CHAPTER III

PROBABLE IMPACT OF PROPOSED ACTION

Total development of the Wyodak mine property will involve 2,080 acres. An estimated 140 acres (120 mined - 20 facilities) have already been disturbed. The mine has been in existence since 1925. A 20 megawatt (MW) air-cooled powerplant is currently in operation at the mine site. The mine property includes federal lease coal as well as private coal.

The impact analysis covers the remaining 1470 acres to be mined, a 330-MW air-cooled plant to be completed by 1977, a 450-MW air-cooled air plant projected to be in operation by 1982, and 44 miles of transmission line to be built in the study area in 1976-1977. As the mine and plant are located on the main railroad line, only a short spur will be required (670') for the warehouse.

Air Quality

Current mining operations, removing approximately 0.7 million tons per year, are adding dust and coal dust to the atmosphere causing a reduction in air quality. Operation of the 20-MW air-cooled Neil Simpson Station is contributing to a reduction in ambient air quality. Estimated yearly emissions from this plant (with controls) are: particulates - 1,518 tons, nitrogen oxides - 920 tons, and sulfur dioxide - 718 tons.

Expansion of mining activities on this site will create additional impacts on air quality. The present production rate is scheduled to increase from 0.7 million tons to 2.5 million tons in 1977 and to 5 million tons in 1982. The present level of mining disturbs an estimated 5 surface acres per

year and 137,200 cubic yards of overburden, due to thinness of overburden in this area. At the 2.5 million ton production level in 1977, the surface disturbance increases to about 18 acres and 3.6 million cubic yards of overburden. In 1982, the surface disturbance will be approximately 36 acres and 7.2 million cubic yards of overburden.

Over the life of the mine (38 years or until 2012) an estimated 1,470 acres will be disturbed and 240 million cubic yards of overburden will be removed and handled. Removal of vegetation and disturbance of topsoil and overburden will expose fine-grained soil and parent material to wind action which is frequently quite strong. Soil particles will be lifted by the wind and carried into the atmosphere, causing a reduction in air quality and reducing visibility during periods of high wind. Coal dust from crushers, trucks, coal piles, and loading operations will also pollute the air during windy periods. Pollution from these sources may increase up to three-fold in 1977 and as much as seven times the present amount in 1982 when production increases to 5 million tons per year. From this point on it is assumed that production and thereby air pollution from coal mining will remain at a constant rate until the coal is exhausted.

Expansion of operations will also increase emissions of sulfur dioxide, carbon monoxide, nitrogen oxides, and hydrocarbons from mining equipment, increased train operations, and operation of vehicles by the increased population (1,100 by 1990) associated with the mine and power plants. As coal production is increased, more loose coal will be exposed, thereby creating the probability of an increase in accidental coal fires (from spontaneous combustion). These will add toxic vapors and particulates to the atmosphere. Increased human activity on and adjacent to the area also increases the chance of additional wildfires. Such fires would temporarily add smoke and particles to the air, further reducing air quality.

Construction of a new 330-megawatt (MW) power plant with a 400-foot stack will be completed and in operation by 1977. All of the old units except unit 5 (20 MW) of the Neil Simpson Station will be retired. Projected yearly emissions from the new 330-MW plant and retrofited unit 5 (assuming compliance with New Source Performance Standards (NSPS) and Wyoming Air Quality Emission Standards), with consumption of approximately 1.5 to 2.0 million tons of coal per year, could be: 1,600 tons of particulates, 15,700 tons of sulfur dioxide (SO_2), and 12,400 tons of nitrogen oxides (NO_x).

Another new air-cooled power plant is scheduled for construction and operation by 1982. This will be a 450-MW plant, requiring approximately 2 million tons of coal per year, and could have yearly emissions, (assuming compliance with applicable air quality standards) of 2,100 tons of particulates, 19,000 tons of sulfur dioxide, and 14,500 tons of nitrogen oxides. When the second new plant becomes operational, total yearly stack emissions (assuming compliance with applicable air quality standards) resulting from the area could be: 3,700 tons of particulates, 34,700 tons of sulfur dioxide, and 26,900 tons of nitrogen oxides.

Some trace elements and radionuclides contained in the ash of coal burned by Wyodak power plants may be released with stack emissions. These emissions could have a detrimental effect upon soil, vegetation, animals, and man although little scientific information exists as to their effects upon the environment. An analysis of a coal sample taken from the tipple at Wyodak's mine (analyzed by the U. S. Geological Survey, Denver, Colorado) shows the following amounts (parts per million-ppm) of twelve trace elements: Arsenic - 1 ppm; cadmium - less than 0.1 ppm; copper - 7.7 ppm; fluorine - 30 ppm; mercury - 0.081 ppm; lithium - 1.6 ppm; lead - 5.6 ppm; antimony - 0.1 ppm; selenium - 0.6 ppm; thorium - less than 1.5 ppm; uranium - 0.6 ppm; and zinc - 4.2 ppm.

(See the Minerals description of this part for other trace elements in coal from the Wyodak mine.)

Construction of the first power plant will involve surface disturbance of 30 acres and the second one will disturb an additional 30 acres. This will add additional dust and internal combustion engine emissions to the atmosphere. Total population increases associated with the mine (480 by 1990), first power plant (420 by 1990), and second power plant (200 by 1990) will add increased vehicle emissions to the air of the basin and particularly the Gillette area air basin.

During normal climatic conditions, the air pollutants originating from this site will be dispersed downwind (east and southeast) within a short distance and before reaching any center of population. However, when inversions occur (see Part I, Chapter IV, Air Quality) onsite workers, as well as people in Gillette, could be seriously affected. Gillette could also be impacted from these pollutants during periods of easterly surface winds (which occur less than 10 percent of the time). During such occurrences, respiratory and heart conditions could be aggravated, asthmatics irritated, and lung diseases caused or worsened.

Offsite impact on air quality will result from construction of new powerlines. Two new 230-kv lines will be constructed from the 330-MW power plant scheduled for operation in 1977. These lines will be constructed to Buffalo, Wyoming, and Spearfish, South Dakota. They will involve partial or complete soil disturbance on approximately 1,012 acres within the two-county study area. This will temporarily add dust and vehicle emissions to the air. As this pollution will be occurring along a stretch of 44 miles, its impact on air quality will not be significant.

Topography

The topography surrounding the Wyodak mines probably will be impacted the greatest of any area in the coal mining district. This impact is caused mainly by thin overburden.

In the southern lease area of the Wyodak mine, coal beds range in thickness from about 60 to 95 feet, excluding from 9 to 20 feet of shaley coal and partings. Overburden thickness ranges from 80 feet on the west to 10 feet on the east side of the same area, which is about 285 acres including the federal lease. The decrease in altitude will range from a minimum of 58 feet on the east to a maximum of 79 feet on the west.

The average drop in altitude for the 285 acres underlain by 41 million tons of coal to be mined at the south pit excluding the area of partly burned coal, will be about 66 feet. Twenty-two million cubic yards of overburden and a stripping ratio of 0.57 are estimated for the 285 acres.

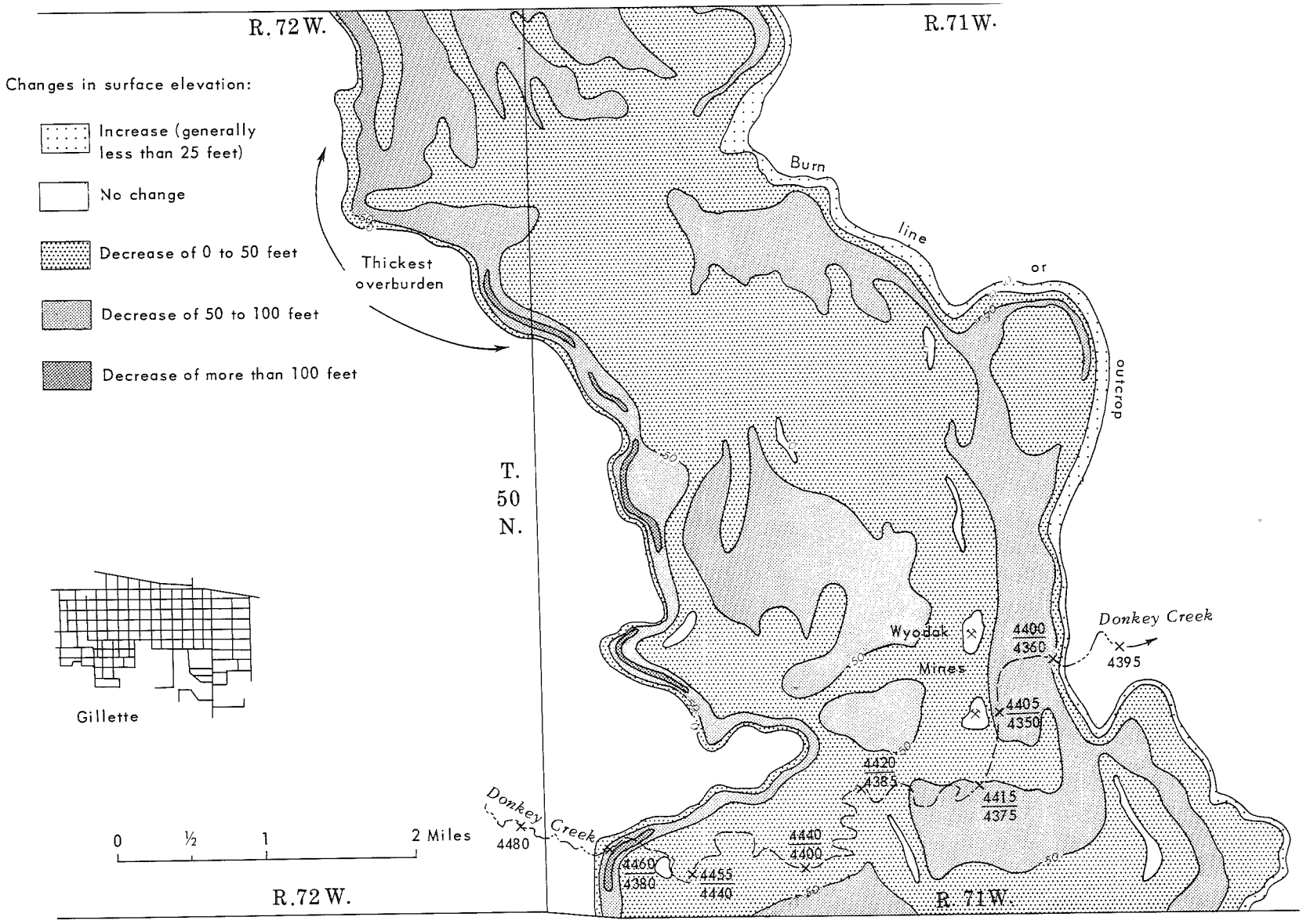
The average drop in altitude for the 74 acres unlain by 10 million tons of coal to be mined at the north pit, will be about 65 feet. Overburden of 5.4 million cubic yards and a stripping ratio of 0.55 are estimated for these 74 acres. The average drop in altitude for the 944 acres unlain by 120 million tons of coal to be mined on the north lease will be about 11 feet. Two hundred-five million cubic yards of overburden and a stripping ratio of 1.8 are estimated for these 944 acres.

Maximum decrease in altitude will occur in areas which have thick coal in relation to thin overburden.

East of Gillette, Wyoming, the township (T50N, R71-72W.) that includes the Wyodak mine is a good example of the interrelation of coal mining, minimum spoil, changes in ground slope and possible increased local erosion and deposition.

Figure 1

Changes in Ground Surface Altitudes Resulting From Surface Mining of the Wyodak Coal Bed (100 feet thick) East of Gillette, Wyoming, Modified From Keefer,1974.



In the mine-reclamation model of a dragline operation for reconstructing the topography of this township after coal mining, the following assumptions were made: total area is underlain by coal mineable by surface methods, total area is surface mined without regard to cultural features or burned-out areas that might, in reality, preclude mining; no reshaping of spoils but only smoothing spoil piles, mining in 200-foot panels westward from the burnline or outcrop to the final highwall, smoothing the highwalls to 3:1 slopes; and smoothing margins. A value of 100 feet was assumed for the thickness of the coal. Figure 1 shows that the average altitude of land surface may be decreased between 50 and 100 feet for large parts of this township. This broad lowering of land surface ends in a long narrow trough on the west side, the remains of the final pits and highwalls. Smoothing and rounding of the spoil piles generally tends to create a more subdued, rolling topographic relief. Any cliff-like or abrupt topographic breaks now present on the area will be eliminated.

Unless the channel of Donkey Creek is deepened east of the burnline, some ponding or formation of lakes will probably occur between the burnline and the highwall, where the former channel of Donkey Creek has been lowered 80 feet. As an alternative, the water can be pumped across the depression on an elevated culvert.

Because of the thickness of the coalbeds, topographic impacts will occur slowly. Since most of the coal is associated with thin overburden, little surface acreage has to be disturbed to mine large volumes of coal.

Soils

Mining will result in the destruction and mixing of the topsoil on all mined lands (1,470 acres) within the mining area. This will destroy all of the soil characteristics, microorganisms and climatic relationships which have been established over a long geologic time span and destroy soil productivity for an indefinite time period. During the life of the mine (until 2012) approximately 1,100 acres of moderately productive agricultural soils identified as the Ulm (1,070 acres), Renohill (10 acres) and Terry (20 acres) soil types will be destroyed. The remaining 840 acres comprised of the Arvada (460 acres), Wibaux (200 acres) and Rough Broken Lands (180) would be impacted slightly because they are not suitable for agriculture and are low in productivity. In addition to the topsoil acreage which will be disturbed, approximately 240 million cubic yards of overburden or lower soil horizons will be removed and disturbed during the life of the mine. This will result in complete destruction of all soil horizons, parent material and soil characteristics and could result in bringing elements such as boron to the surface which may be toxic to plant growth. At the completion of mining operations the soil structure will be completely different from what exists today and productivity could be destroyed.

Upon expected completion of mining by 2012 approximately 43 percent (900 acres) of the soil surface will be permanently lost to reclamation or revegetation as adequate fill material will not be available for total reclamation and partially filled pits of water will remain. Nearly 1,180 acres of disturbed soils will remain for rehabilitation and revegetation.

Mining operations and disturbance of soil surfaces will result in fine-grained soil and parent material being exposed to wind and water actions. Soil permeability and infiltration rates will be reduced, increasing runoff,

soil erosion and sedimentation. Wind action, which is almost constant over the area, will cause fine soil, silt, and clay particles to be lifted into the atmosphere reducing air quality and adding to soil loss.

Construction of a 230-kv powerline (44 miles) will disturb about 1,012 acres of productive soils in the Renohill-Maysdorf-Ulm soil association No. 3 (552 acres), Wibaux association No. 7 (92 acres); Renohill-Cushman Association No. 9 (200 acres); Renohill-Shingle-Terry Association No. 10 (108 acres); and Tassel-Shingle-Otero-Terry-Olney-Kim Association No. 20 (60 acres). Part I, Regional Analysis - Soils, describes these soils associations completely and Map 7, Appendix A, locates them. Approximately 60 acres will be disturbed by construction of two (330- and 450-MW) power plants scheduled for completion in 1977 and 1982. Construction of the power plants will involve removal from production of 20 acres of soil. Powerline construction will remove 150 acres and another 55 acres (by 1990) will be lost to population expansion generated by increased mine and power plant employment. Increased recreation use resulting from population increases will cause soil compaction, increase soil runoff and erosion. The remaining 362 acres disturbed by powerline construction will be rehabilitated and revegetated.

Alteration of Donkey Creek to allow mining may create additional onsite and offsite impacts. Streamflow will be altered increasing velocity and causing increased soil erosion and sedimentation along the stream banks. Some areas may be deprived of soil moisture thereby affecting soil productivity and vegetative growth.

Emissions from the power plants (particulate matter-sulfur dioxides) may cause soil pollution in areas downwind or to the east or southeast of Wyodak. The effect of emissions of this type, on soil has not been adequately assessed.

Mineral Resources

The most important impact is the one on coal. The removal and consumption of an estimated 165.4 million tons of coal from this area over the expected 38-year life of the mine will result in depletion of a nonrenewable energy source.

Some coal will be lost from production in the mining process, mostly due to dilution with waste material near the top and bottom of the bed, along the ends of a particular mining panel, and in areas where the coal is burned.

Ground water

During mining and reclamation

Mining of a total of 165.4 million tons of coal over the life of the project (38 years 2012) removal of 240 million cubic yards of overburden, and disturbance of approximately 1470 acres will destroy aquifers located within the area.

Due to the great thickness of the coal mined and the relatively thin overburden, the backfill will not return the mined area to the original surface altitude and residual holes will remain. After mining is completed, these holes will fill to a level approaching the water level in the nearby aquifers from groundwater discharge and surface runoff. Because the coal and the overlying rocks that are disturbed are discharge areas, recharge to the aquifers will not be affected. The area disturbed by mining operations will be very localized and should not be greater than the original pit.

Pumping for dewatering during mining operations and for consumptive use will temporarily lower water levels to the base of the coal in the pit. Either adequate aquifer test data collected by monitoring a pumping well and nearby observation wells in the coal and the overburden deposits, or, the monitoring of water levels in properly spaced observation wells during actual mine dewatering operations. will be necessary to determine accurately the effects of mine dewatering upon water levels in nearby aquifers. From limited data obtained from mine dewatering operations now in progress in the Gillette area, an estimation of the effects of mine dewatering on nearby water levels is possible. It is estimated that the area of influence caused from mine dewatering could extend outward as much as two miles from the point or points of pumping. Most of the effects will be west of the mining operations. Within the area of influence caused by pumping, water levels will be lowered at increasingly greater depths toward the mine area. At the outer edge of the area of influence, water levels will be lowered insignificantly. Water wells and springs that derive water from shallow aquifers within the area of greater influence may also dry up. Reduction in water levels could impact agricultural use and wildlife populations. Figure 2 shows the extent and amount that water levels will be lowered during mining operations.

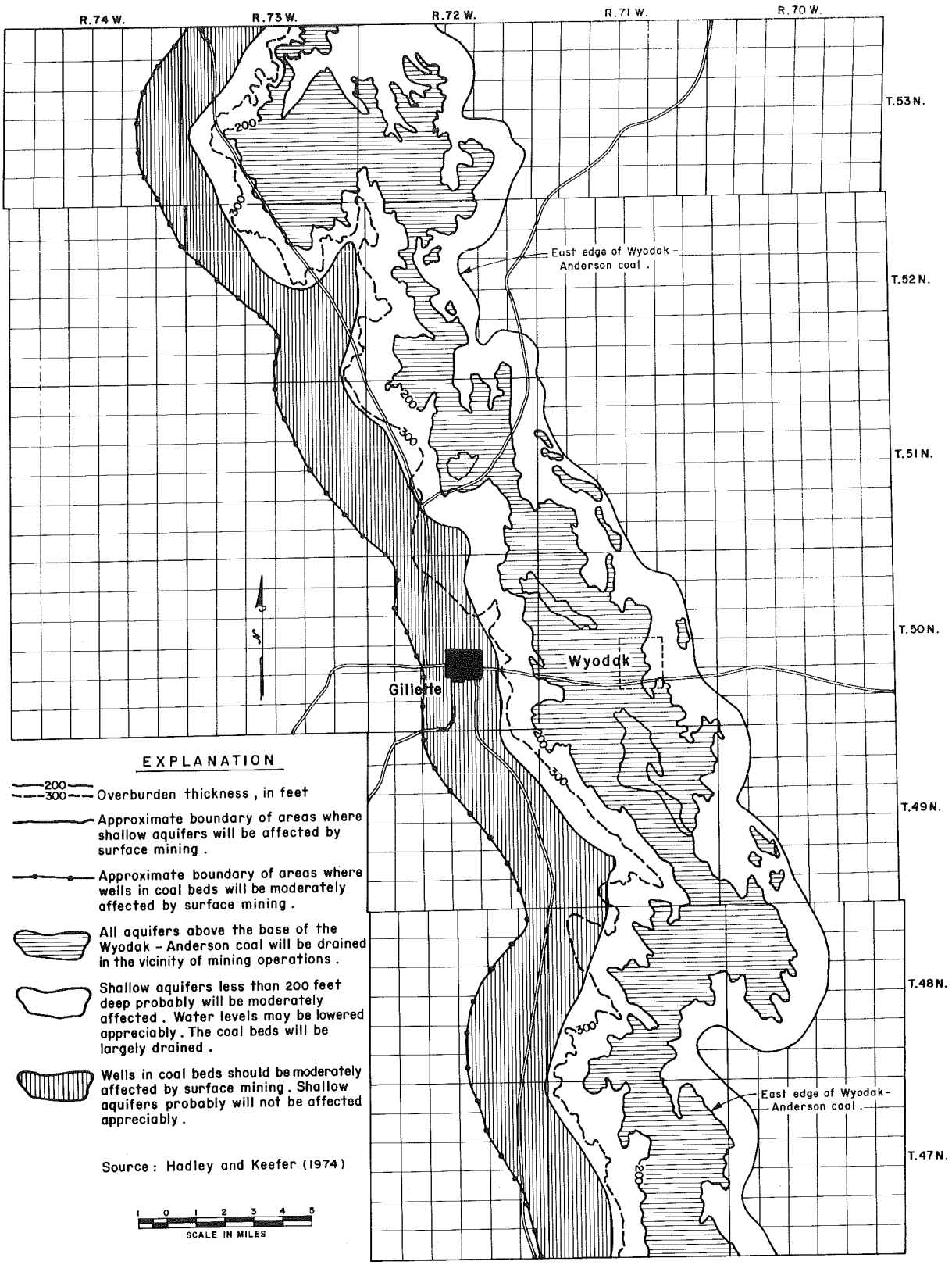


Figure 2

Potential Areas and Amounts of Lower Water Levels - Wyodak

The mined area is a discharge area and thus no change in groundwater recharge will occur. Discharge of water may be more apparent because water formerly lost by evaporation from seeps and springs and from transpiration of plants along stream drainages will be more readily discharged into the mine pits. As mining progresses, abandoned pits will receive water from groundwater discharge and precipitation and runoff. Discharge of water from ponds or lakes by evaporation will be considerable, however, because of the semiarid climate of the region.

After reclamation

Aquifers affected will be local, restricted mostly to the area where the coal was removed. Backfilling will be along the edges of the pit to cover the coal and prevent natural combustion of the coal. Water levels will return to premining levels and the chemical quality of the water in nearby aquifers will be unchanged from the original quality. Recharge will not be affected. Discharge will increase somewhat because of decreased load upon the underlying artesian aquifers. Discharge into the abandoned mine pits will be facilitated because water lost to evapotranspiration before mining along valley lowlands will be reduced as water is discharged more readily into the mine pits.

Surface water

After reclamation

A loss of water from Donkey Creek will result from seepage to the pit. Mean annual flow will be decreased, however peak flows will remain virtually unaffected unless the dikes are breached and the flow fills the mine pit. Mining activities will result in minimal surface runoff change from the lease area as 40 percent of the lease area presently drains to closed basins. When

the 60 percent of the lease area which drains to Donkey Creek is disturbed by mining activities, annual yield from the area will be reduced because of precipitation captured by the mine pits. The rate of runoff will be slowed due to subdued relief resulting from stripping the overburden.

Channelizing Donkey Creek may cause increased flow velocities, resulting in accelerated erosion of streambeds and banks. In changing the course of the stream, its base level may be lowered, resulting in headcutting of tributaries. Release of production waters, including mine drainage, would alter flow characterititcs, possibly resulting in accelerated erosion of streambeds and banks. Depending on the amount of release, increased erosion and sedimentation could extend several miles down stream.

Water quality

Ground water

As the mined area is a point of discharge, reduction of quality of water in the aquifers will not occur while mining is taking place. After spoils have been returned to the pit, leaching could occur which may reduce the chemical quality of water in the aquifers. Leaching of mineral constituents and possible toxic trace elements will occur where water infiltrates through the backfill. In time, this ground water will be discharged at some place either as seeps or springs along drainages or as groundwater discharge into the pit or Donkey Creek. As the water moves from recharge to points of discharge, recharge from additional infiltration through undisturbed rocks will dilute the higher mineralized water so that the increase in mineralization of the water at discharge areas could be insignificant.

Water in the residual ponds or lakes will be similar to a mixture of the ground water discharged into the pond or lake from aquifers and the water

that runs into the pond or lake from surface runoff. An increase in mineralization of the water will occur as water is evaporated leaving the minerals in the water behind.

Surface water

Erosion and sedimentation will be increased during construction and operation of the mine as vegetation is removed. High sediment yields will occur from spoil piles until they have been reclaimed and a protective grass cover established. A major portion of the water in Donkey Creek during low flow periods is sewage effluent from Gillette. Although water discharged from Wyodak may be lower in dissolved solids concentration than the water in Donkey Creek during some periods of low flow, any dissolved solids in the discharged water will increase the dissolved solids load in the stream. Increased erosion and sedimentation could lead to a lowering of water quality in the streams.

Dissolved solids load in water downstream from the proposed mining site will increase during mining and reclamation, but changes in dissolved solids concentration will depend on the amount and concentration of water in receiving streams. Dissolved solids concentration in runoff from newly exposed surfaces will increase. Continuance of the increased dissolved solids loading in downstream waters after reclamation is completed will depend on the degree of success achieved in the reclamation effort to protect exposed surfaces from leaching and erosion.

Increased population associated with mine development could affect water quality through recreational use of the area and from adding additional untreated sewage to the waters in the area.

Vegetation

Impacts on vegetation by coal mining are presently occurring. To date, approximately 120 acres of the inland saltgrass-western wheatgrass community have been destroyed by surface mining in the north and south pits of Wyodak's coal mine. An additional 20 acres have been totally or partially destroyed by roadways, the Neil Simpson Station, and related facilities.

Destruction of vegetation will be accelerated in 1977 with completion and activation of the new 330-megawatt (MW) coal-fired, air-cooled power plant and its requirements for additional coal production. Acreage destroyed by mining and processing of coal is expected to increase from the present 5 acres per year to 18 acres per year in 1977 when coal production reaches 2.5 million tons per year. According to the mining plan, coal production will be doubled to 5 million tons per year in 1982. This will increase vegetation loss to 36 acres per year.

Construction of the new 330-MW powerplant, scheduled for completion in 1977, will disturb 30 acres of the inland saltgrass-western wheatgrass vegetation type. Two new 230-kv powerlines will be constructed in connection with the new powerplant. One line will be constructed to Buffalo, Wyoming, the other one to Spearfish, South Dakota. Approximately 44 miles of these lines will be located within the study area. An estimated 1,012 acres of vegetation will be partially or completely disturbed during construction. Vegetation types which will be affected along the route have not been surveyed in detail but would consist mostly of big sagebrush-grass types.

Projected rates of coal production and estimated coal reserves indicate that the mine life will last 38 years or until 2012. Destroyed vegetation by 2012 will total 1,470 acres on the actual mine area, of the types described in the descriptive section of this part. Another 30 acres of vegetation adjacent to the lease area will be disturbed by the construction of the 450-MW powerplant in 1982.

Construction of the two new power plants will permanently remove 20 acres of vegetation. The access roads and tower footings required for the powerline will permanently remove approximately 150 acres of vegetation. Population expansion associated with increased employment at the mine and power plants will require permanent removal of 55 acres of vegetation by 1990. An estimated 900 acres or 43 percent of the total vegetative area within the mined area will be lost permanently because of the lack of fill to completely reclaim the area. Increased recreation use, especially any increase in off-road vehicle use, will impact an undetermined acreage of vegetation.

Haul road dust and coal dust from coal mining, blasting, processing and transporting, together with particulates and toxic chemicals from powerplant stack emissions will be deposited on vegetation adjacent to and downwind from the mine and powerplant. These toxic chemicals may damage vegetation when wetted by dew and light rain. Dust- and particulate-covered and damaged vegetation would also be less palatable to livestock and wildlife.

Suitable vegetation may be difficult or impossible to reestablish on some of the mined area. Toxic or nonproductive material may be brought to the surface. Microclimate will be changed. Soil structure will be destroyed with loss of some topsoil. These effects of mining may individually or in combination make revegetation difficult or impossible in some areas. With the type of climate and existing soil types in the area, prediction of reclamation success is sketchy. However, an assumed reclamation success in this area is explained in Chapter III, Part I, Reclamation of Mined Lands.

Young vegetation from reclamation will attract wildlife which like to graze on new, young shoots. This grazing will inhibit early growth and revegetation of the disturbed areas.

Archeological and Paleontological Values

No report of a professional archeological survey has been made on the Wyodak lease. A statement has been made that no archeological values exist.

With the unknown archeological-paleontological values, there could be significant impacts from strip mining. There will be nearly 1,470 acres involved in strip mining on this lease. Approximately 240 million cubic yards of overburden will be moved to mine the coal. Additional area (20 acres) will be occupied by construction of two additions to the existing power plant. An interstate highway (I-90) also will cross the south end of the lease, permanently covering 79 acres of leased land. Moving the overburden or establishing permanent structures will either destroy potential archeological sites or make then unavailable for study and salvage.

Besides the direct impact of mining, there will be some indirect impacts associated with the population increase (1,100 by 1990) expected to be generated by construction and operation of the mine and power plants. The increased mine related population will permanently remove and disturb additional acreage (55 acres by 1990) which could possibly contain archeological values.

Recreational use associated with this population will impact known as well as unknown archeological sites throughout the study area. Arrowhead hunters, rock collectors, pot hunters and off-road vehicle users will all disturb additional surface acreage, destroying evidence which could provide information on archeological sites.

Historical Values

No historical values will be impacted by this action.

Aesthetics

Mine operations will impact the elements of form, line, color and texture, which combine to make up the resource termed aesthetics. Disturbance of vegetation, removal of overburden and creation of new landforms cause a change in the appearance of the landscape.

Contrasts in color will be created by stripping away the vegetative cover and overturning the soil material. The predominant color tones now seen on the area are light browns and greys. Mining will create colors of yellow and light greys which will differ from the color of the surrounding area, creating contrasts.

Texture as created by vegetative patterns and degree of erosion will be changed. Smoothing of spoil piles and reclamation with grasses will create a smoother and softer-textured appearance. The new texture created on the lease area will contrast with the roughened and broken texture present on the surrounding areas. The change in texture on the lease area will result in less variety and natural configuration in the landscape. It will create a monotonous scenery, at least on the area that is mined.

Development of the transmission lines will add new lines to the landscape. These lines may cut across existing natural lines such as pipelines and cultivated areas. Creation of new lines on the landscape could develop a jumbled, disorganized, unnatural like landscape which could be displeasing to the viewer.

New intrusions such as powerlines and power plants will be added to the landscape. These could cause development of a discordant character appearing out of place when viewed against the backdrop of a natural, undisturbed landscape. Housing which will be needed to meet the demands of expanding

population associated with mine employment could add other intrusions to the study area.

Landform will be altered. A general lowering of the elevation of the mined area will take place. Abrupt breaks and changes in topographic relief will be smoothed out at completion of mining. The major change will be the remains of the highwall and creation of a lake at completion of mining activities. These will add a new topographic break and depression where none have appeared before.

During the life of the mine, the entire operation will be exposed to direct view from the existing highway and also from the interstate highway to be constructed across part of the area. This impact will not be appreciably different from the existing mine and power generating operation. Impact on aesthetics will take place gradually over a period of time. Intrusions will be added to the landscape prior to and at the beginning of mining. Other changes will take place over a period of 38 years, the projected mine life. The changes to take place on this one site are not significant when compared to the 4.9-million-acre study area. However the impact of mining on this specific site could be very significant when viewed against the backdrop of the surrounding natural landscape.

Wildlife and Fish

All wildlife will be displaced from the area as mining progresses. The smaller wildlife (reptiles, amphibians, invertebrates, rodents and other burrowing animals) which are not able to flee will be destroyed. The populations which are displaced such as the estimated 25 antelope, a small number of sage grouse, plus numerous birds and small mammals will have to relocate on adjacent sites. It is assumed that the surrounding areas are already supporting populations in balance with the available habitat. Therefore, the displaced wildlife may exist for awhile, but the populations will eventually be lowered to remain in balance with the available habitat unless mitigating measures are taken. Part if not all of the displaced population may eventually be lost. The aquatic habitat associated with Donkey Creek will be lost.

Loss of wildlife habitat will be a constant progression across the mined property. Once full production of 5 million tons per year is reached by 1982, an estimated 36 acres of vegetation will be destroyed annually. By the end of the mine life, a total of 1,470 acres of habitat will have been destroyed on the mine property. In all probability, the increased human activity and noise associated with mining operations will disturb and cause the major wildlife species to leave the area prior to destruction of the habitat.

Habitat for the big game species (deer and antelope) and for sage grouse will be lost for a long period of time even though the area will be reclaimed. The projected time periods for return of the area to suitable habitat for various wildlife species groups are graphically shown in Figure 7, Chapter V, Part I. Some of the animals, especially those associated with a grass habitat (Richardson's and thirteen-lined ground squirrels, prairie dogs, mice, and other small rodents) will return to the area as it is reclaimed and

vegetation reestablished. No satisfactory evidence is presently available which would suggest that stripmined areas can be satisfactorily revegetated with plant communities that will satisfy needs of deer and antelope.

Powerline construction which accompanies the 1977 power plant will disturb 1,012 acres, permanently removing 150 acres, mostly of sagebrush vegetative type. The lines will also pose an additional hazard to wildlife (especially raptors) through potential electrocution if not properly constructed.

The use of herbicides for maintenance of powerline rights-of-way could impact additional wildlife habitat on the entire 1,012-acre corridor.

Creation of lakes at completion of mining will permanently remove 900 acres of terrestrial habitat. An aquatic habitat will be substituted. Depending on water quality, the impact of providing additional water surface in this semiarid climate could be beneficial.

Increased population associated with enlarged mine and powerplant operations will remove additional vegetation. By 1990, with a projected population of 1,100, 55 acres of habitat will have been permanently removed.

With increased vehicular use of the area and on surrounding roads, animal road mortality will increase. Mortality will also occur from train traffic. Construction of right-of-way fences and fences to protect the reclaimed area to allow for revegetation to be established may cause some impact on wildlife movement and migration.

Threatened species

Black-footed ferret

Loss of two prairie dog colonies and other small mammals will further reduce overall potential habitat available to the black-footed ferret. Such destruction in association with habitat losses occurring in other areas can

only increase the threat to this species. Loss of habitat is the greatest danger to this endangered mammal. It is not known if any black-footed ferrets inhabit these towns; none have been sighted since the mine has been in operation.

Peregrine and Prairie Falcons

Although noise and disturbance eliminates lands as suitable habitat for these species, no significant overall impact is anticipated.

Big game

Pronghorn antelope

Virtually 100 percent of potentially disturbed lands are antelope habitat. Approximately 1,480 acres of yearlong habitat in addition to 600 acres of winter range will be lost or severely damaged. Probable conversion of large acreages to aquatic habitat and increased stress through intensified human activity will displace an estimated 25 antelope.

Mule deer

Impacts to mule deer, a marginal species in the area, will be low.

Other mammals

Predators and furbearers

Initial impacts will be severe. Coyote, red fox and bobcats will experience less immediate impact due to their wide ranging nature. Direct habitat removal will initiate a decline in populations of raccoons, skunks and badgers. Loss of prey species will especially impact the less wide-ranging species such as badger.

Any future increase in suitable aquatic and riparian habitat might eventually enhance the area for use by raccoons, striped skunks and other predators.

Rabbits and hares

Jackrabbits and cottontails will initially undergo habitat losses as mining operations proceed. This will result in population declines. Where aquatic habitat is not developed and rehabilitation results in a reestablishment of herbaceous cover, some population recovery may be relatively rapid within new habitat capacities.

Rodents

Overburden removal during coal development will eliminate prairie dogs on this lease area. Surrounding areas are already occupied at the greatest densities they are capable of supporting and successful lasting relocation is highly unlikely. There are probably several hundred prairie dogs inhabiting the lease area.

Substantial losses of other small mammals will occur during mine operations in areas cleared for stripping, equipment work areas, and habitat conversion areas. Rapid re-colonization of suitably reclaimed areas will occur due to the high reproductive rates of most small mammals.

Upland game birds

Destruction of suitable habitat will eliminate upland game bird use. Removal of sagebrush will eliminate sage grouse use for at least the duration of the study period. An estimated 1,000 acres of sage grouse habitat will be lost. This amount of habitat provides seasonal habitat for a small number of sage grouse. Reoccupation of the lease area by game birds will depend on individual tolerances to disturbance and amount of suitably reclaimed habitat available.

Waterfowl and shorebirds

Impact of the proposed action on waterfowl will depend on acreage, depth, character of shoreline, other uses, and water quality of undisturbed habitat. Development of new aquatic habitat may enhance waterfowl habitat far beyond its present capability.

Other birds

The information available is not sufficient to allow a good assessment of impacts on birds. Refer to Chapter V, Part I of this EIS. Disturbance from increased human and mechanical activity plus elimination of forage or prey species will sharply reduce use by raptors in the area. Nearly all mobile species will avoid the lease area during periods of noise and disruption.

Fish

Development of water storage structures or "lakes" could provide fish habitat where none presently exist, provided adequate water quality is present.

Reptiles, amphibians and invertebrates

Since most reptiles and amphibians do not readily migrate from disturbed areas, there will be direct population losses resulting from elimination or drastic modification of habitat.

Invertebrates

Permanent loss or change of habitat through mining and construction of facilities will result in a direct loss of invertebrates.

Recreation

Coal strip mining and the attendant activities will diminish some hunting resource values. Nearly 1,470 acres will be mined during the life of the mine (2012). Useable terrain, habitat, and esthetic qualities associated with this acreage, while hunting, will be lost on the lease. Less than 100 hunter days are estimated lost by mining this lease; however, due to the disturbance of all related activities, nearly 200 hunter days may be lost around the area near the lease.

Mining five to ten miles from Gillette will impose an inconvenience for many who must hunt close to the city. Mining activity will disturb wildlife, affect some access to private land previously hunted and generally require residents of the area to travel 30 to 40 miles more for hunting. On the Wyodak lease, some state land (320 acres) will become physically and legally more isolated by mining and reduce some recreation base within the vicinity of Gillette.

Agriculture

Livestock forage

Mining will remove 1,470 acres of grazing land from production over a span of 38 years. Additional removal of 225 acres of land surface for construction area, plant sites, etc., will occur.

Fourteen hundred and ten acres of native range and seeded range furnishing 381 animal unit months of forage will be removed from production. One hundred twenty acres of hayland producing 60 animal unit months of grazing will be removed from production annually. The permanent loss of livestock forage production would occur with the creation of 900 acres (243 AUMs) of lakes and 225 acres (61 AUMs) of site facilities.

Four reservoirs and one well will be destroyed by mining activity. Donkey Creek, which is used for livestock water, will be subject to open pit mining. Water bearing toxic mine wastes may enter the well and Donkey Creek, polluting underground and surface water. The lossss of water will adversely affect distribution of grazing livestock. Polluted water sources may result in death of livesotck.

The water in Donkey Creek may carry high levels of toxic material if fly ash is disposed of in the mined pit and the pit is allowed to overflow into the creek.

Considerable acreage denuded of vegetation during construction and mining will produce areas that are potential sources of dust contamination. Mining activity will create coal dust. This dust may be severe enough to curtail plant growth. It will probably affect forage quality and be a health hazard to grazing livestock.

Invader species of plants will become established on spoil piles.

This may include undesirable plants such as those classed as noxious or others that are toxic to grazing livestock.

Hazards to livestock will be created by highwall areas surrounding pit mining areas.

Wildfires may be started by construction activities. These fires could burn forage outside of the coal lease area.

Residual particulate matter from power plant emissions will be a source of contamination to forage in the vicinity of the power plant. This will probably affect forage quality and may also be a health hazard to grazing livestock.

Farming

One hundred twenty acres of hayland and about 50 acres of land that are used for production of small grain, producing 110 tons of hay and small grain yields of barley and wheat averaging 30 bushels per acre, will be permanently lost for growing crops.

Mining activity will produce large denuded areas that will contribute some amount of blowing soil particles and coal dust. This may have an undesirable effect on the growth of crops.

Fences will be destroyed by mining activity, allowing livestock to drift onto and destroy growing crops.

Access to cropland may be destroyed, making it difficult to care for and harvest crops.

Residual particulate matter from power plant emissions may be a source of contamination to crops in the vicinity of the power plant. This may affect plant growth.

Transportation Networks

The only county road that may be impacted by the Wyodak mine would be the one that crosses the southeast corner of the north mining area. If relocation were required it could easily be achieved with a minimum of inconvenience. No paved highways will be affected by surface mining operations. The few graded and dirt roads which will be obliterated by mining will not seriously impact travel as an adequate number of similar quality roads circumscribe the mine area and access can easily be provided to ranching and other mineral operations in the area.

Impact on the future interstate Highway I-90 from employee travel between Gillette and the mine and power plants will be very minimal. The present highway U. S. 14 and 16 will remain as a frontage road to provide access to the mine thus relieving the interstate route from most mine oriented traffic. Highway 14 and 16 appears capable of easily accommodating the increase in traffic from mine and power plant employment.

Neither the short railroad spur route to the Burlington Northern line nor the proposed electric transmission lines are expected to significantly impact or interrupt existing transportation facilities.

Socio-Economic Conditions

The primary socio-economic impacts will be those associated with increases in capital expenditures, employment, population, and income.

Estimated capital expenditure at the mine will be 10 to 12 million dollars, and approximately 160 million dollars for each of the power plants.

Construction of each powerplant will employ 700 people for two to three years prior to facility operation.

The following table shows estimates of employment, population, and wages induced by the mine. An average annual income of $14,000 by 1980 is expected.

	1977	1980	1985	1990
Mine employment*	20	35	70	70
Power plant employment*	50	60	90	90
Other employment	142	193	325	325
Total population	500	670	1,100	1,100
Wages from mine and power plant employment only* #	$980,000	$1,330,000	$2,240,000	$3,360,000

*Does not include 1970 employment

#Assume inflation = 5 percent per year.

The mine operation will continue until about the year 2012.

Increases in population will increase the demand for services, protection, water supplies, sewage disposal facilities, and housing. Problems associated with more dense populations such as crime, mental illness, and unemployment may increase. These impacts are discussed in Chapter V, Part I.