

# CHAPTER 2: ALTERNATIVES, INCLUDING THE PROPOSED ACTION

## INTRODUCTION

This chapter provides a narrative description of the six alternatives analyzed in this document and a series of tables summarizing relevant data such as recoverable reserves by tract and alternative, population changes, and acreage disturbances for each alternative. Also provided is a list of the types of mitigating measures applied. Table 2-1 gives a comparative analysis of impacts associated with the six alternatives.

The major consequences of each alternative are summarized in this chapter. The individual tract profiles contain site-specific analysis of the impacts of development of each tract included in the alternatives. That analysis includes consideration of agricultural economics.

Because documented evidence of damage to the agricultural production of farms and ranches in the vicinity of a coal mine has not been demonstrated, and because documented analysis has suggested that land values of farms and ranches have been enhanced by coal mines in the vicinity (Moore 1983), we have decided that the analysis of agricultural economics contained in the 1981 coal EIS (USDI, BLM 1981b, appendix G) and in the individual tract profiles prepared for the tracts being studied for sale is adequate. Therefore, further analysis of agricultural economics will not be undertaken.

## THE ALTERNATIVES

The alternatives are directed toward leasing various combinations of tracts to make specific tonnages of coal available for production. Table 1-4 in chapter 1 lists the tracts that would be offered for leasing under each alternative and the tonnage of federal uncommitted recoverable reserves in each tract.

For analytical purposes it is assumed that all tracts offered under each alternative will be leased and, further, that they will be mined in the period covered by this analysis. The impact analysis for Alternative 6 represents the maximum development possible. Figure 2-1 shows the annual production capacity for each alternative in selected years.

## TRACTS OF SPECIAL INTEREST

### Mud Springs

In its expression of interest in the Mud Springs tract, Utah International indicated it would use coal from the tract on the site for generation of electricity. The facility would include two 450-megawatt generating plants that would employ a permanent work force of approximately 200. The workforce for construction of the power plant and associated facilities would peak at 2,800 employees.

The Mud Springs tract is included in Alternatives 3, 4, and 6. Wherever the effects from development of this tract are discussed, we have assumed that if this tract was leased, the coal-fired generators would be built on the site.

If the generating plant were built as described, cooling water probably would be obtained from the Powder River in the amount of 13,000 acre-feet per year.

The most restrictive air quality regulation is the 24-hour maximum allowable increase in sulfur dioxide of 5 micrograms per cubic meter. This is the federal, Wyoming, and Montana standard for prevention of significant deterioration in a Class I area. The maximum predicted increment in sulfur dioxide due to the generating plants would be 2.1 micrograms per cubic meter at the boundary of the Northern Cheyenne Indian Reservation (PEDCo 1983)—well below the standard.

### Bitter Creek

The Bitter Creek tract was among those described in an individual tract profile and summarized in the tract summary report (USDI, BLM 1983). However, the tract was not selected for inclusion in any alternative because its overall desirability for leasing was low. Economic development of this isolated tract's coal would be hampered by a high stripping ratio and a low British thermal unit (Btu) content, and at least 35 miles of railroad spur would be required. Steep terrain and a probable alluvial valley floor are other concerns.

TABLE 2-1  
COMPARISON OF ALTERNATIVES  
CUMULATIVE ENVIRONMENTAL IMPACTS

Resource	Alternative 1 (baseline)	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
<b>GEOLOGY AND MINERALS</b>						
Potential annual coal production resulting from new federal leasing (million tons)	98 + (sig)	128.5 + (sig)	144.6 + (sig)	177.6 + (sig)	197.1 + (sig)	256.8 + (sig)
Net energy analysis (Btus produced to Btus consumed)	230 to 1 + (sig)	232 to 1 + (sig)	230 to 1 + (sig)	231 to 1 + (sig)	231 to 1 + (sig)	225 to 1 - (sig)
<b>SOILS AND RECLAMATION</b>						
Total acreage to be re-claimed*	333,700 - (sig)	355,700 - (sig)	372,000 - (sig)	391,300 - (sig)	402,800 - (sig)	444,800 - (sig)
Coal acreage to be re-claimed	293,900 - (sig)	314,060 (non)	327,790 - (sig)	345,380 - (sig)	356,270 - (sig)	394,070 - (sig)
<b>WATER RESOURCES</b>						
<u>Groundwater</u>						
Maximum number of wells destroyed or affected through mine life	275 - (sig)	333 - (sig)	368 - (sig)	384 - (sig)	375 - (sig)	425 - (sig)
Number of springs destroyed	25 - (sig)	29 - (sig)	35 - (sig)	35 - (sig)	28 - (sig)	49 - (sig)
Acre-feet of water needed for coal mining in 1990	9,340 - (sig)	9,950 (non)	10,270 (non)	11,000 - (sig)	11,240 - (sig)	12,590 - (sig)
Acre-feet of municipal water needed by 1990 population	38,000 - (sig)	38,990 (non)	40,556 (non)	41,844 (non)	41,205 (non)	43,900 - (sig)
<u>Surface Water</u>						
Reduction in surface outflow (maximum through mine life)						
Cheyenne River	2.20% (non)	3.10% (non)	3.10% (non)	3.10% (non)	3.10% (non)	3.80% (non)
Tongue River	0.09% (non)	0.09% (non)	0.12% (non)	0.13% (non)	0.16% (non)	0.44% (non)
Maximum number of point watering sources lost through mine life	108 - (sig)	164 - (sig)	183 - (sig)	204 - (sig)	220 - (sig)	287 - (sig)

\* These figures apply to all energy-related actions on and off the sites of the developments.

Symbols: "+" = positive; "-" = negative; "sig" = significant; "non" = nonsignificant.

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COMPARISON OF ALTERNATIVES--CUMULATIVE ENVIRONMENTAL IMPACTS (continued)

Resource	Alterna- tive 1 (baseline)	Alterna- tive 2	Alterna- tive 3	Alterna- tive 4	Alterna- tive 5	Alterna- tive 6
<b>WATER RESOURCES (continued)</b>						
<u>Surface Water (continued)</u>						
Increase in dissolved solids concentration						
Cheyenne River	5.6% - (sig)	6.3% - (sig)	6.3% - (sig)	6.3% - (sig)	6.3% - (sig)	6.9% - (sig)
Tongue River	1.4% (non)	1.7% (non)	3.5% (non)	4.1% - (sig)	4.3% - (sig)	7.2% - (sig)
<b>AIR QUALITY</b>						
Predicted violations in 1990	a (non)	a,b (non)	a,b (non)	a,b (non)	a,b (non)	a,c (non)
<b>TRANSPORTATION FACILITIES</b>						
Total number of unit coal trains per day	210 - (sig)	227 (non)	234 - (sig)	255 - (sig)	261 - (sig)	289 - (sig)
Average hours and minutes per day that at-grade crossings would be occupied (at 20 m.p.h.)	5:51 - (sig)	6:00 (non)	6:06 - (sig)	6:33 - (sig)	7:03 - (sig)	8:06 - (sig)
Probable number of car-train accidents at at-grade crossings per 1,000 vehicles per day per 100 years	13 - (sig)	14 (non)	14 (non)	16 - (sig)	17 - (sig)	19 - (sig)
<b>SOCIOLOGY AND ECONOMICS</b>						
<u>Population in 1990</u>						
<u>Wyoming</u>						
Campbell County	45,600	48,400	48,400	50,000	50,100	54,700
Converse County	16,700	16,900	16,900	17,200	17,200	18,100
Crook County	5,800	5,900	5,900	5,900	5,900	6,000
Goshen County	14,600	14,800	14,800	15,000	15,100	15,500
Johnson County	8,100	8,200	8,200	8,200	8,300	8,400
Natrona County	83,800	84,900	84,900	85,900	87,400	88,300
Niobrara County	3,200	3,220	3,220	3,240	3,250	3,300
Platte County	9,200	9,400	9,400	9,500	9,500	9,800
Sheridan County	32,600	33,000	35,700	37,600	36,900	40,300
Weston County	9,900	10,000	10,000	10,100	10,100	10,300

a. No violation of federal standards is predicted.

b. Wyoming standards would be violated on Thundercloud, and Kintz Creek tracts; Montana standards would be violated on North Decker I and North Decker II tracts.

c. Wyoming standards would be violated on Thundercloud, Kintz Creek, and Calf Creek tracts; Montana standards would be violated on North Decker I, North Decker II, and Downey Coulee tracts.

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COMPARISON OF ALTERNATIVES--CUMULATIVE ENVIRONMENTAL IMPACTS (continued)

Resource	Alterna- tive 1 (baseline)	Alterna- tive 2	Alterna- tive 3	Alterna- tive 4	Alterna- tive 5	Alterna- tive 6
SOCIOLOGY AND ECONOMICS (continued)						
<u>Population in 1990 (continued)</u>						
<u>Montana</u>						
Big Horn County	15,600	15,600	16,600	16,700	17,200	17,900
Powder River County	4,640	4,640	7,500	8,200	6,100	8,200
Rosebud County	14,500	14,500	16,200	16,900	16,200	18,000
Crow Indian Reservation	8,200	8,200	8,700	8,700	9,000	9,400
Northern Cheyenne Indian Reservation	<u>5,300</u>	<u>5,300</u>	<u>5,700</u>	<u>5,800</u>	<u>5,600</u>	<u>6,200</u>
Total Population	264,240 - (sig)	269,460 (non)	277,720 (non)	284,440 - (sig)	283,250 - (sig)	298,800 - (sig)

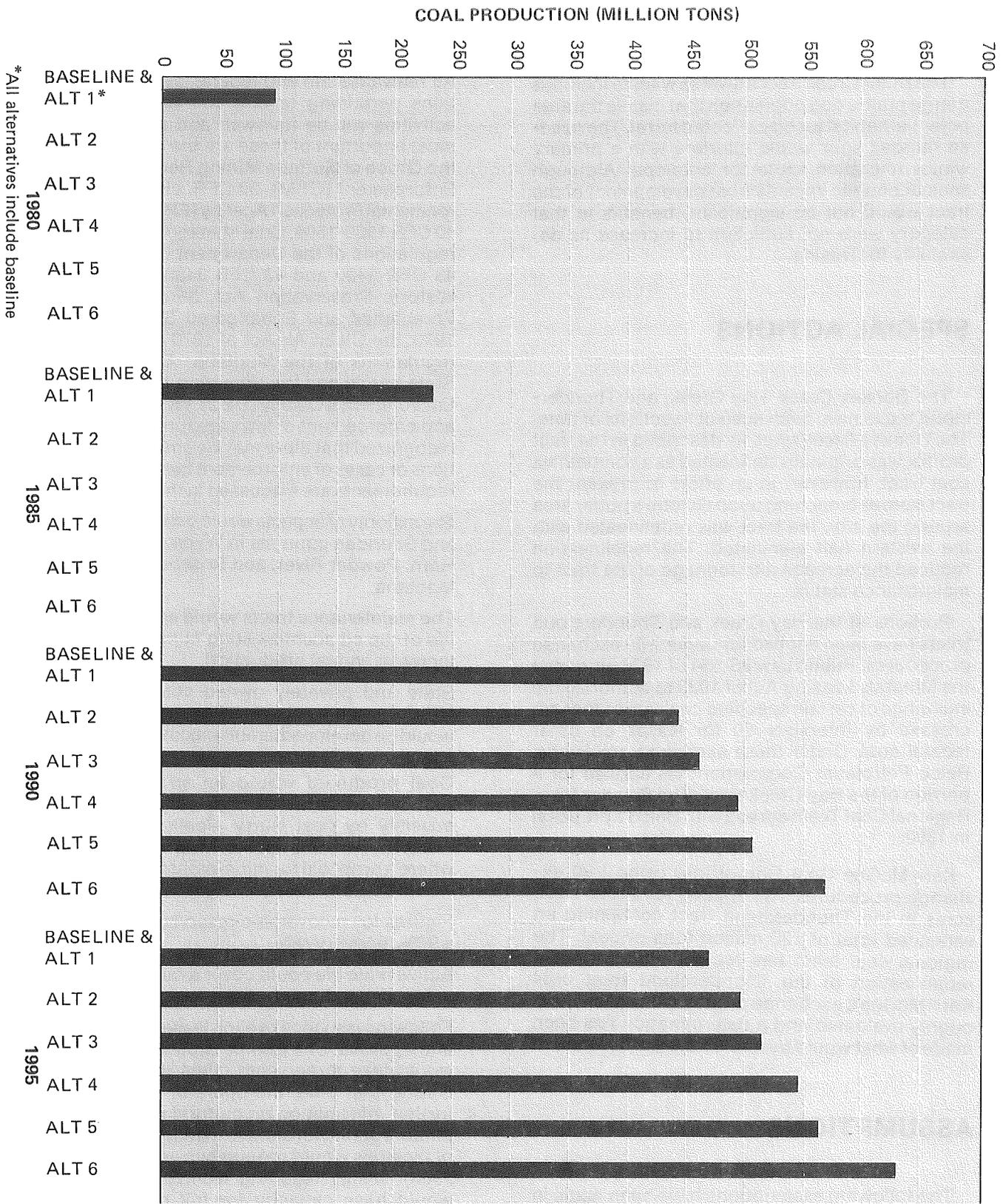


Figure 2-1  
**POWDER RIVER REGIONAL  
 ANNUAL COAL PRODUCTION CAPACITY  
 TO 1995**

## Alternatives

The Bitter Creek tract's diverse wildlife includes a large prairie dog population that makes the area potential habitat for black-footed ferret. The needed railroad spur would interfere with a primary winter migration route for antelope. Although socioeconomic impacts from development of the tract would not be significant, benefits in that category were not sufficient to increase its desirability for leasing.

### SPECIAL ACTIONS

The Donkey Creek, Hay Creek, and Thundercloud tracts have been subject to actions of note. The Donkey Creek tract, as described in the tract profile, was originally delineated as a competitive coal tract; however, in an effort to prevent the tract from encroaching upon Gillette's buffer area around the city, the tract was redelineated with the western half eliminated. The redelineation reduced the acreage and tonnage of the tract to maintenance status.

Portions of the Hay Creek and Thundercloud tracts have been applied for under I-90 exchange procedures. Public Law 95-554 of 1978 amended the Minerals Leasing Act of 1920 to authorize the exchange of certain specified coal leases that are crossed by Interstate 90 for leases on other federal coal. Under these exchange provisions, Belco Petroleum Corporation has applied for a portion of the Hay Creek tract. The Powder River Regional Coal Team agreed with Belco's proposal in 1982.

Kerr-McGee Coal Corporation, using I-90 exchange procedures, has applied for about 1,100 acres in the Thundercloud tract containing an estimated total of 120 million tons of coal. The regional coal team has recommended against redelineation of the Thundercloud tract until Kerr-McGee's exchange proposal has been thoroughly evaluated and a determination has been made of what would best serve the public interest.

### ASSUMPTIONS

The following assumptions have been made in analyzing the environmental impacts of mining and coal-related development considered in this EIS:

All relevant state and federal laws and regulations pertaining to coal mining and related activities will be followed and enforced. The most important of these are the regulations of the Office of Surface Mining Reclamation and Enforcement (OSM), 30 CFR, chapter 7; Environmental Protection Agency (EPA) regulations, 40 CFR 1500-1508; Coal Management Program regulations of the Department of the Interior, 43 CFR 3400 and 43 CFR 3480; the National Historic Preservation Act, 36 CFR 800; the Threatened and Endangered Species Act of 1973; the Clean Air Act of 1970 and 1977; and regulations of the Montana Department of State Lands and the Wyoming Department of Environmental Quality (DEQ). While observance and enforcement of laws are fundamental, it is recognized that there may be emergency situations or cases of enforcement failure. Mitigation requirements are discussed in the next section.

The majority of impacts would occur in Campbell and Sheridan counties in Wyoming and in Big Horn, Powder River, and Rosebud counties in Montana.

The maintenance tracts would add to the mine life of the adjacent existing mines rather than increase annual production.

State and privately owned coal included in federal lease tracts or adjoining those tracts would be developed simultaneously with federal coal.

Coal produced would be strip-mined and transported from the region by railroad and possibly by coal slurry pipeline. A possible exception to this is the Mud Springs tract, where a proposal for mine-mouth consumption would be considered.

Figures for recoverable reserves are based on a 90% recovery rate.

Active mine life could cover a range of 35 to 40 years, depending on reserves and markets.

Following issuance of each lease, development and approval of a permit application package would take three years (1984 through 1986). During that time, the operator would collect further information on cultural resources and obtain a permit for surface mining. Construction of facilities would require two years (1987 and 1988). Mines resulting from this lease sale would have capacity for full production by 1990, except the Mud Springs tract, which would have capacity for full production in 1992.

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Reclamation would proceed concurrently with mining operations. After a six-year reclamation period, the reclaimed land would be stabilized and available for its previous use. Full restoration of the land and its vegetation to the premining condition would require a longer time (30 to 50 years).

Lands used for housing or public facilities would not be reclaimed.

Land use after mining would be the same as that before mining except for housing, public facilities, transportation rights-of-way, and permanent changes due to development.

Coal reserves included in the PRLAs covered under Alternative 1 will all be developed.

## MITIGATION REQUIREMENTS

Federal coal leases will be developed in compliance with all applicable federal, state, and local laws and regulations. Existing laws and regulations form the basis of the federal coal leasing program. Therefore, enforceable statutes, performance standards, and other license requirements are considered part of proposed federal actions under all alternatives and are applicable to all coal tracts.

Additional site-specific mitigating measures have been developed through the BLM's land use and activity planning processes. Cooperating agencies and members of the public have made significant contributions to the development of these measures, which are detailed in appendix C. The mitigating measures are considered to be real, committed, and legally enforceable. The general types of mitigating measures are as follows.

**Cultural Resources:** Field inventories and procedures for protection of cultural resources

**Paleontological Resources:** Survey and resource recovery

**Existing Rights:** Negotiation procedures

**Soils:** Separation of "B" horizon material from underlying material

**Survey Markers:** Protection from damage; provision for replacement

**Raptors:** Buffer zones around nesting areas and restrictions as necessary on surface mining

**Black-Footed Ferret Habitat:** Monitoring and inventory in accordance with prescribed guidelines

**Migratory Birds of High Federal Interest:** Habitat recovery and replacement

**Buffer Zones and Rights-of-Way:** Buffer zones unsuitable for surface mining for existing public facilities

**Alluvial Valley Floors:** Mitigation or designation of unsuitability pending final determinations by authorized agencies

## SUMMARY OF MAJOR CONSEQUENCES

In the interest of presenting a clear comparison of alternatives, we have limited the discussions of resource disciplines in this chapter to soils, vegetation, and reclamation; water resources; land use; air quality; transportation facilities; and economic and social conditions. Through the scoping process, these components were identified as the ones of major interest to the public. Chapter 4 contains detailed analyses of impacts on all affected resources. Cumulative environmental impacts are summarized in table 2-1, and the significance is indicated.

### Alternative 1 (No Action)

#### Soils, Vegetation, and Reclamation

A total of 333,700 acres will be disturbed if no new leasing occurs.

#### Water Resources

Water use would be about 600,000 acre-feet per year by 1990. Major uses would be for irrigation, 420,000; power plants, 46,000; municipal use, 38,000; uranium milling and mining, 7,000; and coal mining 9,340 acre-feet per year.

#### Groundwater

Approximately 275 existing wells and 25 springs on mine sites would be destroyed, but wells usually could be replaced by tapping deeper aquifers or by using wells in spoils aquifers. Springs might eventually reappear, but they would be in different locations.

Impacts of coal mining on groundwater are restricted to an area within a few miles of the mine site. Water levels in wells near a mine would be lowered during mining but would return to near premining levels after the site was restored.

## Alternatives

Recharge would probably increase in many areas because the postmining slope of the land surface would be less steep and because reclamation practices to retain moisture and prevent erosion would increase infiltration. Shale layers that may have caused springs and seeps would be destroyed; however, the increased infiltration might cause increased groundwater inflow to streams or the creation of new springs and seeps near the mine site. Population increase associated with the "no new leasing" alternative would require 11,275 acre-feet of additional supplies by 1990.

### *Surface Water*

The interception and use of water in mining operations and water consumption by the increased population would reduce surface outflow from the region by about 3,113 acre-feet per year (0.5%) during mining. The greatest reductions in flow would occur in the Little Powder and Cheyenne rivers, where flows might decrease more than 2%.

The total dissolved solids (TDS) concentrations of streams might increase as a result of leaching from coal spoils and increased sewage effluent. The maximum increase in TDS would range from 0.4% in the Powder River to 5.6% in the Cheyenne River. The increase in TDS would be long-term but would have no significant impact on current uses of the water or on aquatic biology downstream. The TDS of the Yellowstone and North Platte rivers would not be increased measurably.

### **Land Use**

Under Alternative 1, no new mining properties would be added. The baseline impacts would be those caused by the regional industrial developments listed in appendix B.

### **Air Quality**

Under Alternative 1, in which no new federal leasing would occur, regional changes in air quality resulting from new lease development, coal exchanges, PRLA development, and population increases would be insignificant. However, impacts near the Belle Ayr, Black Thunder, and Jacobs Ranch mines would violate standards on some occasions. Estimated emissions of total suspended particulates (TSP) from all mining sources under this alternative would be 34,044 tons in 1995.

### **Transportation Facilities**

There would be no change from the baseline under Alternative 1. Table 4-10 and figure 4-1 in chapter 4 show the number of trains per day for selected towns. Table 4-10 also shows the at-grade interruptions and accident rates for each alternative. The figures for all alternatives are based on production potential; the actual number of trains would depend upon contracts and coal demand.

### **Economic and Social Conditions**

Because the brunt of negative socioeconomic impacts due to coal development arises from population changes, this section will summarize the incremental changes in population under each alternative (see table 2-2). It is estimated that peak increases in population will occur by 1990.

In general, each succeeding alternative that contains additional leasing proposals would present an increasing change in peak population, except in Sheridan County, Powder River County, Rosebud County, and the Northern Cheyenne Indian Reservation. For the exceptions, Alternative 5 clearly would present a smaller change in peak population than the other leasing alternatives; thus, it has the potential for a more favorable ratio of benefits (from jobs and revenues) to costs (from population and expenditures).

TABLE 2-2  
 INCREMENTAL POPULATION CHANGES RESULTING FROM EACH NEW LEASING ALTERNATIVE  
 IN THE POWDER RIVER REGION

	Alterna- tive 1	Alterna- tive 2	Alterna- tive 3	Alterna- tive 4	Alterna- tive 5	Alterna- tive 6
<u>Eastern and Western Powder River Region<sup>a</sup></u>						
<b>Campbell County</b>						
1988	0	510	510	740	760	1,430
1990	0	2,830	2,830	4,400	4,500	9,100
1995	0	2,830	2,830	4,400	4,500	9,100
<b>Converse County</b>						
1988	0	30	30	60	70	120
1990	0	240	240	450	510	1,420
1995	0	240	240	450	510	1,420
<b>Crook County</b>						
1988	0	10	10	10	10	30
1990	0	50	50	100	110	210
1995	0	50	50	100	110	210
<b>Goshen County</b>						
1988	0	30	30	60	60	110
1990	0	220	220	410	470	850
1995	0	220	220	410	470	850
<b>Johnson County</b>						
1988	0	10	10	20	20	40
1990	0	80	80	140	160	290
1995	0	80	80	140	160	290
<b>Natrona County</b>						
1988	0	170	170	290	340	570
1990	0	1,140	1,140	2,140	3,600	4,500
1995	0	1,140	1,140	2,140	3,600	4,500
<b>Niobrara County</b>						
1988	0	0	0	0	0	10
1990	0	20	20	40	50	100
1995	0	20	20	40	50	100
<b>Platte County</b>						
1988	0	20	20	40	50	80
1990	0	160	160	290	340	610
1995	0	160	160	290	340	610
<b>Sheridan County<sup>b</sup></b>						
1988	0	60	880	1,150	920	1,760
1990	0	370	3,100	5,000	4,300	7,700
1995	0	370	1,430	3,300	4,300	6,000
<b>Weston County</b>						
1988	0	20	20	20	20	50
1990	0	100	100	180	160	370
1995	0	100	100	180	160	370

a. See footnotes to table 4-14 for derivation (except for Sheridan County).

b. See footnotes to table 4-15 for derivation.

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INCREMENTAL POPULATION CHANGES (continued)

	Alterna- tive 1	Alterna- tive 2	Alterna- tive 3	Alterna- tive 4	Alterna- tive 5	Alterna- tive 6
<u>Northern Powder River Region<sup>c</sup></u>						
Big Horn County						
1988	0	0	320	420	810	1,050
1990	0	0	940	1,110	1,600	2,340
1995	0	0	420	570	1,600	1,890
Powder River County						
1988	0	0	840	1,110	510	1,190
1990	0	0	2,870	3,500	1,480	3,600
1995	0	0	1,920	2,580	1,480	2,620
Rosebud County						
1988	0	0	680	1,030	880	1,540
1990	0	0	1,780	2,470	1,680	3,500
1995	0	0	1,070	1,760	1,680	2,750
<u>The Crow Reservation<sup>d</sup></u>						
1988	0	0	160	210	410	530
1990	0	0	480	560	810	1,190
1995	0	0	210	290	810	960
<u>The Northern Cheyenne Reservation<sup>d</sup></u>						
1988	0	0	150	190	180	380
1990	0	0	430	500	330	870
1995	0	0	220	260	330	640

c. See footnotes to table 4-16 for derivation.

d. See footnotes to table 4-17A for derivation.

## Alternative 2

### Soils, Vegetation, and Reclamation

A total of 355,700 acres would be disturbed under Alternative 2. This is 22,000 acres more than would be disturbed under Alternative 1.

### Water Resources

#### Groundwater

Coal mining under Alternative 2 would consume 610 acre-feet of water per year more than that consumed under Alternative 1; however, most of this water could be supplied by rainfall on the mined areas and seepage into the pits. Under this alternative, 58 wells would be impaired or destroyed in addition to those impaired or destroyed under Alternative 1, and at least four additional springs would be impaired or destroyed. The destroyed wells could be replaced at approximately their

original depth in the spoils aquifer after reclamation, but the quality of water would be poorer in most cases, with TDS typically 3,000 to 5,000 milligrams per liter (mg/l). This TDS range is unsuitable for human use and only marginally suitable for livestock use. Better quality water could be obtained at greater depth in most areas, but the static water levels in the deeper wells would be lower and pumping lifts would be greater.

Population increases associated with this alternative would require 990 acre-feet of water more than that required under Alternative 1. The impact of this requirement would be felt primarily by the communities of Wright and Gillette.

#### Surface Water

Under Alternative 2, surface outflow from the region would be reduced during mining by about 200 acre-feet per year (0.03%) in addition to the reduction under Alternative 1. The greatest effect

## Alternatives

would be in the Cheyenne River watershed, where flow would be reduced 0.9%.

About 55 livestock ponds and small reservoirs would be destroyed during mining. The quantity of water lost would not be significant, but the loss of point-watering sources would be a temporary deterrent to the use of the areas by wildlife and livestock.

The maximum potential increase in TDS concentrations in streams would range from 0.3% in the Tongue River to 2.3% in Armells Creek. However, these increases would have no significant impact on current uses of the water or on aquatic biology downstream and no measurable effect on the salinity of the Yellowstone River.

### Land Use

New mine properties covering 20,200 acres would be added under Alternative 2. The acreage of cropland and rangeland that would be affected is shown on table 2-3, which also shows the number of acres disturbed off-site, the acreage disturbed per year, and the maximum number of acres disturbed at any one time.

Nine landowners operate ranches within the boundaries of tracts included in this alternative. Two of them have voiced concern that development of the Kintz Creek tract would adversely affect air quality. They also expressed concern about noise impacts and access. Kintz Creek is also among the tracts selected for Alternatives 3, 4, 5, and 6.

### Air Quality

Under Alternative 2, the Wyoming 24-hour standard would be violated around the Thundercloud and Kintz Creek tracts. (The Wyoming DEQ does not recognize the validity of the 24-hour prediction process.) Montana's 24-hour standards would be marginally violated near the North Decker I, North Decker II, and Spring Creek tracts. No federal air quality standards would be violated under any of the alternatives. The estimated increase in TSP emissions under Alternative 2 would be 5,227 tons per year more than under Alternative 1.

### Transportation Facilities

Alternative 2 would add 5 miles of new rail spur lines to serve new facilities. Full production from these tracts would add 16 unit trains per day to the main lines leaving the region. The number of trains per day is shown on table 4-10 and figure 4-1 in chapter 4. Table 4-10 also shows at-grade interruptions and accident rates. Most of the tracts in this alternative are maintenance tracts that would not add any new rail spur lines or additional trains.

### Economic and Social Conditions

See the narrative under Alternative 1, and table 2-2.

TABLE 2-3  
ACREAGE OF LAND DISTURBED BY COAL MINING UNDER EACH ALTERNATIVE

	Total Acreage Disturbed <sup>a</sup>	Cropland Disturbed	Rangeland Disturbed	Acreage Disturbed Offsite <sup>b</sup>	Acreage Disturbed per Year	Total Acreage Disturbed at Any One Time <sup>c</sup>
Alternative 1 (Baseline)	293,900	No additional mining properties added.				
Alternative 2	20,160	3,040	17,120	1,900	740	6,300
Alternative 3	33,890	4,080	29,810	4,400	920	10,600
Alternative 4	51,480	5,040	46,440	6,100	1,540	15,400
Alternative 5	63,270	5,630	57,640	5,800	1,930	17,400
Alternative 6	101,070	8,410	92,660	10,100	2,850	27,100

NOTE: Figures are not cumulative.

a. Totals do not include off-site impacts.

b. Includes facilities, access roads, rail spurs, and urban growth.

c. Includes land mined and not yet reclaimed, facilities, off-site disturbance, and urban growth.

## Alternatives

### Alternative 3

#### Soils, Vegetation, and Reclamation

A total of 372,000 acres would be disturbed under Alternative 3. This is 38,300 acres more than would be disturbed under Alternative 1.

#### Water Resources

##### *Groundwater*

Annual water use for coal mining under Alternative 3 would be about 930 acre-feet greater than it would be under the "no action" alternative; however, most of the additional water could be supplied by rainfall on the mined areas and seepage into the pits. Municipal use would require 2,556 additional acre-feet per year.

About 93 more wells would be impaired or destroyed than under Alternative 1, and about 10 additional springs would be destroyed.

##### *Surface Water*

During peak production, surface outflow from the region would be reduced by 310 acre-feet per year more than under Alternative 1. Flow reductions would range from about 0.03% more in the Tongue River watershed to about 0.9% more in the Cheyenne River.

About 75 livestock ponds and small reservoirs would be destroyed during mining, causing a temporary deterrent to the use of the areas by wildlife and livestock.

The maximum potential increase in TDS concentrations above those under the "no action" alternative would range from 0.6% in the Belle Fourche River to 2.1% in the Tongue River and 2.3% in Armells Creek. These increases would have no significant impact.

#### Land Use

New mine properties covering 33,900 acres would be developed under Alternative 3. The acreage of cropland and rangeland that would be affected is shown on table 2-3, which also shows the number of acres disturbed off-site, the acreage disturbed per year, and the maximum number of acres disturbed at any one time.

There are 19 landowners (non energy-related operations) who operate within the boundaries of tracts included in this alternative. One landowner whose property adjoins the Mud Springs tract has expressed concern about impacts that development of this tract would have on the air quality of his operation. He also is concerned about noise and social impacts. The Mud Springs tract is also included in Alternatives 4 and 6. Also see the discussion of Kintz Creek under Alternative 2.

#### Air Quality

As under Alternative 2, the Wyoming 24-hour standard would be violated around the Thundercloud and Kintz Creek tracts, and marginal violations of Montana's 24-hour standards would be expected near the North Decker I, North Decker II, and Spring Creek tracts. The estimated increase in TSP emissions under Alternative 3 would be 7,427 tons per year more than under Alternative 1.

Interest has been expressed in a coal-fired power plant on the Mud Springs tract, which is included in Alternatives 3, 4, and 6. If the power plant was built on this tract, sulfur dioxide would be emitted at a constant rate of 10,381 tons per year and nitrogen dioxide at 20,696 tons per year through 2000.

The most restrictive regulation on sulfur dioxide is the prevention of significant deterioration (PSD) increment for the Northern Cheyenne Indian Reservation, a Class I area. The 24-hour allowable increment consumption for sulfur dioxide in a Class I area is 5 micrograms per cubic meter. The maximum increment consumption for sulfur dioxide is projected to be 2.1 micrograms per cubic meter at the reservation boundary.

#### Transportation Facilities

Alternative 3 would add 10 miles of rail spur to serve new facilities. Full production from these tracts would add 25 unit trains per day to the main lines leaving the region. The number of trains per day is shown in table 4-10 and figure 4-1 in chapter 4. Table 4-10 also shows at-grade inter-rptions and accident rates.

#### Economic and Social Conditions

See the narrative under Alternative 1, and table 2-2.

## Alternatives

### Alternative 4

#### Soils, Vegetation, and Reclamation

A total of 391,300 acres would be disturbed under Alternative 4. This is 57,600 acres more than would be disturbed under Alternative 1.

#### Water Resources

##### *Groundwater*

Coal mining under Alternative 4 would require 1,660 acre-feet of water per year more than that required by the "no action" alternative; however, most of the additional water would be supplied by rainfall on the mined areas and seepage into the pits. Associated population growth would require 3,844 acre-feet per year more than Alternative 1.

Approximately 109 more wells would be impaired or destroyed than under Alternative 1, and at least 10 additional springs would be destroyed.

##### *Surface Water*

Surface outflow from the region would be reduced by 555 acre-feet per year more than under Alternative 1. The flow reductions would range from about 0.04% more than Alternative 1 in the Tongue River watershed to about 1.0% more in the Belle Fourche River.

About 96 livestock ponds and small reservoirs would be destroyed during mining, causing a temporary deterrent to use of the areas by wildlife and livestock.

Maximum TDS increases over those under the "no new leasing" alternative would range from 0.76% in the Cheyenne River to 2.7% in the Tongue River.

#### Land Use

New mine properties covering 51,500 acres would be developed under Alternative 4. The acreage of cropland and rangeland that would be affected is shown on table 2-3, which also shows the number of acres disturbed off-site, the acreage disturbed per year, and the maximum number of acres disturbed at any one time.

There are 28 landowners (non-energy related operations) who operate within the boundaries of tracts included in this alternative. Landowners

who have expressed concerns are discussed under Alternatives 2 and 3.

#### Air Quality

Wyoming 24-hour standards would be violated under Alternative 4 around the Thundercloud, Kintz Creek, and Mount Logan tracts. Marginal violations of Montana's 24-hour standards would occur near the North Decker I, North Decker II, and Spring Creek tracts. Power plant emissions from the projected plant on the Mud Springs tract would be the same as those described for Alternative 3. The estimated increase in TSP emissions under Alternative 4 would be 10,305 tons per year more than under Alternative 1.

#### Transportation Facilities

Alternative 4 would add 10 miles of new rail spur lines to serve new facilities. Full production from these tracts would add 44 unit trains per day to main lines leaving the region. The number of trains per day is shown on table 4-10 and figure 4-1 in chapter 4. Table 4-10 also shows at-grade interruptions and accident rates.

#### Economic and Social Conditions

See the narrative under Alternative 1, and table 2-2.

### Alternative 5

#### Soils, Vegetation, and Reclamation

A total of 402,800 acres would be disturbed under Alternative 5. This is 69,100 acres more than would be disturbed under Alternative 1.

#### Water Resources

##### *Groundwater*

Coal mining under Alternative 5 would consume about 1,900 acre-feet of water per year more than would be required if there were no new leasing. Most of the additional water could be supplied by rainfall on the mined areas and seepage into the pits. Associated population growth would require 3,205 more acre-feet per year.

About 100 more wells would be impaired or

## Alternatives

destroyed by mining under this alternative than under Alternative 1, and at least 3 more springs would be destroyed.

### *Surface Water*

Surface outflow from the region would be reduced by 635 acre-feet per year more than under Alternative 1. Flow reductions would range from 0.07% more than Alternative 1 in the Tongue River to about 1.0% more in the Belle Fourche River.

About 112 livestock ponds and small reservoirs would be destroyed during mining.

The maximum additional TDS increases caused by mining in Alternative 5 would range from 0.8% in the Cheyenne River to 2.9% in the Tongue River.

### **Land Use**

New mine properties covering 63,300 acres would be developed under Alternative 5. The acreage of cropland and rangeland that would be affected is shown on table 2-3, which also shows the number of acres disturbed off-site, the acreage disturbed per year, and the maximum number of acres disturbed at any one time.

There are 37 landowners (non-energy related operations) who operate within the boundaries of tracts included in this alternative. Landowners who have expressed concerns are discussed under Alternative 2.

### **Air Quality**

Violations of 24-hour air quality standards under Alternative 5 would be the same as those described for Alternative 4. The Mud Springs tract is not included in this alternative, so impacts described for the proposed power plant on that tract would not occur. The estimated increase in TSP emissions under Alternative 5 would be 12,489 tons per year more than under Alternative 1.

### **Transportation Facilities**

Alternative 5 would add 45 miles of new rail spur lines to serve new facilities. Full production from these tracts would add 50 unit trains per day to main lines leaving the region. The number of trains per day is shown in table 4-10 and figure 4-1 in chapter 4. Table 4-10 also shows at-grade interruptions and accident rates.

### **Economic and Social Conditions**

See the narrative under Alternative 1, and table 2-2.

## **Alternative 6**

### **Soils, Vegetation, and Reclamation**

A total of 444,800 acres would be disturbed under Alternative 6. This is 111,100 acres more than would be disturbed under Alternative 1.

### **Water Resources**

#### *Groundwater*

Coal mining for this alternative would consume 3,250 acre-feet per year more than the "no new leasing" alternative. However, most of this water could be supplied by rainfall on the mine areas and seepage into the mine pits.

About 150 wells would be impaired or destroyed in addition to those impacted by projected mining under Alternative 1, and at least 24 more springs would be destroyed.

Population growth associated with the coal development would require an additional 5,900 acre-feet per year for municipal supplies.

#### *Surface Water*

It is estimated that the reduction in regional surface outflow would exceed that of the "no action" alternative by 1,085 acre-feet per year. The greatest flow reductions would be in the Little Powder River watershed, which would have a decrease in flow of about 1.6%.

About 179 livestock ponds and small reservoirs would be destroyed during mining. The loss of these point-watering sources would be a temporary deterrent to use of the areas by wildlife and livestock until the water sources were replaced after reclamation.

The estimated maximum additional increases in TDS concentrations would range from 1.3% in the Cheyenne River to 5.8% in the Tongue River.

### **Land Use**

New mine properties covering 101,100 acres would be developed under Alternative 6. The

## Alternatives

acreage of cropland and rangeland that would be affected is shown on table 2-3, which also shows the number of acres disturbed off-site, the acreage disturbed per year, and the maximum number of acres disturbed at any one time.

There are 52 landowners (non-energy related operations) who operate within the boundaries of tracts included in this alternative. Landowners who have expressed concerns are discussed under Alternatives 2 and 3.

### **Air Quality**

Under Alternative 6, the Calf Creek tract in Wyoming and the Downey Coulee tract in Montana would be added to the list of tracts that would violate the 24-hour standards, as described under Alternative 4. Impacts from the proposed coal-fired generator on the Mud Springs tract would be

as described under Alternative 3. The estimated increase in TSP emissions under Alternative 6 would be 19,275 tons per year more than under Alternative 1.

### **Transportation Facilities**

Alternative 6 would add 65 miles of new rail spur lines to serve new facilities. Full production from these tracts would add 85 unit trains per day to main lines leaving the region. The number of trains per day is shown in table 4-10 and figure 4-1 in chapter 4. Table 4-10 also shows at-grade interruptions and accident rates.

### **Economic and Social Conditions**

See the narrative under Alternative 1, and table 2-2.

