyenne Indian Reservation and negotiations with parties holding such leases for non-competitive lease or bidding rights for competitive leases for federal coal off the reservation. Peabody Coal Company (Peabody) was one of the parties affected by this legislation. An agreement was signed in October 1980 to exchange reservation rights for a noncompetitive coal lease of 130 million tons in the Greenleaf-Miller Creek area of Rosebud County, Montana.

Because the decision to lease or exchange is made by PL 96-401, the Secretary of the Interior has no discretion in considering issue or exchange of coal leases. He is further constrained by the cancellation agreement between the Northern Cheyenne, the Department of the Interior and Peabody in that certain areas are identified for lease to meet the requirements of the law and the tonnage figures agreed upon. Thus, alternatives which can be addressed in this Environmental Assessment (EA) are limited. Three possibilities exist: the proposed action; the no action or no leasing alternative, and the issuance of bidding rights in place of a lease.

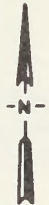
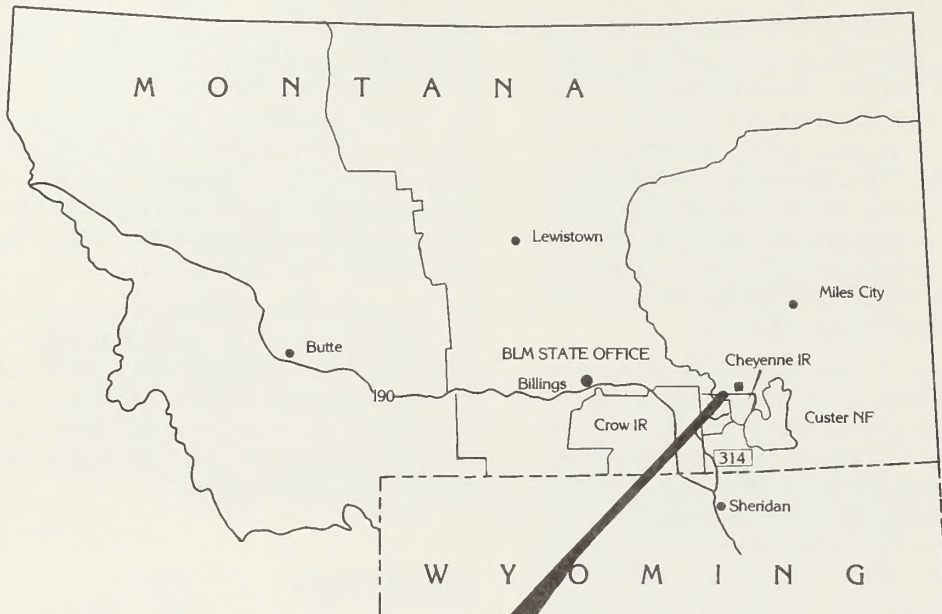
PROPOSED ACTION

The proposed action is to noncompetitively lease 130 million tons of coal to Peabody as stipulated in the cancellation agreement. This is in accord with the decision for the Greenleaf-Miller Creek coal area made in the Powder River Resource Area Management Framework Plan (MFP) Amendment adopted July 13, 1982. The indicated area of interest being addressed by this EA is larger than will actually be leased. This will ensure that all impacts will be addressed on the specific federal coal which will be leased.

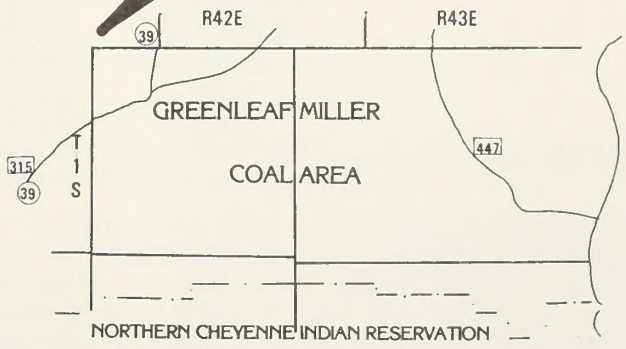
The Greenleaf-Miller Creek area is a checkerboard pattern mineral ownership with interspersed federal and private (fee) coal. Private coal will not be addressed by this EA because it is: first, currently leased by Peabody and second, an Environmental Impact Statement on the entire area to be mined must be written before a mine permit can be issued.

LOCATION

The Greenleaf-Miller Creek area is located just north of the Northern Cheyenne Indian Reservation and 12 miles southeast of Colstrip, Montana. See Maps 1 and 2.



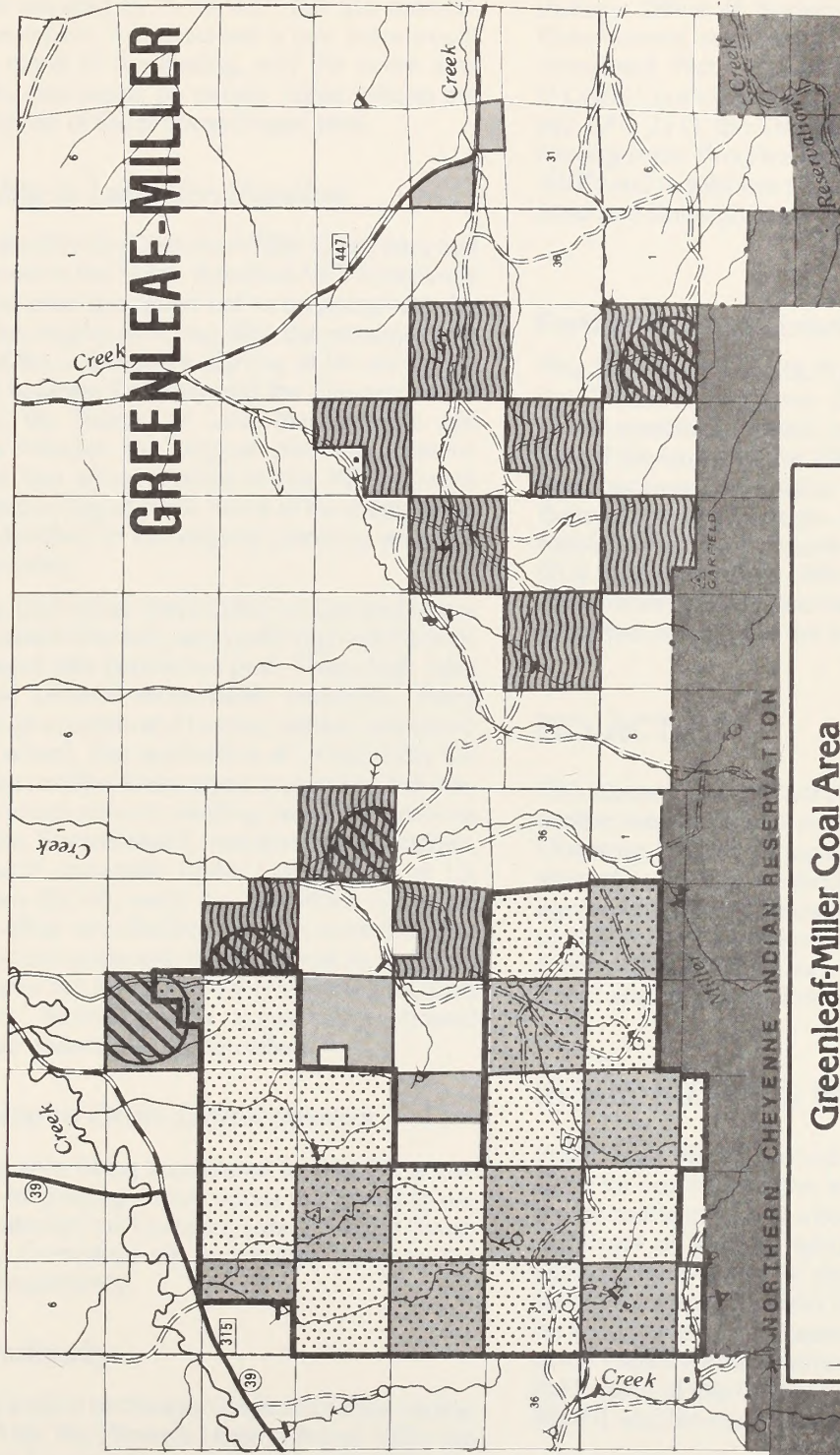
GENERAL LOCATION MAP



R 42 E






R 43 E

T 1 S



Greenleaf-Miller Coal Area

STATUS OF COAL

- | | | | |
|---|---|---|---|
|  | Federal Coal Acceptable for Further Consideration for Coal Leasing |  | Downey Coulee Competitive Lease Tract |
|  | Federal Coal Acceptable for Further Consideration for Coal Leasing with Stipulation |  | Indian Lands |
| | |  | Federal Coal Peabody wants from Northern Cheyenne Legislation |

CHAPTER I ALTERNATIVES

NONCOMPETITIVE LEASE

This alternative is to issue a noncompetitive lease to Peabody as required by PL 96-401. For this environmental assessment, it is assumed a new mine would open as a result of the leasing, and the entire area underlain by coal would be mined. Table I shows the legal description of the proposed lease tract.

Relationship to Land Use Planning

Federal coal within the Greenleaf-Miller Creek area was first addressed in the South Rosebud MFP completed in 1975. The area was found not to be acceptable for leasing in the original planning. With the passage of PL 96-401 and the subsequent signing of the exchange agreement between Peabody and the Department of the Interior, the Bureau of Land Management was directed to reassess the original planning. This reassessment was accomplished in the MFP Amendment adopted in July of 1982. Some of the multiple use concerns identified in the original planning were still found to be valid.

Specifically, high value sharp-tailed grouse and raptor habitat still exist in this area, along with high relief scenic areas timbered with ponderosa pine. These high relief areas would present reclamation problems. Three sharp-tailed grouse leks and nesting habitat were identified (1,035 acres). The application of Unsuitability Criterion 15 did not find these areas unsuitable, but they cannot be mined without meeting certain stipulations for mitigation. Several raptor nest sites were identified, but not found unsuitable under Criterion 11 or 13, because they did not meet the definitions of "active nests." No other unsuitability criterion were found to apply. The scenic areas with their potential reclamation problems were not found to be an overriding multiple use conflict. Surface owner consultation showed owners to be undecided or unqualified.

Relationship to Other Developments

The surface area being considered by this EA is currently used for grazing. Active mines in the vicinity are Big Sky (Peabody Coal Company) and Rosebud (Western Energy Company) six and twelve miles to the northwest, respectively.

Leasing Authority

The leasing and/or exchange of federal coal for mining is governed by: the Minerals Leasing Act of 1920; the Federal Coal Leasing Amendments Act of 1976; the Federal Land Policy and Management Act of 1976 (FLPMA); and the Surface Mining Control and Reclamation Act of 1977 (SMCRA). In addition, the Northern Cheyenne Exchange Legislation of 1980 directs the coal to be leased noncompetitively.

This alternative assumes that if mining occurs, Peabody will comply with existing state and federal regulations governing mining and reclamation. These include: Office of Surface Mining Reclamation and Enforcement regulations (30 CFR 700-899), Environmental Protection Agency regulations (40 CFR 0-1399), Council for Environmental Quality regulations (40 CFR 211), the Department of the Interior's Coal Management Program regulations (43 CFR 23 and 3400) and regulations promulgated under the Montana Strip and Underground Mine Reclamation Act.

Further Environmental Assessment

This EA will allow the BLM to comply with the intent of the Northern Cheyenne Exchange Legislation. The noncompetitively leased coal will not be counted as part of the target for the 1984 Powder River Coal lease sale, because it is outside the normal coal program. Before mining can begin, a permit to mine must be obtained from the Montana Department of State Lands (DSL) and the Federal Office of Surface Mining (OSM). An environmental impact statement will be prepared by these two agencies at the time of permit application.

NO ACTION

This alternative would not allow issuance of a noncompetitive lease to satisfy the requirements of the Northern Cheyenne Exchange Legislation. This is not a feasible alternative because Peabody Coal Company signed an agreement with the Department of Interior in October of 1980 to exchange their lease rights on the Northern Cheyenne Reservation for a lease in the Greenleaf-Miller Creek area in accordance with Public Law 96-401.

ISSUE BIDDING RIGHTS

Public Law 96-401 provided that if the area agreed upon for non-competitive lease was found unacceptable for coal leasing by the Secretary of the Interior, that a certificate of bidding rights would be issued. These bidding rights could be used to acquire federal coal leases at competitive sales. Since the area was found to be acceptable for coal leasing with certain stipulations in the 1982 MFP Amendment adopted in July of 1982, the leasing of this tract will proceed as specified by PL 96-401 and the cancellation agreement.

ERRATA PAGE

TABLE I
 LEGAL DESCRIPTION
 Greenleaf-Miller Coal Area
 (Peabody Area of Interest)

	Acreage*	
T.1S., R.42E., Section 14:	NW1/4	160
	S1/2 (320),	
	W1/2NE1/4 (80)	400
Section 24:	All	640
Section 26:	NE1/4	160
	W1/2NW1/4	80
	SE1/4NW1/4	40
	S1/2	<u>320</u>
Subtotal		<u>1,800 acres</u>
T.1S., R.43E., Section 22:	NE1/4	160
	S1/2	320
Section 26:	All	640
Section 28:	All	640
Section 32:	All	640
Section 34:	NE1/4	160
	NE1/4NW1/4	40
	S1/2NW1/4	80
	S1/2	<u>320</u>
Subtotal		<u>3,000 acres</u>
T.2S., R.43E., Section 2:	All	639.48
Section 4:	Lots 1,2,3,4	159.24
	S1/2N1/2	160
	N1/2SW1/4	80
	SE1/4SW1/4	40
	SE1/4	<u>160</u>
Subtotal		<u>1,238.72 acres</u>
TOTAL		<u>6,038.72 acres</u>

* All surface is privately owned. All subsurface is federal coal.

CHAPTER II

AFFECTED ENVIRONMENT

GEOLOGY, MINERALS, PALEONTOLOGY

The lease area is situated in the northwest corner of the Powder River Basin. Regional dip is southeasterly at about one degree. Some small normal faults may be present within the area.

All surface-exposed rocks are within the Paleocene Tongue River Member of the Fort Union Formation. The two extensive prominent coal seams present within the affected area are the Knobloch and the Sawyer. BTU values for both seams are about 8,600 per pound. Both would rank as subbituminous coal.

The Knobloch coal seam is over 20 feet thick on the east side of the lease area. This seam thins to about 15 feet near the western boundary.

The Sawyer seam is about 20 feet thick near the western boundary. It gradually thins in an easterly direction to about 10 feet thick near the eastern lease area boundary.

In Section 4, T.2S., R.43E., on the northeast flank of Garfield Peak, several local coal seam/clinkers range up to 10 feet thick. The elevation of these seam clinkers is about 3,600 feet and above. These local seams may not be large enough to be economically mined.

Tract gas and oil potential is low. There have been seven wildcat wells drilled within five miles of the tract boundaries. The off reservation wells explored only cretaceous rocks. All seven wildcats were dry holes. No information is available on the Cheyenne Reservation wells.

Some paleontological material may be present within the tract. Fossil leaves, bark, freshwater shells and petrified wood may be present. There is no known significant paleontological material present within the tract.

There are no known sand and/or gravel deposits within the tract.

TOPOGRAPHY

The lease area is drained by Greenleaf and Miller Creeks in the western portion and by coulees emptying into the Tongue River in the eastern portion.

The topography tends to be gently rolling in the north and west portions of the lease area. Stark, high hills and ridges up to 250 feet high are present in the south and east. Very rough, steep, broken terrain is present in the southern half of Section 4, T.2S., R.43E. Highest lease area elevation is 4,100 feet and lowest is 3,080 feet, near Miller Creek.

Sawyer clinker caps many of the high hills and ridges at an elevation of 3,440 feet.

SOILS

Soils are composed of deep loamy (Yamac, Lonna) soils on gently sloping to moderately sloping (2-8%) fans and terraces; deep sandy (Busby) and moderately deep, loamy (Delpoint) soils on strongly sloping (8-15%) side slopes; and shallow, loamy and clayey (Cab-bart, Yawdim) soils on strongly sloping to very steep (8-70%) side slopes and ridges.

Many mapping units throughout the affected area occur as complex, variable patterns of deep, moderately deep and shallow soils, some of which include rock outcrops.

The soils data is from the Rosebud County Order II soil survey maps and soil description sheets.

HYDROLOGY

Surface Water

The Greenleaf-Miller lease area comprises about 80 square miles in south-central Rosebud County, southeastern Montana. The area lies between the Tongue River on the east and Rosebud Creek on the west.

Greenleaf and Miller Creeks drain most of the area and are tributary to Rosebud Creek. Lay Creek drains the southeastern part of the area and is tributary to the Tongue River. All are ephemeral, except for short reaches just downstream from springs and seeps. Mean annual runoff for Greenleaf and Miller Creeks is about 0.05 inch, whereas Lay Creek is about 0.8 inch (Levings 1982). The difference in runoff values is due mostly to the greater slope of Lay Creek. Runoff in these creeks results from snowmelt and intense summer storms.

Average annual precipitation for the affected area is about 16 inches, with 60 percent occurring from April through July. About 30 percent of the average annual precipitation occurs as snow. Very little of the annual precipitation (less than one percent) leaves the area directly as runoff. Most returns to the atmosphere through the processes of evaporation and transpiration. A small amount enters exposed surface clinkers as recharge to the ground water supply.

Runoff water from the three creeks is typically a calcium bicarbonate type (Knapton and McKinley 1977). Major ions usually found include calcium, magnesium, sodium, bicarbonate, chloride and sulfate. Total dissolved solids (TDS) range from about 70 milligrams per liter (mg/l) in snowmelt water to about 4,000 mg/l in ponded water following summer storms. Generally the water is suited for stockwater, wildlife, and irrigation use, but not for domestic use.

Groundwater

Shallow aquifers (less than 200 feet deep) that provide water in the Greenleaf-Miller lease area are alluvium (unconsolidated deposits of silt, sand, and gravel along the area's larger streams) and consolidated beds of coal, silt, and sand of the Tongue River and Tullock Members of the Fort Union Formation. Water from these units is mainly used for livestock, but two domestic wells are known to exist in the area.

The most significant deposits of alluvium exist beneath the valleys of Greenleaf, Miller, and Lay Creeks. Thickness of the alluvium along these creeks is unknown, but may be as great as 40 feet. Reported yields range up to 20 gallons per minute (gpm) but 5 gpm is more common.

Clinker, derived from extensive burning of coal beds, is present in many of the higher ridges and hills in the area. In most places it is very permeable, and contributes to recharge of groundwater in underlying formations.

Wells are generally not completed solely in clinker deposits, rather they are drilled deep into underlying sandstone units. Seeps and springs often exist where the base of the clinker overlies relatively impermeable shale and is exposed at the surface. The seeps and springs seldom yield greater than five gpm.

Coal beds in southeastern Montana are commonly good aquifers, if the coal has been fractured. The Sawyer and Knobloch coal beds are the main seams attractive for mining in the Greenleaf-Miller lease area. At present, no wells are known to be completed solely in either of these beds, although they may contribute to wells drilled into deeper aquifers.

The massive sandstone beds in the Tongue River Member yield the greatest quantities of water to the shallow aquifer system and consequently are the source of most wells in the area. Well depths range from 20 to 200 feet (ft) and yields vary from less than one to 25 gpm (Levings 1982).

Water is available in the area from deeper aquifers (greater than 200 feet deep). Sandstones and coal beds in the Tongue River Member may extend to 800 feet deep. Static water levels often rise to within a few hundred feet of the surface and in enough quantity to be feasible for livestock use.

The Lebo Shale and Tullock Members, Hell Creek Formation, Fox Hills — lower Hell Creek aquifer, and Madison Group all underlie the Tongue River Member in descending order. Levings (1982) describes the following aquifers: the Lebo Shale and Hell Creek are doubtful as reliable aquifers; the Tullock yields up to 15 gpm at depths of 1,000-1,300 feet; the Fox Hills — Hell Creek aquifer yields up to 150 gpm at well depths of 2,000 feet, it is potentially the most prolific aquifer in the

area; the Madison may yield 10 to 500 gpm but at extreme depths (greater than 7,000 feet).

Flow in the shallow aquifers is generally controlled by surface topography. Locally, recharge occurs along the clinkered ridges that form the divides between drainages. Discharge occurs in the bottoms of the drainages and where the contacts between clinker and underlying impermeable shales are exposed.

The water quality of the shallow aquifers in the area is variable. Lee (1981) stated that this water is chemically dynamic and is generally dominated by sodium, magnesium, and sulfate ions. The water is suited for livestock use and marginally suited for domestic use. TDS concentrations range from 110 to 6,300 mg/l with a mean of about 2,100 mg/l (Lee 1981). Water in deeper aquifers is chemically static and characterized by a dominance of sodium and bicarbonate ions.

CLIMATE AND AIR QUALITY

The semiarid climate of east central Montana, which is typical of the Northern Great Plains, results from the area's extreme inland location. The Rocky Mountains modify air masses from the Northern Pacific, but no topographical barriers exist to modify Gulf and Arctic pressure systems. Therefore, rapidly changing meteorological conditions are common and temperatures vary widely on an annual, seasonal, and daily basis.

The nearest meteorological station is at Colstrip, 14 miles to the northwest. Mean annual temperature is approximately 46 degrees Fahrenheit (°F). July is the warmest month and January the coldest month with average temperatures of 71.5°F and 21.0°F, respectively. Average annual humidity is around 55 percent.

Mean annual precipitation is 15.8 inches, however, yearly totals as low as eight inches and as high as 20 inches are not uncommon. About 75 percent of the year's precipitation falls as rain during the 115-day growing season. Snowfall averages 34.6 inches yearly and accounts for approximately 20 percent of the annual precipitation. Total evaporation for the May through September period averages 40 inches over a ten-year period. The prevailing winds in the area are from the south-southwest. Wind speeds exceed 13 miles per hour only 10 percent of the time. The absence of high winds results in prolonged periods of depressed mixing heights, which tend to concentrate pollutants.

The lease area currently experiences very low particulate concentrations, about 20-25 micrograms per cubic meter (mcg/m³) (Montana Department of State Lands 1982). Gaseous pollutants are currently so low they are not monitored. The Northern Cheyenne Indian Reservation, adjacent to the area's southern boundary, is designated a Class I area. The visual range is estimated to be from 45 to 70 miles (BLM 1981).

WILDLIFE

No essential habitat for threatened or endangered species has been identified in the lease area. Although a bald eagle and a peregrine falcon have been seen in the general area, they were felt to be migratory individuals (Martin, et al 1982). No prairie dog towns occur on the affected area. No black-footed ferret sign had been found on nearby towns as of 1981 (USDI 1981).

Numerous sharp-tailed grouse leks occur in the Greenleaf and Miller Creek drainages. Three important leks have been located over federal coal in the affected area (Martin, et al 1981). Buffer zones have been established for these sites. They were not declared unsuitable for further consideration, but stipulations for mining established by BLM (USDI 1981) must be met prior to mining.

Tributaries to the Tongue River and Rosebud Creek drain the lease area. Both systems provide local fisheries and contribute to the Yellowstone River sport fishery.

Golden eagles, other raptors and other state species of special concern do use the general area. However, no critical habitat for these species has been identified in the lease area (Martin, et al 1981; USDI 1981).

CULTURAL RESOURCES

The 6,038 acres under consideration are part of the Greenleaf-Miller block, north of the Northern Cheyenne Indian Reservation. A large part of the area has been inventoried for historic and prehistoric resources, including all of the federal mineral estate acreage in this lease area. A total of 148 cultural resource sites are recorded in the Greenleaf-Miller area, of which 61 (41%) are on federal mineral estate in this lease.

Sites which qualify for designation under the American Indian Religious Freedoms Act (Public Law 95-341) may also occur in the lease area. Consultation has been initiated with the Northern Cheyenne tribe, but no sites have been identified to date by the tribe.

Pending consultation with the Montana State Historic Preservation Officer, 12 historic and prehistoric sites are determined eligible to the National Register of Historic Places:

24 RB 696	Buffalo jump, alignments
24 RB 718	Tipi rings, artifacts
24 RB 719	Buried materials
24 RB 727	Homestead
24 RB 728	Lithic scatter, artifacts
24 RB 729	Tipi rings, artifacts
24 RB 735	Tipi rings, artifacts
24 RB 736	Tipi rings
24 RB 753	Multicomponent Occupation
24 RB 755	Tipi rings, artifacts
24 RB 825	Bison kill
24 RB 837	Homestead

Twenty-four sites require more information to make a determination of eligibility:

24 RB 403	Rock constructs
24 RB 704	Historic dugout
24 RB 721	Homestead
24 RB 722	Homestead
24 RB 737	Tipi rings
24 RB 743	Lithic scatter, tools
24 RB 745	Lithic scatter, tools
24 RB 746	Lithic scatter, tools
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24 RB 772	Homestead
24 RB 774	Homestead
24 RB 796	Homestead
24 RB 798	Tipi rings, artifacts
24 RB 799	Tipi rings, artifacts
24 RB 801	Lithic scatter
24 RB 802	Lithic scatter
24 RB 827	Homestead
24 RB 834	Petroglyph
24 RB 836	Petroglyph

Twenty-five sites do not appear to meet the criteria for eligibility, as they lack potential to provide significant information on prehistory and history.

24 RB 712	Quarry-Porcellanite
24 RB 713	Quarry-Porcellanite
24 RB 715	Quarry-Porcellanite
24 RB 716	Quarry-Porcellanite
24 RB 717	Quarry-Porcellanite
24 RB 720	Lithic scatter
24 RB 725	Lithic scatter
24 RB 730	Lithic scatter
24 RB 731	Rock feature
24 RB 732	Tipi rings
24 RB 733	Tipi rings
24 RB 734	Tipi rings
24 RB 738	Tipi rings
24 RB 744	Lithic scatter
24 RB 750	Lithic scatter
24 RB 757	Lithic scatter
24 RB 758	Rock feature
24 RB 768	Lithic scatter
24 RB 769	Lithic scatter
24 RB 797	Lithic scatter
24 RB 800	Lithic scatter
24 RB 824	Tipi rings
24 RB 826	Quarry-Porcellanite
24 RB 835	Historic dump
24 RB 838	Lithic scatter

The cultural record for the lease area indicates prehistoric Native American occupation and use of this area since 8,000 BC, characterized by late Paleo-Indian Scottsbluff projectile fragments. Middle and late

archaic sites are the most numerous datable sites. Late prehistoric sites are common, while evidence of apparent proto-historic occupation is unusually abundant. The historic sites date from 1881, with most development occurring just after World War I.

Overall area site densities are considered to average one site per 45 acres. Site average within the lease area is one site per 100 acres, much lower than the overall area.

RECREATION

The affected area lies adjacent to the Northern Cheyenne Indian Reservation and the Downey Coulee tract. Also, the affected area is relatively isolated and void of recreational developments. Because private landowners control the surface, the area does not have public access. The only public recreational opportunity appears to be the hunting of deer and upland birds. The affected area does not have wilderness values nor does a wilderness study area exist in the immediate vicinity.

VISUAL RESOURCES MANAGEMENT

The affected area is predominantly Class B scenery; however, Class C scenery is predominant in the northwest part of the affected area. The rugged southern and eastern part of the affected area has numerous sandstone ridges and outcrops of sandstone and scoria. These ridges and peaks rise between 200 and 600 feet above the lower elevations. Upland plateaus in the eastern part of the affected area rise nearly 200 feet above nearby valleys. Because of the steepness, many of these ridges and peaks are classified unsuitable for livestock grazing.

The ridges, slopes and peaks have stands of ponderosa pine while the drainages have scattered deciduous trees and shrubs. The higher elevations have a grassland-timber biome, while the valleys and coulees predominantly have a grassland-sagebrush biome.

Intrusions include fences, developed springs, hay meadows, dikes and numerous ranch trails. Also, much of the affected area cannot be seen from the public roads located on the periphery of the lease area.

LAND USE

Transportation and Access

Access to the eastern portion of the lease area is provided by an improved ranch access road which intersects the Greenleaf Creek road. The western portion of

the affected area is reached by a private road which intersects the Rosebud Creek road. The Rosebud Creek road intersects State Highway 39 approximately nine miles south of Colstrip.

The nearest rail line is a Burlington Northern spur which services the Big Sky mine approximately seven miles from the northwest corner of the lease area.

Rights-of-Way

Rights-of-way across federal land for roads, railroads, telephone and powerlines would not be required, since most of the surface in the lease area is privately owned and the affected federal surface would most likely be covered by a coal lease.

Vegetation

The Greenleaf-Miller lease area consists of approximately 6,039 surface acres. Of that, 5,959 surface acres (98.7%) are rangeland. The balance of 82 acres (1.3%) is cropland. The rangeland consists of three dominant range sites. These range sites are thin breaks, 1,126 acres (19%), silty-shallow, 1,117 acres (19%) and silty, 1,404 acres (23%). Other range site complexes total 2,310 acres (39%). Within these range sites, there are varying production yields (pounds per acre) and condition classification. The thin breaks range site produces approximately 72 AUMs (6%), silty-shallow 253 AUMs (21%), silty 356 AUMs (30%), and other range site complexes 517 AUMs (43%). There are approximately 1,198 AUMs being produced per year on the area in its present condition.

Agriculture

There are approximately 6,040 surface acres of land overlying public coal in the Greenleaf-Miller EA affected area. About 39.4 percent (2,382 acres) of the area is suitable for agricultural cropland use (Class III and IV land). Only 1.3 percent (82 acres) is currently utilized as cropland. See Table II. The balance of the land is Class VI and VIII, which is only suitable for rangeland.

Agricultural operations in the area are mainly livestock with small areas of hay (alfalfa or grass-legume), small grains and tame pasture (see Agricultural Land Use Table). Hay or small grains are mainly grown for livestock feed during the winter months. Some small grains are grown to sell.

This area currently has a total of 82 acres of Class III land (1.3 percent of the area) in hay, which produces approximately 77 tons per year under dryland conditions.

There are approximately 2,300 acres of Class III and IV land (38.1 percent of the area) that are not presently cropped, but are potentially suitable for cropland. This land could produce approximately 2,044 tons of hay or

31,705 bushels of wheat (based on 50% wheat, 50% summer fallow) under dryland farming operations. Of that amount, there are 117 acres which could be irrigated and yield an additional 623 tons of alfalfa hay or 8,268 bushels of wheat. This land is currently utilized as rangeland.

ECONOMICS AND SOCIAL CONDITIONS

The affected area being considered is located north of the Northern Cheyenne Indian Reservation. The nearest towns to the lease area are Colstrip, Ashland and Lame Deer (which is located on the Northern Cheyenne Indian Reservation). Cattle ranching is the predominant nonmining activity in the area.

Several surveys over the past five years have shown, on a fairly consistent basis, that most residents in the Powder River area are in favor of mineral development (BLM study 1979-80). The principal reasons for supporting development are national energy needs and economic growth of the area.

However, as late as February 18, 1983, the Northern Cheyenne Tribal Council expressed concerns about coal mining in this area, because of potential impacts to them on water, scenic values, and air quality increment levels. They are also concerned that a great deal of coal development in the vicinity of the reservation would tend to decrease the potential value of coal on the reservation.

CHAPTER III

ENVIRONMENTAL CONSEQUENCES

GEOLOGY AND TOPOGRAPHY

The overburden and highwall reduction zone strata would be destroyed. The replaced spoils composition would be more homogenous than the present strata.

The mined coal seam and any other coal in the overburden would be precluded from future recovery. Future use of lower coal seams would be precluded under current reclamation laws.

Strata below the mined seam would be undisturbed. Gas and oil exploration or development would be precluded during the active mine phase. Potential delays in oil and gas exploration and development during active mining would probably be insignificant.

Some scoria would be removed during mining. It would be utilized for mine haul roads and other ancillary activities.

Within the spoils any paleontological resources would be at least partially destroyed. The remaining fossil material would be repositioned within the replaced spoils.

SOILS

Soil impacts from mining activities include: displacement of soil from wind and water erosion, change in soil structure and natural fertility, salt migration through the soil profile after reconstruction, and significant problems in revegetation and stabilization on steep slopes.

Disturbance of the soil would result in alterations of soil structure and porosity. This alteration would affect permeability, infiltration rates, soil-air and soil-water relationships and bulk density. The natural fertility would be affected by disruption of the nutrient cycle and a decrease in organic matter content within the soil.

The soil mapping units in the Greenleaf-Miller area were evaluated for suitability of soil material for plant growth using USDA/SCS guidelines for "Soil Reconstruction Material for Drastically Disturbed Areas" [NSH 403.6(a)]. These results are expressed as acre feet of soil material having good, fair and poor suitability due to its physical and chemical properties. This showed 11% (3,198 acre feet) of the area rated good, 33% (9,269 acre feet) rated fair and 56% (15,514 acre feet) rated poor as to suitability for plant growth. (Table III.)

The wind erosion for the tract is rated as 0% low, 60% moderate and 40% high and the water erosion potential is rated as 2% low, 37% moderate and 61% high. The erosion potentials for each soil mapping unit are found in the Rosebud County Soil Series description sheets.

Logical mining units with better and poorer reclamation potential may be located within the affected area. Suitable overburden materials, if available, could be used to provide additional soil depth to provide for more adequate reclamation. Current information

demonstrates that this area has fair to poor potential for successful reclamation.

HYDROLOGY

Surface Water

Upstream from the mined area, surface water supplies would not be affected by mining. Surface water channels disturbed by mining would be reclaimed to their approximate premining conditions with runoff control practices mandated in surface mining regulations. This would probably result in reduced magnitudes of peak flows downstream of the mined areas. Discharges of pit water during mining first go to sedimentation ponds. Before discharge, it must satisfy pollutant discharge regulations imposed by the Montana Department of Health and Environmental Services. No other significant changes in quantity or quality of flow are anticipated following mining.

Groundwater

Mining would destroy or severely affect all wells within the tract boundaries. Groundwater flow through the Knobloch coal seam and aquifers above it would be disrupted. Wells completed in these aquifers, outside but within three miles of the tract boundary, would probably experience lowered water levels (Hardaway and Kimball 1979; Van Voast, et al 1978; Dollhoff, et al 1978). The magnitude of the lowered water levels would be greater the closer the well is to the tract boundary and wells downgradient of the boundaries would generally suffer greater loss in water levels than wells upgradient of the tract.

Spoil material used in reclamation is expected to function hydrologically similar to original aquifer material (Van Voast, et al 1978). Studies on mines in the Colstrip and Decker areas indicate the occurrence and flow of groundwater in mine spoils is not greatly different from premine conditions. Groundwater levels are expected to return to near premining levels following reclamation.

Groundwater quality would exhibit significant changes from premine conditions. The reclaimed spoils expose new surfaces to the invading groundwater, increasing dissolution and total dissolved solids (TDS) concentrations. Van Voast, et al (1978) speculates that most materials available for dissolution in the reclaimed spoils will be flushed with the first pore volume of water. However, this process may take several hundred years. The nature of the increased TDS concentrations depend on the chemical makeup of the reclaimed spoils. Van Voast, et al, (1977) suggests postmining TDS levels between 1,000 and 5,000 mg/l, the principal constituents being magnesium and sulfate. Sodium and bicarbonate may also show significant increases

TABLE III
GREENLEAF-MILLER LEASE AREA SOILS

Mapping Unit Symbol	Mapping Unit Name	Acres	Pct. of Area	Pct. Slope	Erosion Potential From Wind	Erosion Potential From Water	Suitability of Soil Material for Plant Growth (acre feet)		
							Good	Fair	Poor
7E	Ustic Torriorthents	26	<1	15-35	Moderate	High	-	-	-
10A	Gerdrum clay loam	19	<1	0-2	Moderate	Low	-	76	19
10C	Gerdrum clay loam	46	1	2-8	Moderate	Moderate	-	134	45
13C	Busby fine sandy loam	120	2	2-8	High	High	130	340	131
13D	Busby fine sandy loam	282	5	8-15	High	High	305	798	307
16A	Kremlin loam	17	<1	0-2	Moderate	Low	11	7	66
16C	Kremlin loam	147	3	2-8	Moderate	Moderate	98	62	575
21C	Chinook fine sandy loam	87	2	2-8	High	Moderate	377	-	58
21D	to 13D								
23C	Coopers loam	135	2	2-8	Moderate	Moderate	45	169	462
23D	to 49D								
27A	Floweree silt loam	21	<1	0-2	Moderate	Low	11	25	70
27C	Floweree silt loam	76	1	2-8	Moderate	Moderate	38	89	253
36C	to 38C								
37A	Lonna silt loam	23	<1	0-2	Moderate	Low	15	100	-
37C	Lonna silt loam	279	5	2-8	Moderate	Moderate	187	1,208	-
37D	Lonna silt loam	21	<1	8-15	Moderate	High	14	91	-
38C	Cambeth silt loam	29	1	2-8	Moderate	Moderate	14	12	118
42C	Spang sandy loam	12	<1	2-8	High	Moderate	60	-	-
49C	Yamac loam	392	7	2-8	Moderate	Moderate	361	490	1,109
49D	Yamac loam	165	3	8-15	Moderate	High	152	206	467
59C	Kobar silty clay loam	73	1	2-8	Moderate	Moderate	-	158	207
59D	Kobar silty clay loam	7	<1	8-15	Moderate	High	-	15	20
101C	Gerdrum-Kobar silty clay loams	50	1	2-8	Moderate	Moderate	5	128	102
121E	Birney-Kirby channery loams	118	2	4-25	Moderate	Moderate	62	68	458
122D	Birney-Coopers-Kirby	69	1	2-15	Moderate	Moderate	35	54	252

TABLE III (cont.)
GREENLEAF-MILLER LEASE AREA SOILS

Mapping Unit Symbol	Mapping Unit Name	Acres	Pct. of Area	Pct. Slope	Erosion Potential From Wind	Erosion Potential From Water	Suitability of Material for Plant Growth (acre feet)		
							Good	Fair	Poor
122E	to 121E								
123E	Birney-Kirby channery loams, moist	62	1	15-25	Moderate	High	33	36	241
123F	Birney-Kirby channery loams	449	7	25-70	Moderate	High	121	233	1,778
125E	Birney-Kirby-Cabbart	184	3	15-25	Moderate	High	55	145	673
125F	Armells-Kirby-Cabbart	267	4	25-70	High	High	95	374	1,076
126F	Armells-Cabbart	87	1	25-70	High	High	57	65	333
127F	Birney-Kirby-Cabbart	65	1	25-70	Moderate	High	4	55	246
128E	Birney-Yawdlm-Cabbart	69	1	15-25	High	High	4	83	247
131C	Busby-Yetull	109	2	2-8	High	Moderate	96	333	100
131D	to 131E								
131E	Busby-Yetull	64	1	8-25	High	Moderate	52	208	44
132D	to 132E								
132E	Busby-Twillight-Blackhall, warm, fine sandy loams	95	1	8-25	High	High	75	153	44
143F	Barvon-Bitton-Cabba	89	2	35-70	Moderate	High	20	166	108
181F	Cabbart-Armells-rock outcrop	133	2	25-70	High	High	15	110	408
183D	to 183E								
183E	Busby-rock outcrop	55	1	8-15	High	High	32	184	24
184F	Cabbart-Yawdlm-rock outcrop	407	7	15-70	High	High	20	378	1,009
231C	Coopers-Birney	77	1	2-8	Moderate	Moderate	40	75	266
311	Hayre loam, occasionally flooded	98	2	0-2	Moderate	Low	-	490	-
372D	to 372E								
372E	Lonna-Cabbart-Yawdlm	172	3	8-25	High	High	88	126	647
421D	to 423D								
421E	to 422E								
423D	Spang-Birney	11	<1	8-15	High	High	22	5	27
422E	Spang-Coopers-Birney	42	1	15-25	Moderate	High	78	23	94
481F	Kirby-Cabbart-rock outcrop	181	3	25-70	Moderate	Mod/High	11	87	628
491C	Camborthids-Torrifluents Assoc, channelled	191	3	0-8	Moderate	Moderate	115	489	351

TABLE III (cont.)
GREENLEAF-MILLER LEASE AREA SOILS

Mapping Unit Symbol	Mapping Unit Name	Acres	Pct. of Area	Pct. Slope	Erosion Potential From Wind	Erosion Potential From Water	Suitability of Material for Plant Growth (acre feet)		
							Good	Fair	Poor
491D	to 7E								
492D	Yamac-Busby	32	1	8-15	Moderate	High	29	66	60
492E	to 492D								
493C	to 493D								
493D	Yamac-Rentsac	31	1	2-15	Moderate	Moderate	18	26	69
493E	Yamac-Cabbart	6	<1	8-25	Moderate	High	3	7	17
495D	Yamac-Birney	22	<1	8-15	Moderate	High	17	21	73
497F	to 498F								
498D	to 498E								
498E	Delpoint-Cabbart-Yamac	314	5	8-25	Moderate	High	129	386	760
498F	Delpoint-Cabbart-YawdIm	292	5	25-70	High	High	23	330	809
499E	Delpoint-Birney-Cabbart	68	1	15-25	Moderate	High	16	82	201
591D	to 591E								
591E	Kobar-YawdIm-Cabbart	112	2	8-25	High/Mod	High	12	169	346
854F	Bitton-Lamedeer-Barvon	51	1	25-70	Moderate	High	17	84	115
TOTAL		6,039	100			TOTAL IN ACRE FEET	3,198	9,269	15,514
							(11%)	(33%)	(56%)

over premine conditions. Presently, dissolved-solids contents in spoils waters at the Rosebud, Big Sky, and Decker mines are 64 percent, 100 percent, and 39 percent higher, respectively, than concentrations in nearby stock and domestic supplies (Van Voast 1982). The spread of pollutants from the reclaimed area is difficult at best to predict. Van Voast (1980) states the aerial extent is modified by sorption, chemical precipitation, and dilution and may be limited to a few hundred yards from the pit boundaries. Other studies (Rahn 1976 and Moran, et al 1979) suggest this spread may extend several miles downgradient of the tract boundaries.

Levings (1982) suggests using reclamation techniques that would minimize infiltration and water flow through the spoils. The rate of leaching of soluble salts would be reduced, thereby minimizing the change in water quality in downgradient aquifers.

Wells lost to mining can be replaced by drilling into deeper aquifers, i.e. sandstone of the Tongue River Member below the Knobloch coal seam or the Tullock Member. Water quantity and quality would be comparable to the original wells (Lee 1979; Slagle and Stimson 1979). No evidence indicates that any of these alternative groundwater sources would be affected detrimentally by mining.

Offsite impacts, specifically impacts on Colstrip's water supply and sewage systems, would not be significant. Any increases in mine personnel would be offset by decreases in power plant workers as the construction phase would near completion.

CLIMATE AND AIR QUALITY

Impacts on climate from the proposed action would be localized and insignificant. Reclamation would mitigate any impacts that surface modification would cause to climatic conditions.

Only emissions caused by the proposed mining project are considered. Of these emissions, only particulate matter would be of substantial enough consequences to be considered. Nonproject sources will not be considered.

Emissions of particulate matter above background concentrations have been predicted for Area C, Block 1 of the Rosebud mine. Impacts are expected to be similar, if the Greenleaf-Miller area is mined.

During full coal production, the highest annual average ambient concentration of total suspended particulates (TSP) for locations off the mine site was estimated to be 31 mcg/m³ (BLM 1981). This would include the 20 mcg/m³ background concentration (geometric mean). This is well below the Montana standard of 75 mcg/m³. Impacts of the project on TSP concentrations in the townsite of Colstrip would be slight.

Montana has a 24-hour standard of 200 mcg/m³ that cannot be exceeded more than once a year off the mine site. Existing peak 24-hour TSP concentrations for Area C would be about 90 to 100 mcg/m³. Expected increase in TSP from mining would be about 38 mcg/m³ and the total concentration would be below the standard.

Visibility reductions resulting from mining are usually slight. PEDCo Environmental estimated visibility reductions from the second highest 24-hour concentration of particulate matter for Area C to be a maximum of 0.2 mile. Visibility problems could become severe, since a Class I area is adjacent to the Greenleaf-Miller area.

More detailed and site specific air quality data will be forthcoming from a study underway by PEDCo Environmental. A more accurate prediction of impacts to air quality will be included in the study results.

WILDLIFE

No threatened or endangered species would be significantly impacted by the proposed action.

The proposed action would result in the destruction of three important sharp-tailed grouse leks. Mitigation to the satisfaction of the State of Montana and BLM would have to be arranged prior to allowing mining of the area, including leks and buffer zones.

Although no sport fishery would be affected on the lease area, care must be taken to assure the continued quality of water reaching the Tongue River and Rosebud Creek.

Poaching and road kills have increased dramatically in areas of Montana, Wyoming and Colorado where energy development has occurred. The problem is compounded in areas where shift changes coincide with feeding periods, especially big game (Streeter, et al 1979). The same would probably occur in this area and would add to the problem already encountered as a result of increased human activity associated with operating mines (Graff P.C.).

CULTURAL RESOURCES

Cultural resources in mining areas are subject to impact over the life of the mine from construction of mine facilities, haul roads, water development and mining activity. Cultural resources not directly affected by such developments are subject to impacts from increased erosion, access needs, and vandalism. Impacts would thus be direct and indirect. Federal law protects significant historic and prehistoric sites, those on or eligible to the National Register of Historic Places, by requiring the evaluation of the effect of a federal action on such sites. In this case, leasing would, in all

probability, lead to mining, and the loss of important sites in the mine area. Sites which qualify under the American Indian Religious Freedoms Act may also be affected by mining and related activities.

At present, 12 sites are considered eligible to the National Register, pending consultation with the State Historic Preservation Officer. Twenty-four sites require further information before a determination of eligibility can be made. These sites are listed in Chapter II. Those sites found eligible are unsuitable for mining, per Criterion 7 of the unsuitability process in the Federal Coal Management Program Regulations.

The exception to unsuitability Criterion 7 permits coal mining to proceed when there is no significant adverse impact to a NRHP-eligible site. In effect, the potential information preserved in a site is realized through an acceptable plan for mitigation or recordation developed in consultation with the State Historic Preservation Officer. The exception is thought to apply to all sites which are NRHP eligible or require further information for a determination of eligibility to be made.

RECREATION

Hunting has been the primary public recreational activity within the boundaries of the lease area and would be affected because mining would destroy wildlife habitat. Should the adjacent Downey Coulee competitive tract and the Greenleaf-Miller lease be mined, additional hunting pressure would be felt by adjacent landowners and on nearby public lands.

VISUAL RESOURCES MANAGEMENT

Mining this lease area would completely change the area's characteristics. Additional intrusions would include communication and powerlines, additional roads, overburden storage, shops, mining equipment and a rail line. Some of these intrusions would be visible from the public road located near the lease area. Mining this area would create additional contrasts, new horizons and forms not associated with a rural area.

Aesthetically, this lease area would be destroyed by mining, because many of the ridges, peaks and sandstone outcrops would be lost because of mining activities. Also, the lease area is susceptible to water and wind erosion; however, vegetation has currently stabilized the slopes.

Mining this lease area would have an effect upon the Northern Cheyenne Indian Reservation. Dust pollution may affect the Reservation and there will be increased vehicle traffic on U.S. Highway 212 and the Tongue River road. Portions of both vehicle ways are located on the Reservation.

LAND USE

Transportation and Access

Mining of the lease area would of necessity require that present access routes be relocated and upgraded and that new access roads be constructed to handle increased traffic. Impacts from this are expected to be low.

Rights-of-Way

No rights-of-way would be affected by mining of the lease area.

Vegetation

If the 5,957 acres of range were in excellent condition (76-100%) and the entire area were mined, there would be an approximate loss of 1,400 to 1,902 AUMs. However, in its present condition, the loss would be approximately 498 AUMs.

Mining of the area would temporarily eliminate grazing opportunities for domestic livestock. However, vegetative production may be better after mining due to extensive reclamation work. The area may produce more than the current number of AUMs per acre. There is, however, no evidence that the plant community which ultimately evolves would support higher levels of livestock grazing than the premining vegetation supported.

Additional impacts resulting from vegetation disturbances would be: (a) possible reduction of visual aesthetics, (b) increased soil erosion, and (c) reduction in the amount of wildlife and livestock forage.

Agricultural Production

The proposed action would have an insignificant impact on agriculture in the affected area. If mined, 82 acres currently utilized as cropland would be disturbed.

Two operators in the area would be affected by mining. One operator has approximately 82 acres of cropland located inside the coal affected area. The other operator, an energy company, has no cropland within the lease area.

The major crops grown in the lease area are tame pasture, hay (alfalfa or grass-legume) and small grains.

Agricultural Economics

The lease area being evaluated is located north of the Northern Cheyenne Indian Reservation. The lands are used for raising hay and cattle.

The federal acreage being studied overlays approximately 291 million tons of in-place coal that could be mined, however, only 130 million tons would be

exchanged from this acreage. Because it is unknown at this time which acreage would be exchanged, all of the acreage will be evaluated.

Development of coal would temporarily displace agricultural production. To evaluate this issue, it was necessary to compare agricultural production to the value of the coal to be developed. The trade-off is compared several ways.

The first method of evaluation was to compare net national value of agricultural production displaced with the net national value of coal produced. In this evaluation, it was assumed the value of coal is 12.5% (royalty rate) of the going market rate of \$10 per ton. The net value of agricultural production is the cash rent to the owner. A "worst case" scenario was assumed for agriculture, that is, the area would not be reclaimed. Since agricultural production would be lost on each acre, year after year, these losses were totalled to show losses in perpetuity. By comparison, coal output per acre is gained only once. To place agricultural production and coal on the same basis, it was necessary to discount the value of agricultural production in future time periods.

Using these assumptions, the return to national income from coal production would be 2,422 times greater than agricultural production. (See Table IV.)

Another way of comparing trade-off between coal and agricultural resources is to determine what coal would have to sell for to be equal to agricultural production displaced. This avoids assuming that all coal in the area could be sold for the going market value. Coal would have to sell for \$.0005 per ton to equal the net agricultural value displaced. (See Table IV.)

In reviewing regional impacts, an additional comparison can be made of displaced agricultural production to Rosebud County's total agricultural production. The loss from this tract is .1628% of the county's total agricultural production. (See Table V.)

Regional loss of agricultural production, if coal is mined, has been compared to the regional gain from coal, using regional multipliers from the U.S. Water Resource Council.

The gross regional loss from agriculture for each year is equal to \$110,342. The computed yearly regional earnings loss from agriculture would be \$27,585. (See Table VI.)

Assuming the mining of five million tons of coal per year at a price of \$10 per ton, for mine month, the gross regional gain per year from coal would be \$109,550,000. Regional earnings each year would be more than \$37 million. (See Table VII.)

The assumption of five million tons per year should not be used by planners for planning. This figure was used to portray what the regional earnings could be, if coal were mined. There is adequate coal to support this production rate, however market conditions will be the

determining factor as to how much coal would be mined and when.

This comparison of regional earnings shows if coal is developed, the regional earnings would be many times greater than the present regional earnings from agriculture.

A "worst case" scenario was used in the above comparison, assuming that the areas would not be reclaimed. Existing state and federal laws require the lands to be returned to at least premining conditions. Reclamation feasibility must be demonstrated in the mine plan submission.

ECONOMIC AND SOCIAL CONDITIONS

A typical five million ton per year mine would require approximately 225 construction workers for two years and 150 operational workers for the life of the mine. This development would bring new workers into the area. There are two characteristics of the likely population that can be predicted. First, they would be in the 19-35 year age range and secondly, they would have quite different occupations than generally found in the region.

The younger aged population would also bring with it different lifestyles in some respects from those of the long-term residents. However, there is no reason to believe potential conflicts between lifestyles cannot be reconciled.

Studies have shown that workers are willing, in spite of the expense (both financial and time) to commute long distances rather than to live in small communities. Quality of life factors that influence workers' choice of residence are schools, shopping facilities, local services (medical and dental are of special importance), and housing availability.

Many of the construction workers would be weekend commuters and would not bring their families to the area.

The construction workers' housing decision often centers on trade-offs between comfort, price and location. These workers would remain in the area for varying periods of time, depending on their specialty during a two-year construction period. Therefore, most workers would be unable to justify the expense (or to qualify for financing) of a single family house. They would bring house trailers or recreational vehicles into the area and would require adequate spaces to park them.

The miners would be more permanent and would need single family dwellings or apartments.

With the end of construction of Colstrip 3 and 4 generators, many construction workers and miners will be able

TABLE IV
COMPARISON OF VALUE OF AGRICULTURAL PRODUCTION DISPLACED
TO VALUE OF COAL PRODUCTION

Crop	Acres	Agricultural Production			3/ Per Acre Loss if Mined	4/ Tons/Acre 90% Recoverable	5/ Net Value Per Ton \$	Coal Production		7/ Ratio to Agri Prod	8/ Value per ton to equal Agri Prod
		Annual Agri Production	1/ Net Value Per Unit	2/ Total Annual Net Value \$				6/ Total Present Value \$	Undiscounted		
Hay	82	77 tons	\$20/ton	\$ 1,540							
Range- land	5,957	1,198 AUMs	\$10/AUM	\$11,980	\$22.39	43,370	\$1.25	327,390,000		2,422 to 1	\$.0005
TOTAL	6,039			\$13,520							

1. Annual agricultural production x net value per unit
2. Total present value discounted at 10%
3. Total present value/total acres
4. 291 MM Tons/6038.72 acres x .90
5. 12.5% x assumed value of \$10 per ton at mine mouth
6. (Acres) (tons/acre) (net value per ton)
7. Total present value (coal)/total present value (agriculture)
8. Agricultural production per acre loss if mined/tons per acre

TABLE V
 COMPARISON OF COAL TRACT ANNUAL AGRICULTURAL PRODUCTION
 TO COUNTY AGRICULTURAL PRODUCTION

County	Coal Area	HAY/TONS		CATTLE/AUMS		3/ Gross Annual Agri. Sales	4/ Gross Annual Agri Sales by County \$	5/ Percent of County Agri Production Displaced
		Annual Production	1/ Annual Sales	Annual Production	2/ Annual Sales			
Rosebud	Greenleaf- Miller	77	\$4,088	1,198	\$39,500	\$43,588	\$26,771,000	.1628

1. Montana Agricultural Statistics 1982, Montana Department of Agriculture, Helena, 1982, Average for 1981, 53.09 per ton.
2. Ibid, Average value per head, \$395/head 1982.
3. Total of two annual sales columns
4. Montana Agricultural Statistics 1982, Montana Department of Agriculture, Helena, 1982 - for 1980.
5. Gross annual agricultural sales/gross annual agricultural sales by county x 100 = percentage

TABLE VI
 POTENTIAL REGIONAL LOSS FROM AGRICULTURAL PRODUCTION IF COAL IS MINED

Product	Yield	Gross Sales Per Year	1/ Gross Output Multipliers	Gross Regional Loss Per Year	2/ Computed Earnings Multiplier	Total Regional Earnings Loss Per Year
Cattle	1,198 AUMs	\$39,500	2.581	\$101,949	0.25	\$25,487
Hay	77 Tons	<u>\$ 4,088</u>	2.053	<u>\$ 8,393</u>	0.25	<u>\$ 2,098</u>
		\$43,588		\$110,342		\$27,585

1/ Regional Multipliers, U.S. Water Resources Council, U.S. Government Printing Office, Washington, D.C., 1977.

2/ (1/gross output multiplier) (earnings gross output ratio by industry) + (1 - 1/gross output multiplier) (national earnings gross output)

Whereas:

Gross output multipliers
 Cattle 2.581
 Hay 2.053

Earnings gross output ratio by industry
 Cattle .158
 Hay .201

National earnings gross output = .3008

TABLE VII
POTENTIAL REGIONAL GAIN FROM COAL PRODUCTION IF COAL IS MINED

Estimated Tons Per Year	Estimated Price Per Ton	Total Gross Value	<u>1/</u> Gross Output Multiplier	Gross Regional Gain Per Year	<u>2/</u> Computed Earnings Multiplier	Total Regional Earnings Gain Per Year
5 million	\$10	\$50 million	2.191	\$109,550,000	0.34	\$37,247,000

1/ Regional Multipliers, U.S. Water Resources Council, U.S. Government Printing Office, Washington, D.C., 1977.

2/ Computation
 $(1/2.191) (.388) + (1-1/2.191) (.3008)$
 $(.456) (.388) + (.544) (.3008)$
 $.177 + .164 = .34$

to find housing at Colstrip. Forsyth also may have some vacancies to support this influx of people.

Ashland and possibly Broadus may also receive some influx of workers. No non-Indians are forecasted to live in Lame Deer or anywhere else on the reservation.

If this coal area were developed in today's economy, the impacts would be less severe, as some mines in the area have reduced production due to a soft market. Therefore many workers could be available to fill the requirements of a new mine and eliminate a new surge of people. However, world situations could change and create a large demand for coal, which could bring more people to the area. This makes planning extremely difficult. Close coordination is required between the coal companies and city planners to mitigate impacts.

The State of Montana and Rosebud County would gain if coal is developed. Royalty and severance tax figures that could be received by Montana are displayed in Table VIII.

The Northern Cheyenne and Crow Indians can benefit from coal development as the potential for employment would increase. Training should be initiated to meet the needs of the mining company as development progresses.

Road traffic on the reservations would possibly increase as construction workers, from places such as Hardin and Billings, would pass through the reservation. In addition, Indians employed from both reservations would provide additional traffic. The Northern Cheyenne are concerned about increasing levels of truck traffic through the Reservation from regional coal mining activity. U.S. Highway 212, which runs through the reservation, has always been a concern to the Northern Cheyenne because of the heavy truck traffic, moving violations and fatalities resulting from auto-truck accidents (Northern Cheyenne Planning Office Report 1981). The Tribal Council has expressed the concern that the tribe is "uniquely disadvantaged" with respect to their inability to obtain coal impact monies from the State of Montana. Very few operational workers, except for Indians, are expected to use reservation roads.

SHORT TERM VERSUS LONG TERM IMPACTS

Geology/Minerals

Short term impacts would be the disruption of the surface features during mining of the Sawyer, Knobloch and Rosebud coal seams.

If the Rosebud seam is not mined, because of excessive overburden, it would be lost for future use under current law. Localized coal seams exist above the Sawyer bed. If not economically mineable, there would be a one-time

loss of these coal beds. Once mined, these seams would not be recoverable for future use.

Soils

Short term soil impacts include soil compaction from haul roads and facility construction, soil displacement by wind and water erosion and alteration of soil structure, horizonation and natural fertility.

Long term and residual impacts to the soils would be comparable. These would include: structural changes of soil particles due to disturbing the surface and subsurface horizons and changes in natural fertility by disrupting nutrient cycling, microbial action and decreasing organic matter content.

As the area is reclaimed, rebuilding of soil horizons would change soil porosity, permeability and infiltration rates, and soil, air and water relationships. Salinity content would increase as subsurface calcareous material is brought to the surface.

Hydrology

Groundwater levels in the vicinity of the mine would be lowered during mining; however, they would be established to near premining levels readily after reclamation. Reclaimed spoil aquifers contain two to three times the mineralization of the original aquifer and this would create a short-term impact on water quality from spoil aquifers. In the long term, the water would gradually return to approximately the same quality as the average quality in the removed aquifers. There is presently no way to accurately predict how long this would require.

Wildlife

In the short term all species of wildlife, particularly mule deer and sharp-tailed grouse, would be displaced from the area actively being mined. In the long term, wildlife population numbers and diversity would depend upon the success of reclamation efforts. If the area cannot be restored vegetatively to near original condition, the resultant wildlife populations and diversity would be dependent on the type of vegetative cover and habitat established. If a greater habitat diversity is established, effects on wildlife populations would be positive. If habitat diversity is decreased, effects would be negative.

Cultural Resources

Construction of mine facilities, haul roads, water development and mining activity would impact 61 prehistoric and/or historic sites based on present inventory. If an acceptable plan for mitigation of NRHP eligible sites is implemented, no significant adverse effects would occur.

TABLE VIII
 POTENTIAL INCOME TO THE STATE OF MONTANA FROM
 FEDERAL ROYALTIES AND SEVERANCE TAX IF COAL IS MINED AT \$10 PER TON

1/ Coal Area	2/ Federal Acres	3/ Estimated Recoverable Tons Per Acre	4/ Federal Royalty Per Acre \$1.25	5/ Montana Share of Federal Royalty Per Acre	6/ Montana Severance Tax 30% of Contract Sale Price at Mine Mouth
Greenleaf	6,039	43,370	\$54,212	\$27,106	\$351,040,000
-Miller					

- 1/ Total federal acres being considered.
- 2/ Total tonnage possible/total federal acres x 90% recoverable factor
 291 million tons/6038.72 x .90 = 43,370
- 3/ Recoverable tons x \$1.25 royalty.
- 4/ 50% of federal royalties.
- 5/ Approximate acreage to support 130 million tons = 2,698 acres (= $\frac{130 \cdot 6039}{291}$)
 2,698 x \$27,106 = \$73,131,988
- 6/ 2,698 x 43,370 x 30% x \$10 = \$351,040,000

Vegetation-Grazing

The short term effect would be a temporary loss of 5,957 acres (1,198 AUMs) of native vegetation and 82 acres of cropland during the mining and reclamation process. As yet, there is no evidence to support the complete success of reclamation using predominantly native species capable of withstanding and supporting sustained livestock grazing. However, productivity studies in southeastern Montana have proven successful in the short term by using introduced species.

The long term and most serious effect on vegetation would be the loss of the natural vegetation mosaic and species diversity. The overall long term effect on reclaimed sites in eastern Montana are not known.

Vegetation-Agriculture

The short term effect would be a temporary loss of 82 acres of cropland during the mining and reclamation process. As yet, there is no evidence to support the complete success of reclamation to agricultural plant species. However, productivity studies in southeastern Montana have proven successful in the short term by using introduced plant species.

The long term and most serious effect on agricultural plant species would be the loss of establishment and productivity. The overall long term effect on reclaimed agricultural cropland in eastern Montana is not known.

Socioeconomics

Agricultural output would show a loss as land is disturbed by mining. After reclamation, agricultural production would be returned. Some of the local ranchers could supplement their depressed present agricultural income during construction and operational phases of a new mine. The potential for employment of Northern Cheyenne and Crow Indians would increase during the construction and operational phases of the mine. In the long term, the Indian tribes may experience further cultural disintegration and loss of identity, with increased influx of population near their boundaries.

Colstrip would probably receive the greatest impact from an influx of new workers. However, with the pending completion of Colstrip 3 and 4 generators, little impact is expected. Other communities that could be impacted are Forsyth, Ashland and possibly Broadus.

Some increase in traffic could be expected on Highway 212 through the Northern Cheyenne and Crow Indian Reservations during the construction stage (two years) from some additional traffic from Hardin and the Billings area. During the operational phase, little or no additional traffic is expected.

The value of removed coal would be lost forever due to mining.

Tax revenue to Montana and Rosebud County would increase, thus lowering the cost of government to all residents.

CONSULTATION

In preparation of this environmental assessment, the Bureau of Land Management contacted or consulted with the following:

Montana Department of Fish, Wildlife & Parks

Montana Department of State Lands

Montana Historical Society (State Historic Preservation Office)

Montana Bureau of Mines and Geology

Montana Department of Natural Resources and Conservation (Water Rights Bureau)

United States Department of Agriculture (Soil Conservation Service)

U.S. Fish and Wildlife Service

Also for a list of individuals consulted, refer to the List of References.

REFERENCES

SOILS

- Department of Agriculture, Soil Conservation Service. Soil Series Descriptions and Interpretations for Rosebud County (unpublished).
- U.S. Department of Agriculture, Soil Conservation Service, National Soils Handbook 403.6(a).

HYDROLOGY, AIR QUALITY

- Bureau of Land Management 1981. Site Specific Analysis, Colstrip Area C, by PEDCo Environmental Inc. Cheyenne, Wyoming.
- Dollhoff, D.J., Schafer, W.M., DePuit, E.J., Hodder, R.L. and Cooney, C. Effect of Selective Replacement of Coal Surface Mined Overburden on Soil and Hydrology Relationships. 1978 Report 1:Data Base. Montana Agricultural Experiment Station, Montana State University, Bozeman.
- Hardaway, J. and Kimball, D. "Coal Mining and Groundwater" In: Coal Surface Mining and Power Production in the Face of Environmental Protection Requirements, Sept. 26-28, 1979; Second U.S.-Polish Symposium proc., 103-126.
- Knapton, J.R., and McKinley, P.W., 1977. Water quality of selected streams in the coal area of southeastern Montana: U.S. Geological Survey Water-Resources Investigations 77-80, 145 p.
- Lee, R.W. 1979. Ground-Water-Quality Data From the Northern Powder River Basin, Southeastern Montana: U.S. Geological Survey Water-Resources Investigations Open-File Report 79-1331, 55 p.
- Lee, R.W. 1981. Geochemistry of Water in the Fort Union Formation of the Northern Powder River Basin, Southeastern Montana: U.S. Geological Survey Water-Supply Paper 2076, 17 p.
- Levings, G.W. 1982. Potential Effects of Surface Coal Mining on the Hydrology of the Greenleaf-Miller Area, Ashland Coal Field, Southeastern Montana. USGS-BLM cooperative report. Currently in USGS review system.
- Moran, S.R., Cherry, J.A., Rehn, B. and Groenewold, G.H. "Hydrology Impact of Surface Mining of Coal in Western North Dakota." Symposium on Surface Mining Hydrology Sedimentation and Reclamation. 1979 University of Kentucky, Lexington, KY.
- Rahn, P.H. Potential of Coal Strip-Mine Spoils as Aquifers in the Powder River Basin. Project Completion Report by South Dakota School of Mines and Technology for Old West Regional Commission 1976, Billings, MT.
- Slagle, S.E., and Stimson, J.R. 1979, Hydrogeologic Data from the Northern Powder River Basin of Southeastern Montana: U.S. Geological Survey Water-Resources Investigations Open-File Report 79-1332, 111 p.
- Van Voast, W.A., Hedges, R.B., and McDermott, J.J. 1977. Hydrologic Conditions and Projections Related to Mining Near Colstrip, Southeastern Montana: Montana Bureau of Mines and Geology Bulletin 102, 43 p.
- Van Voast, W.A., Hedges, R.B., and McCermott, J.J. 1978 Strip Coal Mining and Mine-Land Reclamation in the Hydrologic System, Southeastern Montana. Project completion report of Montana Bureau of Mines and Geology and Montana College of Natural Science for the Old West Regional Commission, Billings, MT.
- Van Voast, W.A. An Update on Mine Spoils Hydrology, Southeastern Montana. 1982 Montana Bureau of Mines and Geology Paper presented to the Symposium of Surface Coal Mining and Reclamation in the Northern Great Plains, Billings, MT.
- Van Voast, W.A., Hedges, R.B., and McDermott, J.J. 1980. Hydrogeology of an Area of Proposed Surface Coal Mining Near Lower Youngs Creek, Southeastern Montana. Montana Bureau of Mines and Geology Open-File Report, MBMG 43, 46 p.
- Montana Department of State Lands (DSL) and U.S. Office of Surface Mining, 1982. Final Western Energy Company's Rosebud Mine Area C, Block 1 Environmental Impact Statement, Helena, MT

WILDLIFE

- Graff, Dale E. 1982. Personal Communication Warden Captain, Miles City Office, Montana Department of Fish, Wildlife and Parks.
- Martin, Peter R., Kristi DuBois, Heidi B. Youmans, 1981. Terrestrial Wildlife Inventory in Selected Coal Area, Powder River Resource Area. Montana Department of Fish, Wildlife and Parks.

Streeter, Robert G., R. Moore, J. Skinner, S. Martin, T. Terrel, W. Klimstra, J. Tate and M. Nolde 1979. Energy Mining Impacts and Wildlife Management. Which Way to Turn. Transactions of the 44th North American Wildlife and Natural Resources Conference. Wildlife Management Institute, Washington, D.C.

Bureau of Land Management 1981. Powder River Resource Area Management Framework Plan Amendment Draft. BLM, Miles City, MT

RECREATION, VISUAL RESOURCES MANAGEMENT

USGS Quadrangle Maps, Garfield Peak and Ashland NE Quads

Color Infrared Photos 1979 BLM, Miles City District Office

Robert Sept, Rancher, Personal Communication, February 25, 1983

Powder River Resource Area Management Framework Plan Amendment Final, May 1982.

Bureau of Land Management, South Rosebud URA, Steps 3 and 4. Miles City District Office.

Bureau of Land Management, South Rosebud MFP, Steps 1 and 2. Miles City District Office.

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