

CHAPTER VII

PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

Climate

Since emissions cannot be completely controlled an increase of atmospheric particulates is anticipated.

Vehicle and equipment emissions, airborne dust resulting from coal mining, emissions from power plants and gasification plants will result in a cumulative decline in air quality which may result in an adverse impact to climate which would be unavoidable. Therefore, effects of reduced precipitation on agriculture, mined land rehabilitation and water supplies would also be unavoidable.

Air Quality

Development of coal resources in the region together with related activities will have an unavoidable adverse effect on local and regional air quality. Increases in particulates, sulfur dioxide, nitrogen oxides, trace elements (including radionuclides), and hydrocarbons will occur even though emission controls are employed and air quality standards are enforced. These emissions will decrease the ambient air quality in parts of the Wyoming and Casper intrastate air quality control regions.

Deleterious stack emissions cannot be completely eliminated with existing technology so adverse impact to air quality is unavoidable. Table 1 gives total estimated stack emissions per year for 1980, 1985, and 1990.

Table 1

Estimated Stack Emissions (tons/year)

<u>Year</u>	<u>Particulates*</u>	<u>Sulfur Dioxide*</u>	<u>Nitrogen Oxides*</u>	<u>Hydrocarbons**</u>
1980 [#]	7,200	70,100	48,000	39,500
1985 ^{##}	13,700	134,300	90,000	79,000
1990 ^{###}	16,000	155,700	106,100	79,000

*Assumption: New power plant emissions will meet New Source Performance Standards (NSPS) and Wyoming Air Quality Emission Standards.

**Estimated emission from gasification plants only.

#Total power plant capacity 1,425 megawatts.

##Total power plant capacity 2,700 megawatts.

###Total power plant capacity 3,200 megawatts.

Emissions resulting from daily operation of 24 trains by 1980, 34 by 1985 and 46 by 1990 cannot be avoided. The total emissions as shown in Chapter V, Table 2, cannot be avoided, as there are no emission controls applicable to diesel locomotives. These emissions will add to the cumulative adverse impact on ambient air quality.

Vehicle and equipment emissions will increase during the period 1974 to 1990 even though controls are required. The number of vehicles in Campbell and Converse Counties is projected to increase 43 percent over 1970 levels. Additional miles will be driven as workers commute to the mines, power plants and gasification plants.

An indeterminable increase in airborne dust and similar particulate matter (coal dust, fly ash) resulting from coal development activities will be unavoidable even if all mitigating measures are applied.

Short-term adverse effects are not expected to be significantly harmful to either humans, animals, or vegetation, except possibly during periods of inversions. The probability of a two-day inversion occurrence is 15 times per year, and a five-day inversion is four times a year. (Observations by Marwitz indicate persistent winter inversions -- Hearings Statement 6-26-64.) During these periods, significant short-term adverse effects may occur.

Long-term unavoidable damage to plants, animals and humans from air pollutants may occur and be unavoidable. Even though air quality standards are met by each individual plant or source, the adverse effect of coal development in the study area will be a cumulative decline in air quality. Such a decline would be unavoidable and would begin in 1975, increase during the period of 1975 to 1990 and would continue as long as coal was mined and consumed in the study area.

Table 2 projects increases in air pollutants over the 1970 levels in the Casper and Wyoming intrastate air quality control regions.

Table 2
Total Emission Summary for Casper and Wyoming Intrastate Regions
(tons/year)

Type	1970		1980		1985		1990	
	Total*	Total	Increase**	Total	Increase**	Total	Increase**	
Particulates	120,649	128,115	6%	134,733	12%	137,162	14%	
Sulfur Dioxide	63,389	134,095	112%	198,564	213%	220,259	248%	
Nitrogen Oxides	93,264	145,201	56%	188,943	103%	206,961	122%	
Hydrocarbons	67,362	107,862	60%	147,805	119%	148,292	120%	

*Combined total for Casper and Wyoming Intrastate Air Quality Control Region adapted from Wyoming Air Quality Standards and Regulations, 1973.

**Percent increase over base year (1970); includes stack and train locomotive emissions.

Topography

A reduction in altitude caused by mining thick coalbeds beneath thin overburden throughout 14,000 acres by 1990 is unavoidable. The decrease in elevation is directly related to the ratio of overburden to the thickness of the coalbed. Greatest decreases in altitude will occur in areas of thinnest overburden and thickest coalbeds. Lowering of altitude on a north-to-south basis will vary from 54 feet at the North Rawhide mine (Carter), 68 feet at Wyodak mine, 36 feet at Black Thunder mine (A.R.Co.), 38 feet at Jacobs Ranch mine (Kerr-McGee), and 28 feet at the proposed Rochelle mine (Peabody).

Destruction of natural features of the landscape is unavoidable. Even though the general topography of the area can be restored at a lower level, cliffs and abrupt breaks, presently a part of the topographic scene, cannot be restored. The exact shape and slope of the present topography is unrestorable.

Changes in topographic features caused by deep cuts along the proposed rail line cannot be avoided. These will affect topography over a small portion of the entire study area. The impact may be very significant on the exact site but overall magnitude will be minor.

Drainage pattern changes and possible creation of new patterns is unavoidable. Even though these changes may be minimized by utilization of sound planning of operations, a certain amount will still occur.

Soils

Disturbance of topsoil on approximately 29,000 acres (0.6 percent of the study area) by 1990 cannot be avoided. Loss of productivity from 9,500 acres of topsoil by 1990 is unavoidable. This acreage will be occupied by roads, railroads, mine buildings, gasification plants, and power plants. The disturbance of topsoil will lower to some degree the natural soil productivity of the area by compaction, mixing natural soils, and causing accelerated soil erosion.

On the area to be strip mined, 14,000 acres by 1990, complete destruction of all soil horizons, parent material, and soil characteristics which have developed over long periods of geologic time cannot be avoided. The present soil biota and soil forming processes will be terminated. Once mining is completed and the area reclaimed, soil development will start again. As an end result of mining, new soils will be formed with characteristics totally unlike the ones existing prior to mining and, during their early geologic life, likely less suitable as substitutes for vegetation growth.

Reduction of soil productivity, permeability and infiltration rates is unavoidable. Increase in erosion and sedimentation rates will occur, but amount of soil loss through time cannot be determined.

Mineral Resources

The mining and removal of coal cannot be avoided under present plans and proposals. Thus, coal mining activity will have an unavoidable adverse effect on the coalbeds. Coal reserves, a nonrenewable mineral commodity, will be depleted. Based on company plans and projections, an estimated 1.5 billion tons of coal will have been mined by 1990 which comprises 12 percent of the estimated economically recoverable strippable coal reserves thus far identified in Campbell and Converse Counties and about 11 percent of the reserves identified in the Northern Great Plains of Wyoming. Loss of minor amounts of coal in mining operations and transportation is unavoidable.

Coal beneath and adjacent to the proposed railroad right-of-way undergoes impact only in that the present value of the coal and/or coal land is decreased because mining is delayed until further in the future. Although this impact is unavoidable, it is adverse only in the economic sense.

Small amounts of uranium-bearing material might be unavoidably lost through dilution of grade and covering of weakly mineralized rocks in the course of coal mining and construction. The loss would be minor.

Water Resources

The increased use and consumption of water (52,220 acre-feet per year) in the study area by 1990 cannot be avoided. The exact amount which will be consumed and unavailable for other uses is indeterminable and unavoidable. The removal from the study area hydrologic cycle of an estimated 15,000 acre-feet per year by 1990 in the coal slurry pipeline cannot be avoided.

The adverse impact resulting from the interruption of aquifers during mining cannot be avoided. Lowering of water levels of wells, and drying up of springs, seeps, and reduction in streamflow will occur in an area around the mine when aquifers are disrupted. The location and extent of this cone of depression around the mined area will vary depending on various aquifer properties.

If large quantities of ground water are withdrawn from thick sand and shale aquifers, some subsidence may result. Increasing use of ground water as proposed may affect water well levels and discharge of ground water to streamflow. Reduction in flows throughout the study area would be adverse.

Development of lakes, ponds, and pits of water at the completion of mining cannot be avoided where thick coalbeds are mined which have thin overburden levels. This will be adverse to the extent that it depletes streamflows and adds to evaporation loss of water which then is not available for other uses (agriculture, stream fishing habitat).

Changes in water use from agricultural and irrigation uses will occur. These changes, although involving water uses, will actually have adverse, unavoidable impact on farming, grazing, and recreation land uses as well as on fish and wildlife populations.

Reduction in water quality resulting from increased erosion, sedimentation, overtaxed sewage facilities, release of toxic waste to streams, and return of production water to stream channels will take place. The overall reduction in water quality which will take place is unknown.

Vegetation

Existing vegetation will be destroyed on the mined areas, plant sites, housing sites for increased population, transmission line and pipeline rights-of-way, roads and railroad rights-of-way. There will be an unavoidable permanent loss of vegetation on 9,500 acres by 1990 due to construction of permanent facilities. Vegetation will be temporarily destroyed on 14,000 strip mined acres by 1990.

Areas disturbed by rights-of-way will be reclaimed shortly after disturbance. With the semiarid climate prevalent for the study area, successful revegetation on the severely disturbed mined areas is unknown at this time.

All plant succession is unavoidably destroyed at the time of disturbance. Fifty years or more of plant succession will be required for these areas to return to their present state as the existing soil structure and microclimate have been changed and altered.

Adverse impact of stack emissions, especially sulfur dioxide, on vegetation is unknown. The impact, particularly on ponderosa pine, will be unavoidable. Increased population will intensify recreation use which will destroy or decrease the vegetative cover depending on the amount of use an area receives.

Archeological and Paleontological Values

Subsurface material and sites will be damaged or destroyed under the most responsible mining program, with much more lost from surface activities of population expansion.

Some losses, removal of 9,500 acres by 1990, to regional expansion will be expected from lack of surface evidence, time, money, and trained personnel to conduct regional surveys.

Historical Values

Impact on the historical sites: Cantonment Reno, Fort Reno, Hoe Ranch, Portuguese Houses, Powder River Crossing and Red Cloud Agency, from increased population with attendant increase in vandalism and pot hunters cannot be totally avoided. Some damage to these sites will undoubtedly occur as a result of development within the basin.

Visual impacts resulting from construction of rail line, transmission lines, mine facilities, especially silos, and industrial plants are unavoidable. All of the identified historical sites could be impacted visually at some time during the time span required to exhaust the currently economically strippable coal resource.

Some physical impact, despite all precautions, during road building activities, may occur on the following historical sites: Antelope Springs, Minor Bozeman Trail Sites, Crazy Woman Crossing, Seventeen Mile Stage Station and Suggs. Increased access will increase the use pressure on all historical sites and could result in unavoidable damage.

Aesthetics

The change in scenic characteristics throughout the study area cannot be avoided. The major changes will take place in the area of strippable coal reserves. The landscape will be crossed by transmission lines, new road and railroad cut and fill slopes. Vegetative patterns will be altered on rights-of-way and mined areas. New vertical intrusions will be added to the landscape (plant buildings, loading silos).

The change of the study area from a quiet rural setting, with wide open spaces, basically uninhabited to a basin busy with industry and human activity is unavoidable. The quiet solitude and natural peacefulness of the area will be changed.

Wildlife and Fish

Loss of habitat and reduction in populations will occur as a result of coal mining and utilization operations and will be unavoidable. Increased hazards, permanent habitat losses and deteriorated habitat will result in a loss of approximately five percent (850 deer) from the nearly 17,000 deer winter herd in the study area. Approximately 14,500 acres of deer range, including 1,400 acres of key range will be lost.

Antelope will be similarly adversely impacted. Approximately 10,000 acres of year long habitat and an additional 19,000 acres of winter range will be lost, resulting in a nine percent reduction (2,700) of the base population of the study area of 30,300.

In all probability, the 300 head of elk currently using the area will be forced from the area and possibly lost if unable to find other suitable habitat.

Destruction of aquatic habitat and species will occur when streams are altered to allow mining. Amount of loss is indeterminable. Water quality will be reduced, thereby affecting additional aquatic life.

An estimated three percent to four percent (940 to 1,250 birds) of the base sage grouse population in the study area will be lost. This loss will be associated with the loss of 29,750 acres of big sagebrush vegetative type by 1990.

Habitat removal and severe disturbance will result in a direct and permanent loss of sharp tail grouse. Total population numbers are unknown so actual loss cannot be quantified.

Change and elimination of ponds, streams and reservoirs will adversely impact waterfowl. The temporary loss of this water base during mining operations

is unavoidable. Based only upon known aquatic habitat areas where losses appear likely, an estimated loss of 400 to 800 ducks may occur.

Cottontail and jackrabbit populations will be reduced. By 1990, cottontail and jackrabbit populations of about 148 and 101 per square mile, respectively, will be lost on 28 square miles (estimated 7,000 rabbits).

Substantial losses of small mammals will occur. Populations of some rodents such as the deer mouse, least chipmunk, and sagebrush vole will be destroyed or severely reduced on roughly 29,000 acres by 1990.

Recreation

The increased population in the basin will intensify recreation demand. The increased demand could cause deterioration and overuse throughout the area and on existing facilities (Little Thunder Reservoir and Little Powder River Wildlife Area in the National Grasslands, Devils Tower, Keyhole, Guernsey and Glendo State Parks). The generally unavoidable adverse effect is the lowering of recreation quality within the study and adjacent areas.

Agriculture

The permanent cumulative loss of 4,800 acres by 1980, 7,900 acres by 1985, and 9,500 acres by 1990 of agricultural land is unavoidable. The return of agricultural land to production after reclamation depends on rehabilitation success. To determine unavoidable losses, a five percent rehabilitation failure and 10 percent conversion to other uses was assumed. The loss of agricultural production during periods of mining, construction, and rehabilitation cannot be avoided.

Livestock forage

Cumulative forage lost will be 1,515 animal unit months (AUMs) by 1980, 3,435 AUMs by 1985, and 5,067 AUMs by 1990. By 1990, this will amount to four-tenths of one percent of the total forage produced in the study area.

Increased vandalism of livestock watering facilities and fences cannot be avoided. Separation and alteration of ranching operations will occur. Drying up of livestock water sources will occur and ranchers will be inconvenienced by changes in access patterns and use patterns. Increased mortality and molestation of cattle and sheep will take place.

Farming

Cumulative amount of cropland which will be unavoidably lost is 650 acres by 1980, 1,019 acres by 1985, and 1,245 acres by 1990.

Irrigated cropland will be lost due to water right conversion. Total acreage lost due to lack of water is 31,473 acres by 1990.

The unavoidable cropland loss by 1990 would be approximately seven-tenths of one percent of the total available agricultural land within the region.

Transportation Networks

Increased traffic on all existing facilities within the study area cannot be avoided. The increase will begin in the 1975 to 1980 time period, peaking during the 1980 to 1985 interval and probably remaining fairly constant or with very slight increases beyond 1990. This will mean that road maintenance costs and frequency will increase and these costs cannot be avoided.

Temporary inconvenience and poor travel conditions caused during construction of such facilities as the rail line, coal slurry and gasification pipelines are unavoidable. These impacts will be minor and occur only over a short time span. It is impossible to predict the possible increase in train/car accidents. With the number of trains required per day (46 by 1990), the increased probability of these accidents occurring cannot be avoided.

The impact of additional trains on the existing mainline track cannot be avoided. Deterioration of the track and the necessity of having to upgrade the track and impacts associated with this upgrading cannot be avoided. The impacts associated with upgrading will be similar to the impacts discussed in Part II of this statement on construction of the new rail line between Douglas and Gillette.

Socio-Economic Conditions

Population

While the addition of population may not necessarily be adverse, the impact of population growth may generate negative effects. The residual impacts of population can best be discussed by component.

The expected introduction of intensive coal and other industrial development in the Eastern Powder River Coal Basin will induce a regional population increase from 107,364 in 1970 to approximately 167,000 in 1990. The Counties of Campbell and Converse will experience the greatest percentage increases in population. Additionally, over 78 percent of anticipated regional population growth in 1990 will occur in Campbell and Converse Counties. Population in Campbell County will rise from a 1970 level of 12,957 to a 1990 level of 50,400; population in Converse County will grow from a 1970 total of 5,938 to a 1990 total of 15,200.

Employment

A local unavoidable effect will be the attraction of labor from the agriculture, petroleum, and other residentiaries sector into the coal related sectors. This competition for labor will create short-term labor shortages in petroleum and other residentiaries to be filled as coal employment levels off. As a rule, the other residentiaries sector will lag behind coal because newcomers to the area will be expected to arrive for the purpose of coal employment and construction, and not other employment. The labor loss from agriculture will likely be long-term and it may never regain its former employment stature.

The unavoidable effect that large quantities of employment opportunities will be created is largely a consequence of the decision to allow development; such new employment can only be satisfied by importing adequate quantities

of labor into the region. A further consequence in Campbell and Converse Counties will be to hasten the conversion from an agrarian to an industrial economy.

Housing

Industrial development will induce new population that will demand housing. Regional population in 1980 will demand about 46,400 housing units, nearly 9,000 housing units more than the 1970 existing regional stock. As Campbell and Converse Counties will be the locations that receive the greatest population growth, housing stock in Campbell and Converse Counties by 1980 will need to expand by factors of 2.4 and 2.0, respectively, to meet the anticipated demand. Regional housing demand in 1990 will increase to 53,500 units which is 16,000 more than the 1970 stock. Housing demand will grow in Campbell County from 9,500 units in 1980 to 14,800 units in 1990, while housing demand will expand in Converse County from 4,400 units in 1980 to 5,100 units in 1990. The induced population will demand housing which does not now exist.

As housing probably will not be immediately available, the adverse impact of the incoming population having to accept inferior quality housing cannot be avoided.

Education

The impacts on public education as discussed in the Impacts Section are unavoidable. If coal resources are developed, the region will realize a substantial growth in population, which includes school age children. Public school districts, especially in Campbell and Converse Counties, would realize unavoidable increases in student enrollments, which in turn would impact existing school enrollment capacities and full-time teaching staffs. By 1990, Campbell County is projected to have a 8,360 pupil enrollment over

present capacity and need 426 more full-time teachers. Converse County would experience a similar situation although of a lesser magnitude. Converse County by 1990 would have a pupil enrollment of 1,280 over present capacity and need for 91 additional full-time teachers.

If increasing enrollments are not accommodated adequately, the following impacts could result:

1. Overcrowded classrooms in existing schools;
2. Student-teacher ratio imbalance;
3. Use of temporary structures (mobile trailers, modular units) for classrooms because of overcrowded and inadequate facilities;
4. Operating certain schools on a double session basis;
5. Inter-county bussing of students;
6. Reduction in quality of education.

Health and social services

Campbell and Converse Counties will experience an unavoidable increase in demand on their health and social services. There will not be enough physicians, dentists, professional nurses and other social workers to meet the demand. Quality of health care would be adversely reduced. Even though there may be sufficient facilities for the sick to be treated in, people would experience longer waiting periods for treatment. With the rapid population expansion and lack of sanitarians, public health and safety hazards may increase, affecting the entire regional population.

Law enforcement

The impacts on law enforcement as discussed in the Impact Section are unavoidable. If coal is developed, the regional population will expand, creating

a need for increases in police manpower and facilities. The demand for increases in full-time sheriff personnel and full-time municipal policemen is unavoidable.

By 1990, Campbell County would experience a demand for a total of 50 sheriff personnel, a deficit of 42 based on presently available personnel. Converse County by 1990 would have a demand for a total of 15 sheriff personnel, 9 over the number presently on the force. Municipal police departments would experience the same type of increased demand. The Gillette department would have a deficit of 31 people and 11 patrol vehicles by 1990. Douglas would have a deficit of 7 people and 2 patrol vehicles by 1990.

With or without increases in law enforcement personnel, crime incidence will most likely rise. The magnitude of this rise is dependent upon too many variables, which make crime level predictions very difficult and nearly impossible. If adequate levels of enforcement personnel are not provided, intolerable conditions could be encountered in some areas.

Fire protection

Unless expansion is undertaken by communities, deficiencies in water pumping capacity will have the unavoidable effect of diminishing a community's ability to adequately meet hazardous fire conditions. Greater structural fire damage will result, and ability to respond to simultaneous fires will be diminished.

Water and sewer facilities

Water

Current treatment facilities will be unable to meet the projected demand. By 1990, Gillette will have a treatment deficiency of 12.2 million

gallons per day and Douglas would have deficit of 2.2 million gallons per day. The present distribution system would be inadequate for both of these communities by 1980. Adverse unavoidable impacts could occur (use of low quality water, increased sickness, poor health) from not providing adequate water treatment and distribution systems.

Sewer

Current collection and treatment facilities for Douglas and Gillette will be overutilized by 1980. In 1990, Gillette will have a collection capability deficiency of 2.9 million gallons per day and a treatment deficiency of 3.3 million gallons per day. Douglas, by 1990, will experience a deficiency of 700,000 gallons per day in its collection and treatment facilities.

Overuse of the sewage facilities could result in the unavoidable adverse impact of more sewage being dumped into stream channels (Donkey Creek, North Platte River).

Utilities

Regardless of the degree of planning, certain impacts may be unavoidable. Douglas is faced with possible telephone service delays if it grows to the north and it may likely incur delays in all types of utility service if a coal gasification plant with its large employment locates nearby. The Cities of Gillette and Newcastle may be faced with a natural gas shortage if a large number of new base hookups are required. The actual extent to which the supposed natural gas shortage exists was not known to the local distributor inasmuch as he in turn purchases his gas from a regional supplier. Distributors to the other communities did not express a similar problem. Present construction material shortages may worsen if utility companies must acquire increasingly larger amounts of materials to satisfy consumer service requests.