CHAPTER II

DESCRIPTION OF THE EXISTING ENVIRONMENT

This chapter describes only those attributes of the environment along the railroad route that are not described in the regional analysis (Chapter IV, Part I) of this environmental statement. Additional data on all environmental components are found in that chapter.

Air Quality

The proposed 113-mile alignment of the railroad (proposed route) is located in the Casper Intrastate and Wyoming Intrastate Air Quality Control Regions. (See Figure 2, Chapter II, Part I.) Present air quality along this route is typical of that of the Eastern Powder River Coal Basin of Wyoming.

Ambient air quality standards for national and State of Wyoming air quality programs are given in Tables 1, 2, and 3 of Chapter VI, Part I, Mitigating Measures.

Topography

The topography along the proposed railroad route can be termed a relatively monotonous expanse of broadly rolling to gently sloping plains occasionally broken by major drainages that have cut into the landscape, creating areas of moderate to steeply sloping terrain. Alluvial plains of these drainages are moderate to steeply sloping depending on the width of the drainage. Adjacent to and flanking many drainages are narrow bands of sharply undulating hills formed by the numerous dissecting side drainages. There are no outstanding topographic features with the exception of a few buttes and escarpments located in the vicinity of the railroad route.

The route has been divided into several areas of similar topographic characteristics which are described below. The proposed railroad, with the exception of the Shawnee Creek area located at the southern extension of the route, crosses the topographic grain along the entire route. The topographic areas are listed from north to south.

Belle Fourche area

This area exhibits a greater amount of topographic relief for a short distance than any other area traversed by the railroad. Two significant drainages are crossed, the Belle Fourche River and Caballo Creek. Both streams flow from west to east and are located in relatively narrow valleys and in the short intermediate slopes and overflow plains or alluviated valley floors. Flanking hills rise sharply from the intermediate slopes and are dissected by many steeply graded side drainages that form dendritic patterns. The intervening hills after the intial rise from the valley floors are irregular and of moderate slope.

Hilight area

This area exhibits little topographic relief and consists mainly of low, rolling hills grading to gently sloping areas. The highpoint of this area is Hilight. There is a gradual rise from both the north and south to this point. The railroad route cuts across the upper reaches of Black Thunder Creek and its tributaries, which add little to the topographic relief. Several small closed basins form playas or "dry lake beds." Road construction is similar to the Bill area where roads are located in a straight line since topographic avoidance is not necessary. Some roads may run up to 24 miles in a relatively straight line without encountering topographic obstruction. Several clinker capped buttes and subdued hills border the western edge of the railroad route.

Antelope Creek-Cheyenne River area

The topography changes sharply from nearly flat to a significant amount of topographic relief, being dissected by numerous, deep-cut side drainages and sharply incised valleys. The route crosses this area at the lower reaches of these drainages and in an area where streambeds become more deeply incised into the landscape. Stream channels are meandered with sharply cut, steep embankments, and are arranged in a dendritic pattern trending west and south. The intermediate slopes rise at moderately steep angles to the surroundings hills.

The Antelope Creek Valley itself is a flat broad alluvial floor. To the south the topographic relief becomes somewhat subdued. Upon entering the Cheyenne River drainage the topography becomes much gentler than the Antelope Creek area.

Bill area

This area exhibits very little topographic relief which varies from broad, level flats to gently rolling hills and gentle, sloping surfaces between hills. Visibility is unobstructed, and a person can see for several miles if situated on one of the higher areas.

Roads and trails may be located in straight lines of over 12 miles.

Lightning Creek area

The topography of this area is created by large numbers of drainages that are tributaries of Lightning Creek and Walker Creek, Little Lightning and Box Creek. This area varies from sharply undulating hills in the south to a more broadly rolling area in the north. The hills along the railroad route are moderately steep and the intervening valleys are deep when compared to the Bill area.

Shawnee Creek area

The railroad route follows Shawnee Creek which is located in a short, broad alluviated valley that narrows rapidly at its northwestern point. The valley has a moderately steep grade flanked by sharply rising hills. The alluvium slopes rise gently from the creek bottom to the surrounding hills. Shawnee Creek flows southeastward into the North Platte river. The connecting tracks between the Chicago North Western and Burlington Northern Railroads are located on the broad level alluvium of the North Platte valley.

Soils

The proposed railroad right-of-way crosses many different physiographic landforms and various soil types in a north to south direction. This right-of-way will cross nearly 2,400 acres of land and eight soil associations which are identified and located on Map 7, Appendix A. Table 8, Soil Interpretations for Regional Soil Associations, of Chapter IV, Part I, lists soil characteristics, properties, suitabilities and limitations.

Soils situated within the proposed right-of-way, like many other soils of the semiarid part of the Great Plains, have developed from material weathered in place and are generally shallow over bedrock. On the gently rolling uplands, the slightly altered bedrock is usually not less than 36 inches below the surface; on the more rolling lands, the depth to bedrock is about 20 to 30 inches; and on steep slopes, only a few inches of soil or soil material overlies the partially weathered bedrock. Outcrops of rock are common on the steepest slopes.

The individual soil series that makeup the soil associations vary considerably in many internal and external characteristics. The soils within the right-of-way vary widely, ranging from the gently sloping, deep, loamy soils to shallow, rocky soils of the steeper slopes. Some soils are very sandy and clayey, while others--formed in shale--are clayey and occur extensively. Some have cool soil temperatures and thick, black surface layers rich in organic matter; e.g., the haploborolls. Others have much warmer temperatures and essentially no organic enriched surface layer; e.g., the Natrargids.

The properties of the soils (including their temperature and moisture content at critical periods) control their land use capabilities and behavior. Properties such as low soil moisture content, shallow rooting zone, high sodium

content, or steep slopes limit uses and exert a strong influence on productivity, wind and water erosion, revegetation and construction of roads.

Past erosion has removed the thin layer of topsoil down to bedrock in soil associations 11, 13, and 20. Removal of vegetative cover and surface disturbance increases the erosion potential and loss of soil for the entire 113-mile length of the proposed right-of-way.

Soils located within the right-of-way have unique sets of properties that are determined by many aspects of the setting, including: (1) the nature of geologic material from which they weathered; (2) the seasonal precipitation and temperature as they influence runoff, infiltration, and the biota in a given kind of soil material; (3) the plants, animals, and micro-organisms in and on the soil that not only are determined by the chemical and physical properties and climatic parameters of the forming soil, influence the soil by adding organic material, mixing and loosening the soil, and redistributing the bases; and (4) the landform that influences the amount of runoff or accumulation of surface water. Thus, the soils developed within the right-of-way have unique qualities that determine their suitabilities and limitations for use in roadbed construction, fill material, revegetation and erosion control.

A soil association consists of two or three distinctly different soil taxonomic units (soil series) occurring in a regular repeating pattern upon the landscape. The soil associations were developed because adequate basic soil data is not available to locate or identify the individual soil series occurring within the right-of-way.

The productivity, potentials, and suitabilities of the different kinds of soil may vary widely on a small scale, but on a larger scale, the pattern

of occurrence of the soils enables the land user to identify suitabilities, limitations and potentials of the soil for construction, rehabilitation, reclamation and land treatment practices.

The narrative discussion of soil association is designed to give a reasonably vivid and concise picture of the landscape and its soils, geology, climate, vegetation, current use, and general productivity, potentials, and limitations. Emphasis is given to a discussion of landform to provide a general impression of the nature of the area. A complete narrative description of the soil associations crossed by the proposed railroad is presented in Chapter IV, Part I. The proposed railroad right-of-way will cross soil associations 1, 3, 5, 8, 11, 13, 14 and 20, which are discussed below. It should be noted that the acreages and boundaries for each soil association are subject to change as detailed soil data becomes available.

The proposed railroad route will occupy approximately 50 acres in soil association 1. These soils occur in broad alluvial valley floors and flood plains along rivers and major streams. Although these soils are susceptible to flooding during spring and early summer, they are highly productive, yielding about 1,400 to 2,500 lbs/acre. The potential wind erosion hazard is high if vegetative cover is removed.

Approximately 975 acres of soil association 11 will be occupied by the right-of-way. These soils occur on moderately sloping to steep uplands

underlain by shale and dissected by numerous small drainages. The shrink-swell potential ranges from moderate to high. Productivity is medium, yielding about 850 to 1,500 lbs/acre. Potential wind and water erosion is very high if vegetative cover and surface is disturbed.

Soil association 13 occupies a narrow band along the mountain foothills and stream terraces that are gullied and broken by rock outcrops. The railroad right-of-way will occupy nearly 150 acres of this soil association. Productivity is low to medium, yielding about 850 to 2,000 lbs/acre. The erosion hazard is moderate to severe if vegetative cover is removed.

Approximately 440 acres of soil association 14 will be occupied by the right-of-way. These soils occur on nearly level to gently sloping lands and are developed in alluvium. They are saline, impervious to water and contain alkali panspots. Productivity is low, yielding 450 to 1,200 lbs/acre. Erodibility is high if the protective cover is removed.

The proposed railroad right-of-way will occupy approximately 735 acres of soil association 20. These soils occur on rolling to steep slopes that are dissected by many small drainages. The soil depth is shallow (less than 10") and moderately alkaline. Productivity is medium, yielding 1,000 to 2,100 lbs/acre. These soils are highly susceptible to wind and water erosion if the surface protective cover is removed.

Approximately 50 acres of soil associations 3, 5, and 8 will be occupied by the right-of-way. These soils occur on rough broken lands, steep upland ridges and sidehills. Productivity ranges from low to medium yielding 450 to 1,400 lbs/acre. Susceptibility to wind and water erosion is high if the surface is disturbed.

Tables 10 thru 28 of Appendix C provides additional physical, chemical and limitations/suitabilities for construction, revegetation, topsoil, etc. for each of the soil associations.

Mineral Resources

The railroad route crosses sedimentary rocks that range in age from early Tertiary (Paleocene) through Pleistocene and Holocene.

Most of the route is upon Paleocene and Eocene strata composed of sandstone, siltstone, claystone, and shale with many beds of subbituminous coal. Middle and upper Tertiary rocks occur near the south end of the route. Pleistocene stream alluvium covers many valley floors, and local areas of Pleistocene windblown sand occur on some of the interstream divides. Holocene alluvium is found along modern stream channels, many of which are entrenched in the Pleistocene alluvial valley floors.

The Cretaceous and Tertiary rocks are best known, with respect to their areal distribution, lithology, petrography, and engineering characteristics. The Quaternary units, of both Pleistocene and Holocene ages, are not well known. Except for a few areas along the Belle Fourche River and its tributaries, they have not been mapped. Their age, distribution, and characteristics are known only from scattered personal observations and by extrapolation from other areas in the High Plains and Rocky Mountains (Osterwald 1974).

Folds

The route of the proposed railroad is on the east limb of the Powder River Basin syncline, so that beds along most of the route dip westward at low angles. Beds dip more steeply near the margin of the basin, in the vicinity of Orin Junction and Shawnee; dips of as much as 11° to the north and south occur at the south end of the railroad route (U.S. Geological Survey 1972). Dips of as much as 30°, toward the north and south, occur about seven miles west of Orin Junction, near the Burlington Northern station at Foster. Several small

folds trend northeastward near Orin Junction and Shawnee. Other variations in strike and dip may be encountered along the wye connection to the Chicago North Western mainline. No other folds are known at the surface along the route of the proposed railroad, although subsurface folds probably exist in rocks below the coal bearing sequence (U.S. Geological Survey 1961, pp. 337-390).

Faults

Faults are known only at the south end of the railroad route between the Powder River Basin and the Hartville uplift. Other small faults, as yet unmapped, may be encountered along the route, similar to faults known in the southern Powder River uranium district (U.S. Geological Survey 1961, 1972).

Joints

There are no known detailed studies of the attitudes and spacings of joints in the Eastern Powder River Basin (Leggett 1939). Some predictions of joint directions along the railroad route can be made by inference from other areas in the Powder River Basin and the Great Plains. Throughout large areas of the Great Plains in eastern Nebraska two prominent joint sets, one striking northwest and the other northeast, cut resistant rock units at the surface and can be detected in nonresistant rock units on aerial photographs. Similarly, a northeast-trending set can be detected on aerial photomosaics of a large area of the Powder River Basin east of Buffalo, Wyoming. Similar trends probably will be encountered along the railroad route (U.S. Geological Survey 1961).

Seismicity

Eastern Wyoming, including the Powder River Basin, is in seismic risk zone 1 (Osterwald 1974). Four earthquakes of intensity V or greater have been

recorded. Although epicentral locations of the early earthquakes probably are very poorly known because of lack of instrumentation and very sparse population, all of these probably occurred along faults bordering the Powder River Basin on the south. No earthquakes are known to have occurred near the northern part of the railroad alignment.

A description of the geologic formations that outcrop along the proposed route is given in Chapter IV, Part I.

Coal resources

Many coalbeds crop out near the proposed railroad route and the western alternate route (generally to the east of the routes). Other coalbeds crop out in the vicinity of the eastern alternate route. Many of these beds are minable under present economic conditions, and most must be considered valuable potential resources. The reserves of coal along the routes are enormous, but the largest reserves are between Bill and Wyodak. About 350 feet of coal, some of it in beds 100 feet thick, occurs in about 2,500 feet of stratigraphic section in the Gillette area. The proposed route crosses presently minable coal at two places, the right-of-way covering about 161 million tons of coal buried under less than 200 feet of overburden.

Oil and gas fields

Many oil and gas fields are near the railroad routes and the proposed route crosses the large Hilight Oil Field.

Uranium deposits

A few small uranium deposits, both disseminated deposits in sedimentary rocks and small veins along joints and faults, are known near the southern end of the proposed railroad route. Most of these deposits are in T. 32 N.,

R. 69 W. Ore was produced from two of these, one of vein type and one of disseminated type. Two of the deposits, including the disseminated one from which ore was produced, are in the Tullock Member of the Fort Union Formation; the others are in the White River and Arikaree Formations. Although other deposits of uranium may be discovered in the future along the railroad routes, they probably will also be small.

Sand and gravel

Sand and gravel for construction purposes is scarce in the area of the railroad route, and in some places is barely sufficient to supply present local needs for concrete aggregate. The only known sand and gravel deposits along the route occur in the channel and floodplain of the North Platte River at Orin Junction. Small ridges and benches along Lightning Creek locally contain pebbles of granite and quartzite up to two inches in maximum diameter. Sand deposits, in which the largest particles are about a quarter of an inch in diameter, occur in the stream channels of Antelope, Dry, and Sand Creeks. Deposits of sand and gravel occur principally along small stream terraces near the northern part of the railroad route, and other deposits occur along tributaries and in the headwaters of the Belle Fourche River. Some of these deposits are eight to ten feet thick. Pebbles in the gravel are mostly limestone, with some sandstone, limonite, quartzite, and chert. The gravel contains about 45 percent sand, and lenses of fine sand are interbedded with coarse gravel. Another deposit near the point where the proposed route crosses the Belle Fourche was about three to four feet thick and contained about 2,000 cubic yards of sand and gravel in 1946. Another deposit, two to three feet thick, near the point where the western alternate route crossed the Belle Fourche, was mapped in 1946; it contained about 1,500 cubic yards of sand and fine gravel (U.S. Geological Survey 1958).

Water Resources

Supply

Ground water resources along the proposed right-of-way include shallow aquifers in alluvium and in such formations as Wasatch, Fort Union, Arikaree and White River. Most of the route is underlain by the Wasatch Formation. About 18 miles of the north end of the route, including the Amax spur, and about 18 miles near the center of the route from 4 miles northwest of Bill northward is underlain by the Fort Union. Both connections of the route with the mainline east of Douglas are underlain by the Arikaree--about 1-1/2 miles of the west leg of the wye and about 3 miles of the east leg. North of the Arikaree is the White River Formation which underlies about 4 miles of the west leg and only one mile of the east leg of the wye. The north switch of the wye to 7 miles northward will be underlain by the Fort Union. All of these aquifers are considered to have potential for development of water resources. (Detailed information on the location, quantity, and quality of each aquifer is given in Chapter IV, Part I.)

The proposed route begins near Caballo Creek (tributary to Belle Fourche River) at the north terminus (Amax spur) and proceeds southerly crossing the upper Belle Fourche River and its tributaries, upper Cheyenne River tributaries, and finally Shawnee Creek, a tributary to North Platte River, at the wye of the south terminus. Surface water supplies are limited since most streams crossed by the route are ephemeral or intermittent rather than perennial. Such streams flow only as a result of direct runoff from snowmelt or rainfall. Beginning at the north terminus and proceeding south major streams which will be crossed by the route include Caballo Creek, Belle Fourche River, Coal Creek, Little Thunder Creek, Porcupine Creek, Antelope Creek, Dry Fork Cheyenne River,

Dry Creek, Box Creek, Lightning Creek, and Shawnee Creek. Drainage structures for the 113-mile route include approximately 12 bridges and 220 culverts of various sizes. With the exception of Shawnee Creek all of the major streams drain in an easterly direction into the South Fork Cheyenne River which flows eventually into the Missouri River in South Dakota.

Quality

Chemical analyses of ground water from alluvium show dissolved solids range from about 500 to more than 2,000 milligrams per liter (mg/l), but more commonly range between 1,000 and 1,500 mg/l. Wasatch water contains dissolved solids from less than 500 to more than 2,000 mg/l, but commonly ranging between 500 and 1,500 mg/l. Fort Union aquifer analyses show dissolved solid ranges from about 300 to more than 1,500 mg/l, but commonly between 500 and 1,000 mg/l. Dissolved solids in waters of the Arikaree Formation are mostly about 300 mg/l while those of the White River Formation range from about 300 to more than 4,000 mg/l.

The quality of water in the Cheyenne and Belle Fourche Rivers and their tributaries is influenced by erosion and the amount of dissolved solids in sediment transported during intermittent flood runoffs. Both sheet and channel erosion contribute to moderate sediment loads in most streams. Since large amounts of the eroding soils are shale-derived and high in dissolved solids, runoff waters are estimated to contain a range of total dissolved solids (TDS) of 200 to 3,000 mg/l for the Belle Fourche River, and from 1,000 to 4,000 mg/l for the Cheyenne River. TDS values normally go down as volume of flow goes up and increase when flows get smaller. Sedimentation rates for streams crossed by the route are estimated to range from 0.15 acre-foot/square mile/year to as much as 1.0 acre-foot/square mile/year.

Relationship between ground and surface water

All streams crossed by the proposed railroad route originate in the plains of the semiarid Powder River Basin and are mainly ephemeral, flowing only as a result of direct runoff from snowmelt or rainfall. Therefore, there is no contribution of groundwater to streamflow and, conversely, little recharge of alluvium aquifers from intermittent streamflow.

Uses and rights

Water uses will be limited to those described for the two-year construction period. Acquisition of the required amount of water is not considered to be a problem but must be in conformity with state water law.

Vegetation

Terrestrial vegetation occupying the area along the 113 miles and 2,400 acres of proposed railroad right-of-way is predominantly a big sagebrush/grass type. Three broad vegetation communities are found along the proposed route, but approximately 2,225 acres of the area are a shrub aspect-type (#4) dominated by big sagebrush. (See map 8, Appendix A.) The two minor communities consist of about 125 acres of a greasewood type (#5) and some 50 acres of broadleaf forest type (#10), and both are limited to the bottoms and floodplains of major streams crossed by the route.

Aquatic vegetation is almost nonexistent along the route since mainly ephemeral streams are found in the area.

Archeological and Paleontological Values

The right-of-way for the proposed railroad has not yet been intensively surveyed for archeological values. It is not known how many nor where the archeological sites exist within the right-of-way corridor.

Archeological sites recorded nearby (within 10 miles) indicate a high probability of sites occurring inside the railroad right-of-way. Nineteen sites have been reported on the Amax coal leases in a general archeological surface site survey by the University of Montana. A Kerr-McGee anthropology expert reports sites in a general surface survey of that lease. Dr. Frison from the University of Wyoming (State Archeologist) will soon begin an intensive site survey of the proposed railroad right-of-way and will finish intensive site surveys of the Atlantic and Sun Oil leases. He reports many sites from all these units and one of high scientific value from the Sun Oil tract which was recorded during preliminary field reconnaissance in preparation of research proposals (Frison 1974).

Dr. Frison indicates that archeological evidence is strong along the railroad right-of-way but sites have not yet been discovered. All the materials are typologically dated as early as 12,000 years ago.

The private collections of Llano materials and the single Altithermal site investigated ("Hawken" site - see Figure 36, Chapter IV, Part I) prove the cultures' existence in the Powder River Basin, possibly within the proposed right-of-way. This site is approximately 40 miles northeast of the proposed route.

Historical Values

No historic sites or structures exist along the proposed railroad routes (main, alternates, or spurs). The Douglas Corridor alternate route near Douglas, crosses a 150-foot strip of the Bozeman Trail where erosion has eradicated this segment of the trail. All historic sites and buildings of the region are out of range of the railroad proposals. Fort Fetterman the nearest site is 14 miles west of the proposed route.

Aesthetics

This is a description of the landscape along the proposed route from its junction with the Amax spur south to where it meets the main line at Shawnee Creek. As the route leaves the existing spur line and proceeds south, it climbs a gentle incline. The surrounding terrain is gently rolling. Vegetation is generally an even distribution of sagebrush and grass; with some exposed soil, part of which is the red clinker material. As the route drops into the Belle Fourche drainage, the landform becomes a little more rugged. The drainages are cut deeper, and there is a good deal more exposed red clinker material. As the route proceeds up Coal Creek, the terrain becomes more gently rolling again with more sage and grass cover and less exposed soil. Through the Hilight Oil Field, the land is generally very gently rolling with considerable sage and grass cover, and many intrusions from oil and gas development activities. Much of the area is criss-crossed by roads and pipelines with numerous oil pumps and gas wells. Immediately south of the Hilight gas plant there is a great deal of ranching activity and almost no sagebrush; the cover is almost entirely grass. About two miles south of the Hilight gas plant the route climbs a gentle incline and passes between several flat-topped, cone-shaped ridges with red clinker material exposed. After the route passes between the cones, the terrain opens into a very gently rolling topography with less exposed soil and mostly good cover of sage and grass. Drainages are shallow and fairly stable. Color is mostly of the low-growing vegetation. This evenly textured, gently rolling topography continues all the way down the route through Porcupine Creek and into the Antelope Creek drainage. As the route approaches Antelope Creek, there is less grass and more sage in the vegetation with not much exposed soil, and still very gentle slopes. As the route climbs out of Antelope Creek, sage

dominates the vegetative cover and there is quite a lot of exposed soil. Here the soil color is the soft brown tone, almost ocher yellow, which contrasts with exposed clinker material along the red hills directly to the east of the line.

As the route crosses into the Dry Fork of the Cheyenne River, the drainages become steeper with sharply eroded cuts to the drainage bottom. The patterns of sagebrush are more scattered, there is more grass, and much more soil exposed. There are quite a few more sandstone outcrops along the ridges. The bottom of the Dry Fork drainage is fairly wide in this location with a number of scattered cottonwood trees.

As the route climbs out of the Dry Fork drainage toward Bill, it crosses State Highway 59. From this point south to where the route again leaves the highway, the landscape becomes very gently rolling with scattered grass and sagebrush mixed almost equally in broad patterns. The only intrusions in this area are a major pipeline, several minor pipelines, and a number of roads. There are a few farming and ranching operations at the valley bottoms, but very little to detract from the natural environment. Not much soil is exposed throughout this section, but what there is has a definite yellow ocher cast to it. Drainage bottoms are not nearly as deeply incised as those in the Dry Fork drainage, and they seem to be quite well healed.

As the route drops down into the Shawnee Creek drainage, the terrain again becomes steeper and more deeply eroded. Several flat-topped ridges flank the drainage on both sides, and a few scattered pines are visible on the ridges to the east. The drainage bottom itself again picks up a few scattered cottonwoods and maintains a fairly gentle grade all the way down to the junction with the main line. Due to the very gently rolling nature of the terrain along

the entire route, the very slight contrasts in vegetative patterns and textures, and the generally muted tones of the colors throughout the area, the scenic values along this proposed route are generally very low.

Wildlife and Fish

Big game

Pronghorn antelope

With few exceptions, the antelope is the most common big game animal along the proposed route (Map 9, Appendix A); the area within five miles of Bill is an especially important wintering area. The lineal nature of the railroad right-of-way makes quantification difficult. Winter concentration areas, such as the area near Bill, probably support winter densities up to 50 animals per square mile. Antelope population is believed to be stable and probably at or near the carrying capacity of the habitat.

Important browse species utilized by antelope particularly during fall and winter months, include big sagebrush and rabbitbrush. Forbs and grasses are utilized in spring and early summer. The single most important forage species is big sagebrush which also serves as cover during adverse weather and fawning.

Extensive seasonal migration by antelope are not traditional in this area. Antelope seasonally disperse and often move several miles to more suitable winter ranges from surrounding areas. The extent and significance of these movements varies with the severity of the winter.

Mule deer

Mule deer are found primarily along drainage courses and areas of broken topography where there is brushy cover (see map 10, Appendix A). In some areas broken topography provides suitable cover. Extensive sagebrush-grass regions with gentle topography such as those making up most of the route support few deer.

Big sagebrush, rabbitbrush, skunkbush sumac, and a variety of forbs provide most of the mule deer forage.

Other mammals

Predators

Little information on predator use of the railroad area is available. No data on present populations or trends are available. Ranchers attempt to control predator populations in the general area to some degree. The currently high fur prices ($30-40 for coyotes and fox and $80-100 for bobcat) give predators economic importance.

Rabbits

Two species of hares (jackrabbits) and one species of rabbit (cottontail) may be found along the route. The white-tailed jackrabbit is fairly common, but populations vary in a more or less cyclic pattern. Black-tailed jackrabbits are present in small numbers in the general area.

The desert cottontail may be found along the entire route. As with the jackrabbits, populations of cottontails vary considerably from year to year. Cottontail densities are greatest along drainage courses which provide more abundant brushy cover. No data on present populations or trends for cottontails or jackrabbits are available. Both jackrabbits and cottontails are hunted, but hunter harvest is light.

Rodents

Although the presence of a variety of rodents is likely along the route, no data on densities, trends, or distribution are available. Species observed in similar habitats within a few miles of the route and, therefore, likely to occur along the railroad, include the deer mouse, whitefooted mouse,

northern grasshopper mouse, thirteen-lined ground squirrel, Ord's kangaroo rat, sagebrush vole, olive-backed pocket mouse, western harvest mouse, and meadow vole (Sun Oil Co., 1974, p. 74; Peabody Coal Co. and Panhandle Eastern Pipeline Co., 1974, pp. 75-82). The northern pocket gopher, porcupine, plains pocket gopher, least chipmunk, black-tailed prairie dog, and white-tailed prairie dog can be expected to occur here. The Cheyenne and Belle Fourche Rivers and Antelope Creek support small numbers of muskrats and beaver.

Bats

No information concerning the presence of bats on the railroad is available. Species possibly occurring here include little brown myotis, long-legged myotis, Keen's myotis, long-eared myotis, hoary bat, Townsend's bat, and big brown bat.

Upland game birds

Sage grouse

The entire route is habitat for sage grouse. Estimated sage grouse density is 5-8 grouse per square mile. Sage grouse depend on abundant sagebrush for food and cover. The proposed route falls on or near crucial strutting (mating) and nesting areas. Available data only partially delineates such areas. Sage grouse are harvested as a game species.

Sharp-tailed grouse

Few sharp-tails are found along the proposed route. Where they occur (less than 5 per square mile), grassland in association with brushy cover provides habitat. Little or no hunter harvest is likely from the railroad route.

Hungarian (grey) partridge

Hungarian partridge occur throughout the area in a wide variety of habitat types. The population consists of small, widely scattered flocks. Harvest by hunters is very low.

Mourning dove

Little population data on the mourning dove is available. Doves nest throughout the area during summer months and migrate south out of Wyoming for wintering. Greatest nest densities are in riparian vegetation along drainage courses. A variety of seeds comprise the diet of doves. No data on hunter harvest is available.

Waterfowl

Waterfowl habitat along the proposed route is limited to a few small stockwater ponds, the Cheyenne and Belle Fourche Rivers, and Antelope Creek. Waters in the general area are used by waterfowl as rest areas during spring and fall migrations. Larger permanent waters are used for nesting and brood rearing. Species most likely in the area are the eared grebe, mallard, gadwell, and green-winged teal.

Other birds

Raptors

The most common raptors are red-tailed hawk, Swainson's hawk, rough-legged hawk, and American kestrel. All of these species nest in the general area and forage over the railroad area. During winter months, significant numbers of rough-legged hawks, bald eagles, and golden eagles move into the general area, probably from areas to the north where winters are more severe. Species present in lesser numbers include the ferruginous hawk, marsh hawk,

prairie falcon, great-horned owl, and short-eared owl. Drainage courses with medium to large trees provide nesting habitat for many of the raptorial species.

Prey species include various rodents, cottontails, jackrabbits, birds, and insects. Most raptorial species found here prey primarily on small mammals.

Song birds

The number of species of song birds present at various times of the year probably exceeds 100. Almost no information on the occurrence of these species along specific sections of the railroad is available. Some of the more common species are the western meadowlark, the lark bunting, and the horned lark. The western meadowlark feeds primarily on insects and most migrate south for winters. Horned larks occur on the area throughout the year, feeding on insects and small seeds. Lark buntings, also migratory, feed primarily on seeds while their young utilize insects until fledging (leaving the nest). The greatest densities of birds at all seasons are along drainage courses where riparian vegetation provides greater habitat diversity.

Fish

Fish habitat along the route is limited to intermittent streams such as the Cheyenne River, Belle Fourche River, Antelope Creek, and Caballo Creek. Available information indicates that 10 to 15 species, mostly rough fish, may be found in these streams (Baxter and Simon, 1970). Included are the plains flathead minnow, sand shiner, plains minnow, black bullhead, plains killfish, green sunfish, creek chub, white sucker, and carp. Undependable supplies and quality of water reduce overall suitability of this habitat.

Reptiles and amphibians

Several species of reptiles and amphibians have been identified within a few miles of the proposed railroad and in similar habitat (Sun Oil Company 1974, p. 60). These include leopard frog, tiger salamander, eastern shorthorned lizard, plains hognose snake, wandering garter snake, and prairie rattlesnake. Reptile and amphibian populations are believed to be relatively low.

Invertebrates

Local insect populations are abundant. Representative groups include grasshoppers, beetles, ants, wasps, bees, and butterflies. Although most are plant eaters, some species are scavengers, predators, or parasites. A variety of spiders (mostly predators) is also present. Other invertebrate groups likely along the railroad include earthworms, leeches, and snails. (No information on species available.) All are most likely to be found along or in the intermittent streams.

Threatened species

Black-footed ferret

The black-footed ferret is on the U. S. Department of the Interior list of endangered species. (U. S. Bureau of Sport Fisheries and Wildlife 1972 p. 289). Available information indicates that prairie dogs are usually the primary food source for ferrets and prairie dog colonies the principal habitat. Some prairie dog colonies are in the vicinity of the railroad.

Peregrine falcon

This rare falcon may occur on the railroad area during periods of migration but is unlikely at other seasons.

Prairie falcon

Relatively rare in Wyoming, this falcon has not been sighted in the area of the proposed route. Prairie falcons are known to be present in the Powder River Basin and likely forage over the railroad area.

Recreation

The recreation opportunities along the proposed route are rather minimal due to the high, windswept ridges and hills. This route also is located at the heads of all major drainages and tributaries of the Powder, Belle Fourche, and Cheyenne Rivers. Because of this naturally high, unsheltered area (except for antelope), less opportunity exists for viewing and hunting wildlife or providing other forms of outdoor recreation.

The area east of this route, where some permanent water is located consists of large blocks of public land (National Grasslands - 344,000 acres) with good recreation opportunities (31,600 recreation visitor days in 1973). Additional access to those lands will result from constructing the railroad. Also, roads will be kept open for industrial and agriculture use.

Another recreation interest in the area is collecting. Local groups contacted indicated no significant concentrations of collectible gem stones and petrified wood, but opportunities to locate better sites is possible if public access is protected across the railroad. Construction of the proposed railroad may be interesting to the highway traveler along State Highway 59.

Agriculture

The railroad route proposed by Burlington Northern Inc./Chicago North Western Transportation Company will cross lands owned by 50 private landowners, the State, and Federal Government. The right-of-way will cross 80.6 miles of private surface, 9.2 miles owned by the State, 2 miles administered by the Bureau of Land Management, and 20.9 miles administered by the U.S. Forest Service.

Livestock grazing

Bureau of Land Management lands are leased to contiguous ranches for grazing purposes for periods up to ten years. These lands, due to the fragmented land pattern, are usually fenced with and used in conjunction with adjoining private lands.

The Forest Service lands which the route would cross, are located within the Thunder Basin National Grasslands.

The proposed route crosses lands included in 91 individually fenced pastures and fields which are part of the land base for 39 ranching operations These ranch units derive the major portion of their income from the grazing of cattle or sheep, or a combination of both. These fields contain either native or introduced forage species. Over 90 percent of the land receives no irrigation. There is subirrigation along the Belle Fourche River and hay fields are irrigated in the Shawnee-Fisher area and north along Shawnee Creek.

Farming

The Powder River Basin is not noted for extensive farming activities and this is especially true along the proposed railroad route. Some dryland farming activity is located along the route, notably in the area of Bill.

Small grain production is basically limited to wheat and barley. Production is marginal and demands special management practices to be profitable. Soil management is mandatory and summer fallowing is practiced to reduce the probability of crop failure in drier years. Fields are left fallow every other year to increase and conserve soil moisture. Strip farming is also practiced to reduce erosion.

Wheat yields average 16.5 bushels per acre and barley averages 19 bushels per acre. Some oats may occasionally be grown along the route and production averages about 20 bushels per acre. These yield averages are dryland averages since no small grain is irrigated along the route.

Transportation Networks

The general vicinity of the proposed railroad route is traversed by only one designated highway, State Highway 59. Traffic flow along the highway is heaviest north of Reno Junction carrying 1,120 vehicles per day; but it is only lightly traveled at 380 vehicles per day south of the junction. (Wyoming State Highway Commission, 1972). Due to the light traffic flow along Highway 59 south of Reno Junction, it appears that very little daily commuting to work is going on between the two counties. The proposed railroad route is planned to cross Highway 59 at two points south of Reno Junction and each alternate route plans one crossing. Crossings are proposed to be accomplished via railroad undercrossings.

Many numerous lesser unimproved and graded dirt roads throughout the area provide access to many oil fields and ranch operations. These roads are to a large extent privately maintained although counties maintain a few but unknown number of the more significant roads. The proposed route crosses an estimated 50 of these lesser roads. Traffic flow figures on these roads are not generally available, but traffic can accurately be described as extremely light.

The proposed railroad route crosses 4 of the major pipelines shown on Figure 82, Chapter IV, Part I, and a limited but unknown number of lesser pipelines not shown. Major electric transmission lines in the area are shown on Figure 83, Chapter IV, Part I.

Socio-Economic Conditions

The existing conditions of the study area, which includes this proposed development, are discussed in Chapter IV, Part I.