
CHAPTER 3: THE AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This chapter describes the existing conditions of the physical, biological, cultural, and socioeconomic resources in the study areas and the environmental consequences of the proposed action. The resources that are addressed here were identified during the scoping process or interdisciplinary team review as having the potential to be affected. All of the areas are within or adjacent to the existing permit areas for the Caballo, Rawhide and the North Antelope Rochelle Mines (NARM). Most of the exchange areas are located within the current permit areas of the three mines and have been covered by baseline studies. Annual monitoring has continued over the study areas and adjacent lands. All baseline studies conducted within the permit areas were reviewed and approved by WDEQ/LQD as part of the permitting requirements for the current mine permits.

Critical elements of the human environment (BLM 1988) that could potentially be affected by the proposed actions include air quality, cultural resources, Native American religious concerns, T&E, and candidate species, hazardous or solid wastes, water quality, wetlands/riparian zones, invasive non-native species, and environmental justice. Five other critical elements (areas of critical environmental concern, prime or unique farmlands, flood plains, wild and scenic rivers, and wilderness) are not present in the analysis area and are not addressed further. In addition to the critical elements that are potentially present in the analysis area, the status and potential effects of mining on topography and physiography, geology and mineral resources, soils, water quantity, alluvial valley floors, vegetation, wildlife, land use and recreation, paleontological resources, visual resources, noise, transportation resources, and socioeconomics are discussed.

Section 3.1 describes the regional environment and is applicable to all tracts. Section 3.2 addresses the Gold Mine Draw lease area being proposed for relinquishment. Discussions for each of the requested exchange areas will follow.

3.1.1 PRB – TOPOGRAPHY AND PHYSIOGRAPHY

The PRB is an elongated, asymmetrical structural downfold. It is bounded by the Casper Arch, Laramie Mountains, and Hartville Uplift to the south; the Miles City Arch in Montana to the north, the Big Horn Mountains on the west, and the Black Hills on the east.

The PRB landscape consists of broad plains, low hills, and tablelands. Generally, the topography changes from open hills and elevated ridges with 500 to 1,000 ft of relief in the northern part of the PRB to plains and Tablelands with 300 to 500 ft of relief in the

southern part. Playas are common in the basin, as are buttes and plateaus capped by clinker or sandstone. Elevations range from about 2,500 ft. to greater than 6,000 ft. above sea level.

3.1.2 PRB - GEOLOGY

Stratigraphic units in the exchange area include, in descending order, recent (Quaternary age) alluvial and eolian deposits, the Eocene age Wasatch Formation (the overburden), and the Paleocene age Fort Union Formation (which contains the targeted coal beds). Surficial deposits in the analysis area include Quaternary alluvial and eolian deposits, Wasatch Formation, clinker, and weathered Wasatch and Fort Union formations. The Wasatch Formation forms most of the overburden on top of the recoverable coal seams in the Fort Union Formation in the general analysis area. It consists of interbedded lenticular sandstones, siltstones, shales, and thin discontinuous coals. There is no distinct boundary between the Wasatch Formation and the underlying Fort Union Formation. From a practical standpoint, however, the top of the mineable coal zone is considered as the contact between the two formations. Regionally, overburden thickness generally increases to the west due to the westerly dip of the beds in this area. Overburden thickness decreases in stream valleys where it has been eroded.

The Fort Union Formation consists primarily of shales, mudstones, siltstones, lenticular sandstones, and coal. It is divided into three members: Tongue River (which contains the target coal seams), Lebo, and Tullock, in descending order (Figure 3.1-1).

The Tongue River member consists of interbedded claystone, silty shale, carbonaceous shale and coal, with lesser amounts of fine-grained sandstone and siltstone. Within the Gold Mine Draw tract, there are up to two mineable coal seams. The nomenclature of these seams varies from mine operator to mine operator. The US Geological Survey (Flores et al. 1999) refers to the thick mineable coals in the Gillette coal field as the Wyodak-Anderson coal zone of the Tongue River Member of the Fort Union Formation.

The Fort Union coal seams are sub bituminous and are generally low-sulfur, low-ash coals. Typically, the coal being mined has a lower heating value north of Gillette than south of Gillette.

The Lebo Shale and Tullock members of the Fort Union Formation underlie the Tongue River member. They consist primarily of sandstone, siltstone, mudstone, shale and coal. In general, the Tullock member contains more sand than the Lebo Shale member.

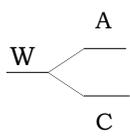
Geologic Unit		Hydrologic Characteristics
RECENT ALLUVIUM HOLOCENE		Typically fine grained and poorly sorted in ephemeral drainages with occasional very thin, clean interbedded sand lenses. More laterally extensive, thicker, and coarse-grained along intermittent Antelope Creek and ephemeral to intermittent Porcupine Creek. Excessive dissolved solids generally make these aquifers unsuitable for domestic, agricultural and livestock usage. Low infiltration capacity in ephemeral draws unless covered by sandy eolian blanket. Low to moderate infiltration along Antelope Creek and Porcupine Creek.
CLINKER HOLOCENE TO PLEISTOCENE		Baked and fused bedrock resulting from burning coal seams which ignite on the outcrop from lightning, manmade fires or spontaneous combustion. The reddish clinker (locally called scoria, red dog, etc.) formed by melting and partial fusing of overburden above the burning coal. The baked rock varies greatly in the degree of alteration; some is dense and glassy while some is vesicular and porous. It is commonly used as a road construction material and is an aquifer wherever saturated.
WASATCH FORMATION EOCENE		Lenticular fine sands interbedded in predominantly very fine grained siltstone and claystone may yield low to moderate quantities of poor to good quality water. The discontinuous nature and irregular geometry of these sand bodies result in low overall permeabilities and very slow groundwater movement in the overburden on a regional scale. Water quality in the Wasatch formation generally does not meet Wyoming Class I drinking water standards due to the dissolved mineral content. Some wells do, however, produce water of considerably better quality which does meet the Class I standard.
FORT UNION FORMATION PALEOCENE	TONGUE RIVER MEMBER	 <p>The coal serves as a regional groundwater aquifer and exhibits highly variable aquifer properties. Permeability and porosity associated with the coal arise almost entirely from fractures. Coal water typically does not meet Class I or Class II (irrigation) use standards. In most cases, water from coal wells is suitable for livestock use. The coal water is used throughout the region as a source of stock water and occasionally for domestic use.</p>
	LEBO MEMBER	The Lebo member, also referred to as "The Lebo Confining Layer" or "Lebo Shale" has a mean thickness of 711 feet in the PRB and a thickness of about 400 feet in the vicinity of Gillette (Lewis and Hotchkiss 1981). The Lebo typically yields small quantities of poor quality groundwater. Where sand content is locally large, caused by channel or deltaic deposits, the Lebo may yield as much as 10 gpm (Lewis and Hotchkiss 1981).
	TULLOCK MEMBER	The Tullock member has a mean thickness of 785 feet in the PRB and a mean sand content of 53 percent which indicates that the unit generally functions well as a regional aquifer. Yields of 15 gpm are common but vary locally and may be as much as 40 gpm. Records from the SEO indicate that maximum yields of approximately 300 gpm have been achieved from this aquifer. Water quality in the Tullock Member often meets Class I standards. The extensive sandstone units in the Tullock Member are commonly developed regionally for domestic and industrial uses. The City of Gillette is currently using eight wells completed in this zone to meet part of its municipal water requirements.
UPPER CRETACEOUS	LANCE FORMATION	Sandstone and interbedded sandy shales and claystone provide yields generally of less than 20 gpm. Higher yields are sometimes achieved where sand thicknesses are greatest. Water quality is typically fair to good.
	FOX HILLS SANDSTONE	Sandstone and sandy shales yield up to 200 gpm, however, yields are frequently significantly less. The water quality of the Fox Hills is generally good with TDS concentrations commonly less than 1000 mg/l.
	PIERRE SHALE	This unit is comprised predominantly of marine shales with only occasional local thin sandstone lenses. Maximum yields are minor and overall the unit is not water bearing. Water obtained from this unit is poor with high concentrations of sodium and sulfate as the predominant ions in solution.
W = WYODAK COAL; A = ANDERSON COAL; C = CANYON COAL		

Figure 3.1-1 Stratigraphic Relationships and Hydrologic Characteristics of Upper Cretaceous, Lower Tertiary, and Recent Geologic Units, PRB, Wyoming. (Compiled from Hodson et al. 1973 and Lewis and Hotchkiss 1981).

3.1.3 PRB – MINERAL RESOURCES

The PRB contains large reserves of fossil fuels including oil, natural gas or methane (from conventional reservoirs and from coal beds), and coal, all of which are currently being produced. In addition, uranium, bentonite, and scoria are mined in the PRB (BLM 1996g). There are no active mining claims on any of the tracts under consideration.

3.1.3.1 PRB - Coal

There are 15 coal mines lying along a north/south line that parallels Wyoming Highway 59 starting north of Gillette, Wyoming, and extending south for about 75 miles (Figure 1-1). These mines are located where the Wyodak coal is at its shallowest depths (nearest the outcrop). Two of these mines, the Fort Union and Coal Creek mines, are capable of producing but are not currently active. A portion of the Fort Union Mine has recently been permitted as the KFx Mine and is currently under construction. The Dave Johnston Mine, located in Converse County near Glenrock, Wyoming has shut down coal mining operations and is conducting final reclamation.

3.1.3.2 PRB - Oil and Gas

Oil and gas have been produced in the PRB for more than 100 years from reservoir beds that range in age from Pennsylvanian to Oligocene (DeBruin 1996). There are approximately 500 producing oil and/or natural gas fields in the basin. The estimated amount of unrecovered hydrocarbons in the basin are 1.94 billion barrels of recoverable oil and 1.60 trillion cubic feet of gas (USGS 1995). Depth to gas and oil-bearing strata is generally between 4,000 feet and 13,500 feet, but some wells are as shallow as 250 feet.

There are no active conventional oil or gas wells or pipelines within the offered tract.

3.1.3.3 PRB - Coal Bed Natural Gas

Methane gas generation from coal beds is a natural process. Methane may be trapped in the coal by overburden pressure, by the pressure of water in the coal, or by impermeable layers immediately above the coal. Deeper coal beds have higher pressures and generally trap more gas. Under favorable geologic conditions, methane can be trapped at shallow depths in and above coal beds, and this seems to be the case in the PRB. Without the existence of conditions that act to trap the gas in shallow coals or in adjacent sandstones, the gas escapes to the atmosphere. It is likely that a lot of methane generated by the coal beds in the PRB has gradually escaped into the atmosphere because the coal is relatively shallow. However, a large amount also remains in the coal. One study estimates that there are approximately 38.2 trillion cubic feet of CBNG gas in place in coal beds that are thicker than 20 feet and deeper than

200 feet. This study estimates that there are approximately 25 trillion cubic feet of recoverable CBNG reserves (Finley and Goolsby 2000).

Historically, methane has been reported flowing from shallow water wells and coal exploration holes in parts of the PRB. According to DeBruin and Jones (1989), most of the documented historical occurrences have been in the northern PRB. Olive (1957) references a water well in T54N, R74W that began producing gas for domestic use in 1916.

CBNG has been commercially produced in the Powder River Basin since 1989 when production began at Rawhide Butte field west of the Eagle Butte Mine. CBNG occurs in the coal beds of the Fort Union and Wasatch formations throughout the PRB in Wyoming. The predominant CBNG production to date has occurred from coal beds of the Wyodak-Anderson zone (USGS 2000) in seams known as the Anderson, Canyon, Wyodak, Big George, and other locally used names. These are generally equivalent to the seams being mined by the surface mines along the eastern margin of the basin, including the Caballo Mine.

CBNG is produced from other, deeper seams locally throughout the PRB. Deeper seams exist in the Caballo Mine area, but they are not in production. Relinquishment of the offered tract will make the lands available for oil and gas development as mining will not directly affect all of the lands within the tract.

CBNG development requires more extensive facilities in areas where there are splits between the coal seams. Current CBNG well completion practices within the Powder River Basin generally preclude completion of two seams separated by thick shales within a single well bore. As a result, in the areas where the parting thickness increases, two wells would be required to produce essentially the same reserve that would be produced from a single well in a single contiguous seam.

Since the early 1990s, the BLM has completed numerous EAs and two EISs analyzing CBNG projects. The most recent of these was the *Final Environmental Impact Statement and Draft Planning Amendment for the Powder River Basin Oil and Gas Project* (Wyoming PRB Oil and Gas EIS) (BLM 2003a). This document analyzes the impacts of drilling, completing, and operating about 39,400 new private, state, and federal CBNG wells and associated ancillary facilities in the next ten years. This is in addition to the more than 12,000 CBNG wells that had been drilled or were permitted for drilling when the Wyoming PRB Oil and Gas EIS was prepared. The study area for this EIS includes an almost 8,000,000-acre area covering all or parts of Campbell, Converse, Johnson, and Sheridan counties. The cumulative impacts of reasonably foreseeable conventional oil and gas development within the Wyoming portion of the PRB are also analyzed in the EIS.

3.1.3.4 PRB - Bentonite

Layers of bentonite (decomposed volcanic ash) of varying thickness are present throughout the PRB. Some of the thicker layers are mined where they are near the surface, mostly around the edges of the basin. Bentonite has a large capacity to absorb water, and because of this characteristic it is used in a number of processes and products, including cat litter and drilling mud. No mineable bentonite reserves have been identified on the exchange area.

3.1.3.5 PRB - Uranium

There are substantial uranium resources in southwestern Campbell and northwestern Converse counties. Uranium exploration and mining were very active in the 1950s, when numerous claims were filed in the PRB. Uranium mining decreased in the early 1980s due to decreased demand and increased foreign supply. There are currently two *in-situ* uranium recovery operations in the PRB. Production at another ended in 2000 (WGS 2003).

3.1.3.6 PRB - Scoria

Scoria or clinker has been and continues to be a major source of gravel for road construction in the area.

3.1.4 PRB – SOILS

Numerous baseline soil surveys associated with surface mining operations and oil field development have been conducted in the area of the Caballo, North Antelope Rochelle, and Rawhide Mines. Soil surveys of Campbell and Converse Counties, Wyoming have also been conducted by the NRCS.

Soils on tracts #1-8 were identified by series, which consist of soils that have similar horizons in their profile. Horizons are soil layers having similar color, texture, structure, reaction, consistency, mineral and chemical composition, and arrangement in the profile.

3.1.5 PRB – AIR QUALITY AND CLIMATE

Air quality of any region is controlled primarily by the magnitude and distribution of pollutant emissions and the regional climate. The transport of pollutants from specific source areas is strongly affected by local topography. Generally, local effects are superimposed on the general overall weather pattern and are most important when the large-scale wind flow is weak.

3.1.5.1 PRB - Air Quality Regulatory Framework

Air quality and pollutant emissions to the air are regulated under the federal CAA and Wyoming Air Quality Standards and Regulations (WAQSR) administered by the WDEQ/AQD. A fundamental requirement of both federal and state regulations is that ambient concentrations for specific criteria pollutants not exceed allowable levels, referred to as the ambient air quality standards (AAQS). These standards have been established by the EPA and the WDEQ at levels deemed necessary to preclude adverse impacts on human health and welfare. The National AAQS (or NAAQS) set nationwide thresholds for maximum acceptable concentrations of various pollutants. The Wyoming AAQS (or WAAQS) must be at least as stringent as NAAQS. Selected Wyoming and national ambient air standards are shown in Table 3.1-1. The NAAQS and WAAQS set the absolute upper limits for specific air pollutant concentrations at all locations where the public has access.

The assumed background pollutant concentrations included in Table 3.1-1 were derived by ENSR International based on a review of available monitoring data measured throughout northeastern Wyoming and southeastern Montana. The assumed background pollutant concentrations are below applicable NAAQS and WAAQS for all criteria pollutants and averaging times.

Pursuant to the CAA, the EPA has developed classifications for distinct geographic regions known as air basins and for major metropolitan statistical areas (MSAs). Under these classifications, for each federal criteria pollutant, each air basin (or portion of a basin or MSA) is classified as in "attainment" if the area has "attained" compliance with (that is, not exceeded) the adopted NAAQS for that pollutant, or is classified as "non-attainment" if the levels of ambient air pollution exceed the NAAQS for that pollutant. Areas for which sufficient ambient monitoring data are not available are designated as "unclassified" for those particular pollutants. States designate areas within their borders as being in "attainment" or "non-attainment" with the AAQS. Existing air quality throughout most of the PRB in Wyoming is in attainment with all ambient air quality standards, as demonstrated by the relatively low concentration levels presented in Table 3.1-1. However, the Sheridan, Wyoming area has been designated as a federal non-attainment area (PM₁₀ - moderate) where the applicable standards have been violated in the past.

Future development projects which have the potential to emit more than 250 tons per year (tpy) of any criteria pollutant (or certain listed sources that have the potential to emit more than 100 tons per year) would be required to undergo a regulatory PSD increment consumption analysis under the federal new source review permitting regulations. Development projects subject to the PSD regulations must also demonstrate the use of the best available control technology (BACT) and show that the combined impacts of all PSD sources will not exceed the allowable incremental air quality impacts for NO₂, PM₁₀, or SO₂. The PSD increments are shown in Table 3.1-1.

TABLE 3.1-1

**AIR POLLUTANT BACKGROUND CONCENTRATIONS,
APPLICABLE AMBIENT AIR QUALITY STANDARDS,
AND PSD INCREMENT VALUES (in µg/m3)**

Pollutant	Averaging Time ¹	Background Concentration	Primary NAAQS ²	Secondary NAAQS ²	Wyoming Standards	PSD Class I Increments	PSD Class II Increments
CO	1-hour	3,336 ³	40,000	40,000	40,000	----	----
	8-hour	1,381 ³	10,000	10,000	10,000	----	----
NO ₂	Annual	5 ⁴	100	100	100	2.5	25
O ₃	1-hour	167 ⁵	235	235	235	----	----
	8-hour	140 ⁵	157	157	157	----	----
PM ₁₀	24-hour	54 ⁷	150	150	150	8	30
	Annual	17 ⁷	50	50	50	4	17
SO ₂	3-hour	181 ⁶	----	1,300	1,300	25	512
	24-hour	62 ⁶	365	----	260	5	91
	Annual	13 ⁶	80	----	60	2	20

¹ Annual standards are not to be exceeded; short-term standards are not to be exceeded more than once per year.

² Primary standards are designed to protect public health; secondary standards are designed to protect public welfare.

³ Amoco Ryckman Creek collected for an 8-month period during 1978-1979, summarized in the Riley Ridge EIS (BLM 1983).

⁴ Data collected at Thunder Basin National Grasslands, Campbell County, WY (2002).

⁵ Data collected at Thunder Basin National Grasslands, Campbell County, WY (8-hour 2001-2003, 1-hour 2002).

⁶ Data collected by Black Hills Power at Wygen 2, Campbell County, WY (2002).

⁷ Data collected by AMAX Coal at the Eagle Butte Mine, Campbell County, WY (2002).

Source: ENSR 2005

Existing surface coal mining operations in the PRB, including the Caballo, North Antelope Rochelle, and Rawhide Mines are not currently affected by the PSD regulations for two reasons. Surface coal mines are not on the EPA list of 28 major emitting facilities for PSD regulation and point-source emissions from individual mines do not exceed the PSD emissions threshold. A new mine would be classified as a major source and subject to PSD review if potential emissions of any regulated pollutant equal or exceed 250 tpy. Fugitive emissions are not included in the definition of potential emissions except for certain specified source types [40 CFR 52.21, (b)(1)(iii)]. Mining related fugitive emissions are exempt from the applicability determination.

The WDEQ/AQD administers a permitting program to assist the agency in managing the state's air resources. Under this program, anyone planning to construct, modify, or use

a facility capable of emitting designated pollutants into the atmosphere must obtain an air quality permit to construct. Coal mines fall into this category.

In addition to the designations relative to attainment of the NAAQS, the CAA requires the EPA to place each airshed within the US into one of three PSD area classifications. PSD Class I is the most restrictive air quality category. It was created by Congress to prevent further deterioration of air quality in national parks and wilderness areas of a given size which existed prior to 1977 or those additional areas which have since been designated Class I under federal regulations (40 CFR 52.21). All remaining areas outside of the designated Class I boundaries were designated Class II areas, which allow a relatively greater deterioration of air quality over that in existence in 1977, although still within the NAAQS. No Class III areas, which would allow air quality to degrade to the NAAQS, have been designated. The federal land managers have also identified certain federal assets with Class II status as "sensitive" Class II areas for which air quality and/or visibility are valued resources. The federal CAA also provides specific visibility protection of mandatory federal Class I areas. Mandatory federal Class I areas were designated by Congress on August 7, 1977 and include wilderness areas greater than 5,000 acres in size and national parks greater than 6,000 acres in size. Table 3.1-2 is a list of mandatory federal Class I areas, tribal Class I areas, and federal Class II areas in the region and their distance from the offered and exchange lands. Wind Cave National Park, Badlands Wilderness Area, and the Northern Cheyenne Indian Reservation are the closest mandatory federal Class I areas. As shown in Table 3.1-1, the allowable incremental impacts for NO₂, PM₁₀, and SO₂ within PSD Class I areas are very limited. Most of the PRB in Wyoming is designated as PSD Class II with less stringent requirements. Even though the development activities being considered in this EIS would occur within areas designated PSD Class II, the potential impacts are not allowed to cause incremental effects greater than the stringent Class I thresholds to occur inside any distant PSD Class I area.

3.1.5.2 PRB - Existing Air Quality

WDEQ detects changes in air quality through monitoring and maintains an extensive network of air quality monitors throughout the state. Particulate matter is most commonly measured as particles finer than 10 microns or PM₁₀. The eastern side of the Powder River Basin has one of the most extensive networks of monitors for PM₁₀ in the nation due to the density of coal mines (Figure 3.1-2). In addition, there are also monitors in Sheridan and Gillette, Wyoming, and the WDEQ installed monitors in Arvada and Wright, Wyoming in November 2002.

WDEQ uses monitoring located throughout the state to anticipate issues related to air quality. These monitoring stations are located to measure ambient air quality and not located to measure impacts from a specific source. Monitors located to measure impacts from a specific source may also be used for trends. These data are used to pro-actively arrest or reverse trends towards air quality problems. When WDEQ became aware that particulate readings were increasing due to increased coal bed natural gas activity and aggravated by prolonged drought, the WDEQ approached the

**TABLE 3.1-2
APPROXIMATE DISTANCES AND DIRECTIONS TO PSD
CLASS I AND CLASS II SENSITIVE RECEPTOR AREAS**

Receptor Area	Distance and Direction from NARM (miles)	Distance and Direction from Rawhide Mine (miles)	Distance and Direction from Caballo Mine (miles)
Mandatory Federal PSD Class I			
Badlands Wilderness Area ¹	130 E	160 SE	140 SE
Bridger Wilderness Area	215 W	215 SW	210 SW
Fitzpatrick Wilderness Areas	220 W	205 SW	205 SW
Gates of the Mountains Wilderness Area	235 NW	350 NW	355 NW
Grand Teton National Park	275 W	260 SW	240 SW
North Absaroka Wilderness Area	225 NW	205 NW	210 NW
Red Rock Lakes Wilderness Area	355 NW	305 W	305 NW
Scapegoat Wilderness Area	445 NW	390 NW	395 NW
Teton Wilderness Area	230 W	210 W	210 W
Theodore Roosevelt National Park (North Unit)	290 NE	245 NE	255 NE
Theodore Roosevelt National Park (South Unit)	245 NE	205 NE	215 NE
U. L Bend Wilderness Area	305 NW	245 NW	255 NW
Washakie Wilderness Area	195 W	180 SW	175 SW
Wind Cave National Park	95 E	115 SE	110 SE
Yellowstone National Park	255 NW	210 W	220 W
Tribal Federal PSD Class I			
Fort Peck Indian Reservation	330 N	255 N	265 N
Northern Cheyenne Indian Reservation	125 NW	85 NW	100 NW
Federal PSD Class II			
Absaroka-Beartooth Wilderness Area	245 NW	190 NW	200 NW
Agate Fossil Beds National Monument	110 SE	160 SE	150 SE
Bighorn Canyon National Recreation Area	155 NW	135 NW	135 NW
Black Elk Wilderness Area	80 NE	105 SE	100 SE
Cloud Peak Wilderness Area	85 NW	75 W	70 W
Crow Indian Reservation	115 NW	85 NW	90 NW
Devils Tower National Monument	65 NE	40 NE	50 NE
Fort Belknap Indian Reservation	350 NW	280 NW	290 NW
Fort Laramie National Historic Site	90 SE	160 SE	145 SE
Jewel Cave National Monument	70 E	100 SE	90 SE
Mount Rushmore National Memorial	90 NE	110 E	105 E
Popo Agie Wilderness Area	205 SW	205 SW	200 SW
Soldier Creek Wilderness Area	130 SE	145 SE	140 SE

¹ Congress designated the wilderness area portion of the Badlands National Park as a mandatory federal PSA Class I area. The remainder of the national park is a PSD Class II area.

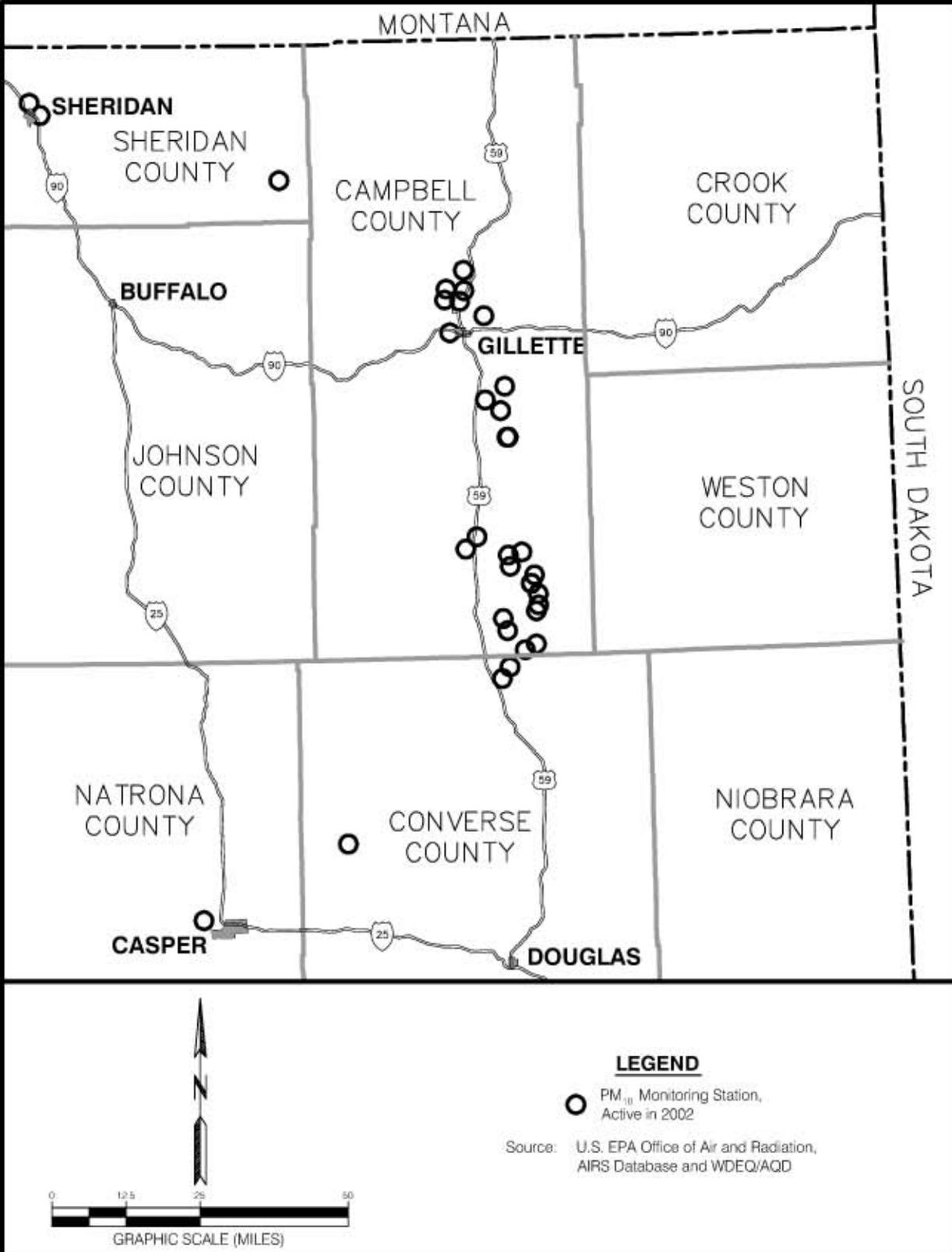


Figure 3.1-2 Active PM₁₀ Monitoring Stations in Northeastern Wyoming

counties, coal mines, and coal bed natural gas industry. A coalition involving the counties, coal companies and coal bed natural gas operators have made significant efforts towards minimizing dust from roads. Measures taken have ranged from the implementation of speed limits to paving heavily traveled roads.

Monitoring is also used to measure compliance. The WDEQ can take a range of enforcement actions to remedy the situation where monitoring shows a violation of any standard. Where a standard is exceeded specific to an operation, the enforcement action is specific to the facility. For many facilities, neither the cause nor the solution is simple. The agency normally uses a negotiated settlement in those instances.

WDEQ has also located two visibility monitoring stations in the PRB. One of these sites is 32 miles north of Gillette and includes a nephelometer, a transmissometer, an aerosol monitor (IMPROVE protocol), instruments to measure meteorological parameters (temperature, RH, wind speed, wind direction), a digital camera, instruments to measure ozone, and instruments to measure nitrogen oxides (NO, NO₂, NO_x). The other visibility monitoring station is located 14 miles west of Buffalo and includes a nephelometer, a transmissometer, an aerosol monitor (IMPROVE protocol), instruments to measure meteorological parameters (temperature, RH, wind speed, wind direction), and a digital camera.

Other air quality monitoring in the PRB includes NO₂ monitoring along the east side of the PRB, Wyoming air resources monitoring system (WARMS) monitoring of sulfur and nitrogen concentrations near Buffalo, Sheridan, and Newcastle, and National Atmospheric Deposition Program (NADP) monitoring of precipitation chemistry in Newcastle.

Air quality conditions in rural areas are likely to be very good, as characterized by limited air pollution emission sources (few industrial facilities and residential emissions in the relatively small communities and isolated ranches) and good atmospheric dispersion conditions, resulting in relatively low air pollutant concentrations. Occasional high concentrations of carbon monoxide (CO) and particulate matter may occur in more urbanized areas (for example, Buffalo, Gillette, and Sheridan) and around industrial facilities, especially under stable atmospheric conditions common during winter.

The major types of emissions that come from surface coal mining activities are in the form of fugitive dust and tailpipe emissions from large mining equipment. Activities such as blasting, loading and hauling of overburden and coal and the large areas of disturbed land all produce fugitive dust. Stationary or point sources are associated with coal crushing, storage, and handling facilities. In general, particulate matter (PM₁₀) is the major significant pollutant from coal mine point sources.

Blasting is responsible for another type of emission from surface coal mining. Overburden blasting sometimes produces gaseous orange-colored clouds that contain NO₂. Exposure to NO₂ may have adverse health effects, which are discussed in Chapter 4. NO₂ is one of several products resulting from the incomplete combustion of

explosives used in the blasting process. Wyoming's ambient air standards for NO₂ are shown in Table 3.1-1.

Other existing air pollutant emission sources within the region include:

- Exhaust emissions (primarily CO and oxides of nitrogen [NO_x]) from existing natural gas fired compressor engines used in production of natural gas and coal bed natural gas; gasoline and diesel vehicle tailpipe emissions of combustion pollutants (volatile organic compounds [VOC], CO, NO_x, inhalable particulate matter less than 10 microns in effective diameter [PM₁₀], fine particulate matter less than 2.5 microns in effective diameter [PM_{2.5}], and sulfur dioxide [SO₂]);
- Dust (particulate matter) generated by vehicle travel on unpaved roads, windblown dust from neighboring areas and road sanding during the winter months;
- Transport of air pollutants from emission sources located outside the region;
- Emissions from railroad locomotives used to haul coal (primarily NO₂ and PM₁₀); and,
- SO₂ and NO_x from power plants.

3.1.5.3 PRB - Historical Ambient Air Quality: Particulates

Until 1989, the federally regulated particulate matter pollutant was measured as TSP. This measurement included all suspendable dust (generally less than 100 microns in diameter). In 1989, the federally regulated particulate matter pollutant was changed from a TSP based standard to a PM₁₀ based standard. PM₁₀ is particulate matter with an aerodynamic diameter of 10 microns or less that can potentially penetrate into the lungs and cause health problems. Wyoming added PM₁₀ based standards to match the federal standards in 1989 and retained the TSP based standards as state standards until March 2000. Wyoming's ambient air standards for PM₁₀ are shown in Table 3.1-1. Wyoming adopted a PM_{2.5} standard in March 2000. However, the state of Wyoming will not enforce that standard until EPA has completed its review of the PM_{2.5} standard and has determined to retain and enforce the standard as promulgated on July 18, 1997.

TABLE 3.1-3

**SUMMARY OF AIR QUALITY MONITORING
IN WYOMING'S POWDER RIVER BASIN, 1980-2002**

Year	Coal Produced (mmtpy)	Yards Moved (mmbcy)	Number of Mines Operating/ Monitoring TSP/ Monitoring PM ₁₀ ¹	Number of Sites TSP/PM ₁₀ ² (µg/m ³)	TSP Average (µg/m ³)	PM ₁₀ Average (µg/m ³)
1980	58.7	105.3	10/14/0	34/0	35.5	na ³
1981	71.0	133.4	11/13/0	35/0	39.4	na
1982	76.1	141.1	11/14/0	40/0	31.2	na
1983	84.9	150.9	13/14/1	41/1	32.6	11.2
1984	105.3	169.5	14/16/1	42/1	33.9	11.1
1985	113.0	203.4	16/17/0	49/0	32.3	na
1986	111.2	165.7	16/17/0	45/0	29.3	na
1987	120.7	174.6	16/17/0	43/0	31.7	na
1988	138.8	209.7	16/17/0	43/0	37.7	na
1989	147.5	215.6	15/17/3	40/3	32.1	15.9
1990	160.7	223.5	17/17/5	47/5	34.3	14.8
1991	171.4	245.9	17/17/5	46/6	32.7	16.5
1992	166.1	296.0	17/17/7	41/7	31.7	15.9
1993	188.8	389.5	17/17/8	40/11	27.8	14.5
1994	213.6	483.9	17/18/8	44/11	31.7	15.5
1995	242.6	512.7	16/18/8	41/12	29.6	12.9
1996	257.0	605.4	17/18/8	41/12	35.4	16.0
1997	259.7	622.0	16/17/10	39/15	33.3	15.9
1998	308.6	710.7	16/17/12	36/17	33.9	15.9
1999	317.1	758.0	15/17/12	36/18	55.3	21.6
2000	322.5	845.3	15/15/12	31/17	56.1	23.4
2001	354.1	927.1	12/11/12	29/29	57.5	27.2
2002	359.7	1,032.1	13/11/13	23/38	56	23.3

¹Includes Buckskin, Rawhide, Eagle Butte, Dry Fork, Fort Union, Clovis Point, Wyodak, Caballo, Belle Ayr, Caballo Rojo, Cordero, Coal Creek, Jacobs Ranch, Black Thunder, North Rochelle, North Antelope, Rochelle, and Antelope mines.

²Some sites include more than one sampler, so the number of samplers is greater than the number of sites.

³Not applicable because no monitoring was done for PM₁₀.

Sources: 1980 through 1996 emissions and production data from April 1997 report prepared by WMA for WDEQ/AQD; 1997 through 2002 emissions data from EPA AIRData database, and production data from WDEQ/AQD.

Regional

WDEQ/AQD requires the collection of information documenting the quality of the air resource at each of the PRB mines. Each mine monitored air quality for a 24-hour

period every six days at multiple monitoring sites through the end of 2001. All PM₁₀ monitors are now required by WDEQ/AQD to sample air quality for a 24-hour period every three days beginning in 2002. Data for TSP dates back to 1980; data for PM₁₀ dating back to 1989. This has resulted in over 55,000 TSP and 14,000 PM₁₀ samples collected through 2002 and makes the eastern PRB one of the most densely monitored areas in the world. Table 3.1-3 uses the annual arithmetic average of all sites to summarize these data.

As indicated in Table 3.1-3, the long-term trend in particulate emissions remained relatively flat through 1998. TSP concentration from 1980 through 1998 averaged 33.1 $\mu\text{g}/\text{m}^3$, ranging between 27.8 $\mu\text{g}/\text{m}^3$ and 39.4 $\mu\text{g}/\text{m}^3$. There were increases in 1988 and 1996, which may have been the result of fires in the region during those years. PM₁₀ concentration from 1989 through 1998 averaged 15.4 $\mu\text{g}/\text{m}^3$, ranging between 12.9 and 16.5 $\mu\text{g}/\text{m}^3$. This period (1980-1998) was associated with major growth in the surface coal mining industry. Coal production increased from about 59 mmtpy to over 308 mmtpy (an increase of over 249 mmtpy), and associated overburden production increased from 105 mmbcy to over 710 mmbcy per year (a 605 mmbcy per year increase). From 1990 through 2002, the average annual increase in coal production was 7%, while annual overburden production increased an average of 13.9% over the same period. The larger annual increase in overburden production is probably because mines are gradually moving into deeper coals as the shallower reserves are mined out.

The relatively flat trend in particulate emissions from 1980 through 1998 is due in large part to the Wyoming air quality program that requires BACT control measures at all permitted facilities. These control measures include watering and chemical treatment of roads, limiting the amount of area disturbed, temporary revegetating disturbed areas to reduce wind erosion, and timely final reclamation.

The average annual TSP concentration increased from 33.9 $\mu\text{g}/\text{m}^3$ in 1998 to 55.3 $\mu\text{g}/\text{m}^3$ in 1999 and 57.5 $\mu\text{g}/\text{m}^3$ in 2001. The 2002 average annual TSP concentration was 56.0 $\mu\text{g}/\text{m}^3$. The average annual PM₁₀ concentration increased from 15.9 $\mu\text{g}/\text{m}^3$ in 1998 to 21.6 $\mu\text{g}/\text{m}^3$ in 1999 and 27.2 $\mu\text{g}/\text{m}^3$ through 2001. In 2002, the average annual concentration was at 23.3 $\mu\text{g}/\text{m}^3$. There were no major fires in the region during this time. The increases in coal production over those four years (3.8% per year and 12.8 mmtpy over the four-year period) and associated overburden production (9.8% per year and 72 mmbcy over the four-year period) were not larger than the four-year increases during some of the previous 18 years, but the particulate concentration increase was much larger than in previous years.

Control Measures

Control of particulate emissions at most PRB mines is accomplished with a variety of measures. Emissions at coal crushing, storage, and handling facilities (point sources) are controlled with baghouse dust collection systems, passive enclosure control systems (PECs), or atomizers/foggers. These are all considered BACT controls by

WDEQ/AQD.

Fugitive emissions are also controlled with a variety of measures that the agency considers BACT. Typically, mine access roads have been paved and water trucks are used to apply water and chemical dust suppressants on all haul roads used by trucks and/or scrapers. Haul truck speed limits are imposed to further help to reduce fugitive emissions from roads. Material drop heights for shovels and draglines (bucket to truck bed or backfill) are limited to the minimum necessary to conduct the mining operations. Timely permanent and temporary revegetation of disturbed areas is used to minimize wind erosion. Fugitive emissions from the coal truck dumps are controlled with stilling sheds. Some of the mines have participated in the control of fugitive emissions from some nearby unpaved county roads by applying dust suppressants. All of these control measures are employed at the Caballo, North Antelope and Rochelle Mine.

The WDEQ/AQD is continually reviewing the data and considering regulatory options. WDEQ/AQD has increased monitoring frequency requirements and required installation of continuous monitors at all PRB coal mines. Other regulatory options may include enforcement actions such as a notice of violation resulting in a consent decree and/or modified permit condition. WDEQ/AQD is also coordinating with EPA to develop additional monitoring requirements in CBNG development areas, high PM₁₀ mitigation action plans in permits, and additional mitigation measures under the State Implementation Plan.

Some of the coal mines are actively participating in a dust control coalition formed to help address dust from more than 20 miles of regional county roads. The coalition includes the Campbell County Commission and several regional CBNG and oil producing companies as well as the coal mine operators. The coalition has used chemical treatments to control dust as well as closing roads where appropriate or necessary and rebuilding existing roads to higher specifications.

Other operational control measures that WDEQ/AQD may require at specific mines when exceedances occur include, but are not limited to, watering inactive areas and problem areas; relocating overburden truck-dumping operations; deferring blasting; curtailing topsoil stripping, reclamation dozer operations, and/or production operations; requiring windrows in areas stripped of topsoil; requiring treatment of windrow areas with chemical dust suppressants; interseeding of topsoil stockpiles, and soil stabilization. The mines are experimenting with dust control treatments, including magnesium chloride, surfactants, and petroleum-based products. In addition, WDEQ/AQD may require additional monitoring, action levels based on continuous monitoring, expedited reporting of monitored exceedances, detailed reporting of contributing factors (meteorological conditions, control steps implemented) for monitored exceedances, and continual evaluation of activity plans when exceedances are monitored at surface coal mines.

3.1.5.4 PRB - Historical Ambient Air Quality: NO₂

Regional

NO₂ was monitored from 1975 through 1983 in Gillette and from March 1996 through April 1997 at four locations in the PRB. Table 3.1-4 summarizes the results of that monitoring. Beginning in 2001 the coal industry in cooperation with WDEQ/AQD installed a network of NO₂ monitors in the PRB. Annual data from 2001 through 2004 from this regional network are summarized in Table 3.1-5.

Annual NO₂ levels measured in the March 1996 to April 1997 timeframe were below applicable standards. The highest reading was 22 µg/m³ as compared to the 100 µg/m³ standard. All 2001 annual mean NO₂ concentrations are well below the standards of 100 µg/m³.

**TABLE 3.1-4
ANNUAL AMBIENT NO₂ CONCENTRATION DATA**

Site	Gillette	Black Thunder Mine	Belle Ayr Mine	Bill
Year	Percent of Standard ¹			
1975	6			
1976	4			1
1977	4			5
1978	11			
1979	11			
1980	12			
1981	14			
1982	11			
1983 ²	17			
1996 ³	16	16	22	22

¹Based on arithmetic averaging of data.

²Monitoring discontinued December 1983, reactivated March 1996 to April 1997.

³Arithmetic average - actual sampling ran from March 1996 to April 1997.

*Inadequate number of samples for a valid annual average.

Source: McVehil-Monnett 1997

Site Specific

As discussed above, NO₂ monitoring results are available from several sites in the PRB. The Gillette, Black Thunder Mine and Belle Ayr monitoring sites are located in proximity of the offered and selected tracts. The Gillette monitor is located approximately 7 miles south of the South Sand Channel tract (#7) at the Rawhide Mine. The Belle Ayr Mine is located approximately 3 miles southeast of the Gold Mine Draw tract, and the Caballo West tract (#8). The Black Thunder Mine is located approximately 5 miles north of the NARM tracts (#1-6). The Bill site is located approximately 20 miles south of the NARM tracts (#1-6).

TABLE 3.1-5

2001 - 2004 AMBIENT NO₂ CONCENTRATION DATA

Monitor	2001 Annual Mean NO₂ Concentration (µg/m³)^{1,2}	2002 Annual Mean NO₂ Concentration (µg/m³)^{3,4}	2003 Annual Mean NO₂ Concentration (µg/m³)⁵	2004 Annual Mean NO₂ Concentration (µg/m³)⁵
Antelope Mine	7	6	4	4
Belle Ayr Mine	14	14	7	7
Black Thunder Mine	5*	6		
15 Mi. SSW of Gillette ⁶			7	5
TBNG	6**	3	3	2

* Data for the 3rd quarter is questionable; therefore, it was not used in determining the annual mean for the site.
 ** Data for May through December 2001. Monitor was not operational until May 2, 2001.

¹Mine Data (WDEQ/AQD 2002)
²TBNG Site (ARS 2002)
³Mine Data (WDEQ/AQD 2003a)
⁴TBNG Site (ARS 2003)
⁵EPA AirData website (EPA 2005)
⁶Monitor became operational in July, 2003 and is located approximately 15 miles SSW of Gillette, WY.

Control Measures

All three mines included in this analysis have implemented programs designed to control or limit public exposure to intermittent, short-term NO₂ releases associated with blasting and they all comply with the blasting plan publication and notification requirements of their respective Permits to Mine issued by WDEQ/LQD. To date, there

have not been any reported events of public exposure to blasting clouds or NO₂ releases at the Caballo, Rawhide or North Antelope Rochelle mines.

Some of the mines in the PRB have implemented programs designed to control/limit public exposure to the intermittent, short-term NO₂ releases associated with blasting. All mines comply with the blasting plan publication and notification requirements associated with the permits to mine issued by WDEQ/LQD.

Voluntary measures that have been instituted by some mines include:

- telephoning neighbors and workers in the general area of the mine prior to large blasts;
- monitoring weather and atmospheric conditions prior to the decision to detonate a large blast;
- minimizing blast size to the extent possible; and
- posting signs on major public roads that enter the general mine area and on all locked gates accessing the active mine area.

Black Thunder Mine received several reports of public exposure to NO₂ from blasting prior to 2001. Measures to prevent future such incidences have been instituted at Black Thunder Mine when large overburden blasts are planned. These measures are required by permit and include:

- notification of neighbors and workers in the general area of the mine prior to the blast;
- blast detonation between 12:00 p.m. and 3:00 p.m. whenever possible to avoid temperature inversions and minimize inconvenience to neighbors;
- monitoring of weather and atmospheric conditions prior to the decision to detonate a blast;
- posting of signs on major public roads that enter the general mine area and on all locked gates accessing the active mine area; and
- closing public roads when appropriate to protect the public.

Mine operators in the eastern PRB have also been working with blasting agent manufacturers to reduce NO_x emissions by changing the size of the blasts and using different blasting agents, mixtures, and additives. Operators have tried adding substances like microspheres and rice hulls, using different blends of ANFO and slurries and gels, and using electronic detonation systems that can vary shot timing, different shot hole patterns, and plastic shot hole liners. No one single procedure or variation

has proven consistently successful due to the numerous factors that are believed to contribute to the production of NO₂. The most successful control measure has been reducing the size of the cast blasting shots. (Rick Chancellor 2003).

3.1.5.5 PRB - Air Quality Related Values

Air quality related values (AQRVs), including the potential air pollutant effects on visibility and the acidification of lakes and streams, are applied to PSD Class I and sensitive Class II areas. The land management agency responsible for the Class I area sets a level of acceptable change (LAC) for each AQRV. The AQRVs reflect the land management agency's policy and are not legally enforceable standards.

Visibility

Potential impacts to visibility were considered at 29 PSD Class I and sensitive Class II areas near the PRB. Table 3.1-2 shows the nearest distances from the sensitive receptor areas to each of the three mines included in this analysis.

Visibility can be defined as the distance one can see and the ability to perceive color, contrast, and detail. Fine particulate matter (PM_{2.5}) is the main cause of visibility impairment. Visual range, one of several ways to express visibility, is the furthest distance a person can see a landscape feature. Maximum visual range in the western United States would be about 140 miles.

Visibility impairment is expressed in terms of deciview (dv). The dv index was developed as a linear perceived visual change (Pitchford and Malm 1994) and is the unit of measure used in the EPA's Regional Haze Rule to achieve the national visibility goal. A change in visibility of 1.0 dv represents a "just noticeable change" by an average person under most circumstances. Increasing dv values represent proportionately larger perceived visibility impairment. Figure 3.1-3 shows annual averages for the 20% best, worst and middle visibility days at Badlands and Bridger wilderness areas from 1988 to 1998, respectively (IMPROVE 2002)¹.

Acidification of Lakes

The acidification of lakes and streams is caused by atmospheric deposition of pollutants (acid rain). Lake acidification is expressed as the change in acid neutralizing capacity (ANC) measured in microequivalents per liter (µeq/l), the lake's capacity to resist acidification from acid rain. Table 3.1-6 shows the existing ANC monitored in some mountain lakes disturbed by mining activities.

¹ Summaries are based on IMPROVE aerosol data using procedures from the EPA *Draft Guidance for Tracking Progress under the Regional Haze Rule*.

**TABLE 3.1-6
Impact of ANC of Sensitive Lakes**

Wilderness Area	Lake	Background ANC (µeq/L)	Distance from Caballo Mine (miles)	Distance from NARM (miles)	Distance from Rawhide Mine (miles)
Bridger	Black Joe	67	210	215	215
	Deep	60	210	215	215
	Hobbs	70	220	225	225
	Upper Frozen	5	210	215	215
Cloud Peak	Emerald	55.3	90	105	95
	Florence	32.7	80	95	85
Fitzpatrick	Ross	53.5	215	230	215
Popo Agie	Lower	55.5	205	210	210
	Saddlebag				

Source: ENSR 2005

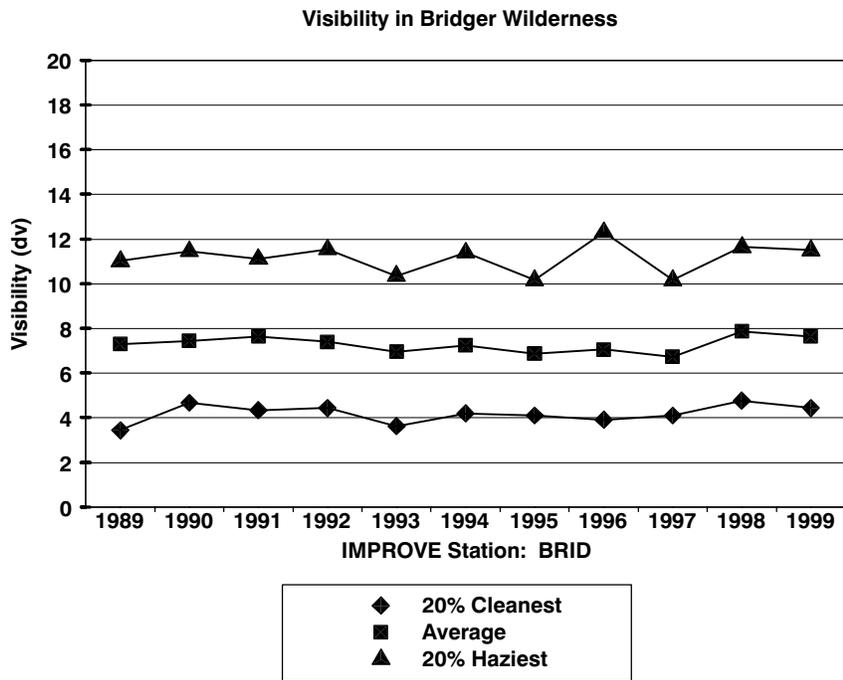
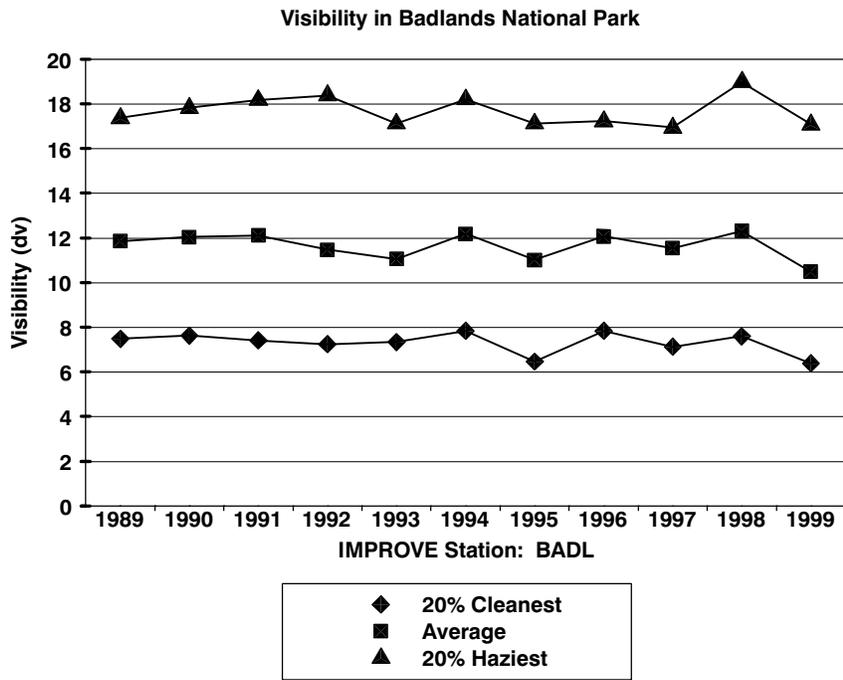


Figure 3.1-3 Visibility in the Badlands and Bridger Wilderness Areas.

3.1.6 WATER RESOURCES

3.1.6.1 Groundwater

In the PRB, there are generally three water-bearing geologic units that could be disturbed by mining. In descending order, these units are the alluvium, Wasatch Formation overburden, and the Wyodak coal seam or its local equivalent. The subcoal Fort Union Formation is used for water supply at most mines, but will not be physically disturbed by mining activities. Figure 3.1-1 shows the stratigraphic units beneath the offered tract and the selected tracts and their hydrologic properties.

Recent Alluvium

Surface drainages in the PRB are generally dry draws and the alluvium, colluvium, and slope wash deposits associated with these draws are generally thin. In addition, these unconsolidated deposits are typically of limited lateral extent precluding any significant storage and movement of groundwater. The texture of the alluvium becomes coarser with depth.

Wasatch Formation

Within the PRB this formation consists of interbedded sandstones, siltstones, and shale with occasional discontinuous coal stringers and clinker deposits. Saturated strata within the Wasatch are limited in areal extent and are typically thin, lenticular sandstones. The hydraulic connection between sandstone lenses is tenuous due to intervening shale aquitards; thus, groundwater movement through the Wasatch Formation overburden is limited. The sandstone and thin coal stringers, where saturated, will yield water to wells, and this water is largely used for stock watering. Because the saturated sandstone and coal units within the Wasatch Formation are not continuous, the Wasatch is not considered a regional aquifer.

Another geologic unit which may be considered a part of the Wasatch Formation is scoria, also called clinker or burn. It consists of Wasatch sediments that overlaid the coal at one time in the past before the coal burned naturally. These sediments were baked, fused and melted in place, then collapsed into the void left by the burned coal.

Scoria deposits can be a very permeable aquifer and can extend laterally for miles in the eastern PRB. The hydrologic function of scoria in the general area is to provide infiltration of precipitation and recharge to laterally contiguous overburden and Wyodak coal.

Recharge to the Wasatch Formation is from the infiltration of precipitation and lateral movement of water from adjacent clinker bodies. Regionally, groundwater is

discharged from the Wasatch Formation by evaporation and transpiration, by pumping wells, and by seepage into the alluvium along stream drainages. For the Wasatch Formation as a whole, the discontinuous nature of the water bearing units results in low overall hydraulic conductivity and low groundwater flow rates. Because of the varied nature of the aquifer units within the Wasatch, hydraulic properties are variable as well. Martin, et al. (1988) reported that hydraulic conductivities within the Wasatch ranged from 10^4 ft/day to 10^2 ft/day. The geometric mean hydraulic conductivity based on 203 tests was 0.2 ft/day. The geometric mean hydraulic conductivity from 70 aquifer tests using wells completed in sandstone in the Wasatch overburden was 0.35 ft/day, while that from 63 aquifer tests completed in siltstone and claystone in the Wasatch overburden was 0.007 ft/day (Rehm et al. 1980).

Water quality in the Wasatch Formation is generally poor, with total dissolved solids (TDS) concentrations ranging from approximately 1,800 mg/L to 3,400 mg/L.

Wyodak Coal

Due to its continuity, the Wyodak coal seam is considered a regional aquifer within the PRB. In some areas, the coal contains a parting, which divides the seam into two separate mineable seams. Despite the occurrence of separate seams, the Wyodak coal is considered a single aquifer in the general analysis area.

Prior to mining, the direction of groundwater flow within the coal aquifer was generally from recharge areas near the outcrop and burn zone into the basin, following the dip of the coal. Water-level data collected and presented in the GAGMO 20-year report (Hydro Engineering 2001) indicate that the groundwater flow directions have been influenced by mining and CBNG activities throughout the PRB.

Subcoal Fort Union Formation

The subcoal Fort Union Formation can be divided into three hydrologic units: the Tongue River aquifer, the Lebo Member, and the Tullock aquifer (Law 1976). The hydrologic units below the Wyodak coal are not directly disturbed by mining, but many mines use them for water supply wells. In a few cases there have been drawdowns in the subcoal aquifer due to leakage into mine pits, dewatering, and CBNG development. The Tongue River aquifer consists of lenticular fine-grained shale and sandstone. The Lebo Member, also referred to as the Lebo Confining Layer, is typically more fine-grained than the other two members and generally retards the movement of water (Lewis and Hotchkiss 1981). The Tullock aquifer consists of discontinuous lenses of sandstone separated by interbedded shale and siltstone. Transmissivity is the product of an aquifer's hydraulic conductivity or permeability times the thickness of the aquifer. It is commonly used when discussing the hydraulic properties of the Fort Union Formation, where wells are completed by exposing many discrete sand lenses to the well bore.

Transmissivities are generally higher in the deeper Tullock aquifer than in the Tongue River or Lebo, and many mines in the PRB have water-supply wells completed in this interval (Martin et al. 1988). The average transmissivity for this member as reported by OSM (1984) is 290 ft² per day. The water quality of the Fort Union Formation is generally good. Water from this aquifer is typically of the sodium bicarbonate type.

Lance and Fox Hills Formations

Underlying the Fort Union Formation is the Lance Formation of Cretaceous age. At the base of the Lance Formation is the Fox Hills Sandstone.

3.1.6.2 Surface Water

Typical streamflow events frequently result from snowmelt during the late winter and early spring with flow events are closely reflective of precipitation patterns. Although peak discharges from such events are generally small, the duration and therefore percentage of annual runoff volume can be considerable. During the spring, both rain and snow storms increase soil moisture, hence decreasing infiltration capacity. Subsequent rainstorms can result in both large runoff volumes and high peak discharges. The surface water quality varies with streamflow rate; the higher the flow rate, the lower the TDS concentration but the higher the suspended solids concentration.

3.1.7 ALLUVIAL VALLEY FLOORS (AVFS)

WDEQ regulations define AVFs as unconsolidated stream laid deposits where water availability is sufficient for subirrigation or flood irrigation agricultural activities. Prior to leasing and mining, AVFs must be identified because SMCRA restricts mining activities that affect AVFs that are determined to be significant to agriculture. Impacts to designated AVFs are generally not permitted if the AVF is determined to be significant to agriculture. If the AVF is determined not to be significant to agriculture, or if the permit to affect the AVF was issued prior to the effective date of SMCRA, the AVF can be disturbed during mining but must be restored as part of the reclamation process. The determination of significance to agriculture is made by WDEQ/LQD, and it is based on specific calculations related to the production of crops or forage on the AVF and the size of the existing agricultural operations on the land of which the AVF is a part.

3.1.8 WETLANDS

“Waters of the US” is a collective term for all areas subject to regulation by the Corps of Engineers (COE) (Section 404 of the Clean Water Act). “Waters of the US” include special aquatic sites, wetlands, and jurisdictional wetlands. Special aquatic sites are large or small geographic areas that possess special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values (40 CFR 230.3). Wetlands are a type of *special aquatic site*, which includes those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Wetlands generally include swamps, marshes, bogs, and similar areas (33 CFR 328.3(a)(7)(b)). Jurisdictional wetlands are defined by 33 CFR 328.1 and .2 as “those wetlands which are within the extent of COE regulatory review.” They must contain three components: hydric soils, a dominance of hydrophytic plants, and wetland hydrology. As the result of a recent Supreme Court ruling (*Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers, January 9, 2001*) non-navigable, isolated intrastate wetlands (playas) and other waters of the US are not considered jurisdictional. Navigable, non-isolated wetlands and other waters of the US are still considered jurisdictional by the COE.

Many wetland scientists consider areas that contain only one of the three criteria listed above as functional wetlands. The FWS used this categorization in producing the National Wetland Inventory (NWI) maps. These maps were produced using aerial photo interpretation with limited field verification.

The presence of jurisdictional wetlands on a mine property does not preclude mining. Jurisdictional wetlands must be identified and special permitting procedures are required to assure that after mining there will be no net loss of wetlands. A wetland delineation must be completed according to approved procedures (COE 1987) and submitted to the COE for verification as to the amounts and types of jurisdictional wetlands present. In Wyoming, once the delineation has been verified, it becomes a part of the mine permit document. The reclamation plan is revised to incorporate at least an equal type and number of jurisdictional wetlands.

3.1.9 CULTURAL RESOURCES

Cultural resources, protected under the National Historic Preservation Act of 1966, are the nonrenewable remains of past human activity. The PRB appears to have been inhabited by aboriginal hunting and gathering people for more than 11,000 years. Throughout the prehistoric past, highly mobile hunters and gatherers who exploited a wide variety of resources used the area.

The general chronology for aboriginal occupation (dated as years before present [B.P.]) is:

- the Paleoindian period (11,000-7,500 years B.P.),
- the Archaic period (7,500-1,800 years B.P.),
- the Prehistoric period (1,800-400 years B.P.),
- the Protohistoric period (400-200 years B.P.), and
- the Historic period (200-120 years B.P.).

The Paleoindian period includes a series of cultural complexes identified by distinctive large projectile points (spear points) often associated with the remains of large, now-extinct mammals (mammoth, bison, camel, etc.). The Archaic period is characterized by a range of smaller side-notched, stemmed, or corner-notched projectile points and by more generalized subsistence pursuits including gathering plants. This lifeway continued to the late Prehistoric period, which is marked by a technological change from dart projectiles to the bow and arrow and by the appearance of ceramics. During the Archaic and late Prehistoric periods, the PRB was occupied by small bands of hunters and gatherers whose movements were determined largely by seasonal and environmental changes that influenced the occurrence of subsistence resources (BLM 1979).

Protohistoric and early Historic sites are found in the PRB, including rare historic trade goods, sites, and routes associated with early trappers and military expeditions, and early ranching attempts dating to the 1880s. A few small coal mining sites also exist.

A Class III cultural resources survey is a professionally conducted, intensive inventory of a target area, designed to locate all cultural properties that have surface and exposed profile indications. Cultural properties are recorded and sufficient information collected on them to allow evaluation for possible inclusion in the National Register of Historic Places (NRHP). That determination is made by the managing federal agency in consultation with State Historic Preservation Office (SHPO). Consultation with SHPO must be completed before the MLA mining plan is approved. Until consultation with SHPO has occurred and agreement regarding NRHP eligibility has been reached, all sites should be protected from disturbance.

Once a Class III survey is completed, site-specific testing or limited excavation is used, if necessary, to gather additional data which will: 1) determine the final evaluation status of a site and/or 2) form the basis of additional work that will be conducted during implementation of a treatment plan if the site is eligible for the NRHP. A treatment plan is developed for those sites that are eligible for the NRHP and are within the area of potential effect. Treatment plans are implemented before mining and can include such mitigating measures as avoidance (if possible), large-scale excavation, complete recording, historic American building survey/historic American engineering record documentation, archival research, and other acceptable scientific practices.

3.1.10 NATIVE AMERICAN CONCERNS

Native American heritage sites are classified as prehistoric or historic. Some may be being used as offering sites and fasting or vision quest sites, and selected rock art sites.

Other sites of cultural interest and importance may include rock art sites, stone circles and various rock features, fortifications or battle sites, burials, as well as locations that are sacred or part of the oral history and heritage that have no man-made features. To date, no Native American sacred sites in the general analysis area have been documented. However, the position of the area between mountains considered sacred by various Native American cultures (the Big Horn Mountains to the west, the Black Hills, and Devils Tower to the east) creates the possibility of existing locations which may have special religious or heritage significance to Native American groups.

Native American tribes were consulted at a general level in 1995-1996 as part of an effort to update the BLM Buffalo RMP. Tribes that have been potentially identified as having concerns about actions in the PRB include: the Crow, Northern Cheyenne, Shoshone, Arapaho, Oglala Lakota, Rosebud Sioux, Flandreau Santee Sioux, Santee Sioux, Crow Creek Sioux, Lower Brule Sioux, Standing Rock Sioux, and Cheyenne River Sioux.

3.1.11 PALEONTOLOGICAL RESOURCES

The formations exposed on the surface of the PRB are the sedimentary Eocene Wasatch and Paleocene Fort Union formations, which are both known to contain fossil remains. Some paleontological surveys have been conducted in the PRB. Vertebrate fossils that have been described from the Wasatch Formation include mammals such as early horses, tapiroids, condylarths, primates, insectivores, marsupials, creodonts, carnivores and multituberculates; reptiles such as crocodilians, alligators, lizards, and turtles; birds, eggs, amphibians, fish, plants, and nonmarine invertebrates such as mollusks and ostracods. The Fort Union also contains fossils of plants, reptiles, fish, amphibians, and mammals.

3.1.12 VISUAL RESOURCES

Visual sensitivity levels are determined by people's concern for what they see and the frequency of travel through an area. Common throughout the analysis area are landscapes that include rolling sagebrush and short-grass prairie. Existing surface mines form a somewhat continuous band on the east side of US Highway 14-16 north of Gillette. Other man-made intrusions include ranching activities (fences, homesteads, and livestock), oil and gas development (pumpjacks, pipeline right of ways, CBNG well shelters, and CBNG compressor stations), transportation facilities (roads and railroads) and electric power transmission lines. The natural scenic quality in the immediate lease area is relatively low because of this development and the existing surface coal mining operations.

For management purposes, BLM evaluated the visual resources on lands under its jurisdiction in the 1985 Buffalo RMP. The inventoried lands were classified into visual resource management (VRM) classes as follows:

- Class I - Natural ecologic changes and very limited management activity is allowed. Any contrast (activity) within this class must not attract attention.
- Class II - Changes in any of the basic elements (form, line, color, texture) caused by an activity should not be evident in the landscape.
- Class III - Contrasts to the basic elements caused by an activity are evident but should remain subordinate to the existing landscape.
- Class IV - Activity attracts attention and is a dominant feature of the landscape in terms of scale.
- Class V - This classification is applied to areas where the natural character of the landscape has been disturbed up to a point where rehabilitation is needed to bring it up to the level of one of the other four classifications.

3.1.13 NOISE

Existing noise sources in the vicinity of the Caballo, North Rochelle and Rawhide Mines include coal mining activities, traffic on nearby roads, rail traffic, wind, and CBNG compressor stations. Noise originating from CBNG development equipment (e.g. drilling rigs and construction vehicles) is apparent locally over the short term (i.e., 30 to 60 days) where well drilling and associated construction activities are occurring. However, if the drilling and construction sites are sufficiently widespread, then the elevated levels of noise generated from each site should not overlap in time or space with noise from other sites. Long-term noise from the ongoing development of CBNG resources is associated with the new compressor stations.

Mining activities are characterized by noise levels of 85-95 dB(A) at 50 ft. from actual mining operations and activities (BLM 1992b). The unit of measure used to represent levels (decibels) using the A-weighted scale is dB(A). It is a measure designed to simulate human hearing by placing less emphasis on lower frequency noise because the human ear does not perceive sounds at low frequency in the same manner as sounds at higher frequencies. Figure 3.1-4 present noise levels associated with some commonly heard sounds.

	HOW IT FEELS	EQUIVALENT SOUNDS	DECIBELS	EQUIVALENT SOUNDS	HOW IT SOUNDS
↑ Danger to hearing	Near permanent damage level from short exposures	50 hp siren (100 ft)	130	Jackhammer	135 dB(A)
		Jet engine (75 ft)		Chainsaw	Approx. 64 times as loud as 75dB(A)
	Pain to ears	Turbo-fan jet at takeoff power (100ft)	120	Fire cracker (15 ft.)	125 dB(A)
		Scraper-loader		Rock and roll band	Approx. 32 times as loud as 75dB(A)
	Uncomfortably loud	Jet fly over (1000 ft)	110	Unmuffled motor bike (2-3 ft.)	115 dB(A)
		Noisy newspaper press		Car horn	Approx. 16 times as loud as 75dB(A)
	Discomfort threshold	Air compressor (20 ft)	100	Unmuffled cycle (25 ft.)	105 dB(A)
		Power lawnmower		Garbage trucks and city buses	Approx. 8 times as loud as 75dB(A)
	Very loud	Steady flow of freeway traffic	90	Diesel truck (25 ft.)	95 dB(A)
		10-HP outboard motor		Garbage disposal	Approx. 4 times as loud as 75dB(A)
Conversation stops	Automatic dishwasher	80	Food blender	85 dB(A)	
	Vacuum cleaner		Muffled jet ski (50 ft.)	Approx. 2 times as loud as 75dB(A)	
Intolerable for phone use	Window air conditioner outside at 2 ft.	70	Passenger car 65 mph (25 ft)	75dB(A)	
	Window air conditioner in room		Busy downtown area	55 dB(A)	
Extra auditory physiological effects	Occasional private auto at 100 ft.	60	Normal conversation	Approx. 1/4 as loud as 75dB(A)	
	Quiet home during evening		Bird calls	45 dB(A)	
Quiet	Bird calls	50	Library	Approx. 1/8 as loud as 75dB(A)	
	Library		Soft whisper 5 ft.	35 dB(A)	
Sleep interference	Soft whisper 5 ft.	40	In a quiet house at midnight	Approx. 1/16 as loud as 75dB(A)	
	Leaves rustling		30		
Very quiet		20			
			10		

Adapted From ABC's of Our Noise Codes published by Citizens Against Noise, Honolulu, Hawaii

3.1.14 TRANSPORTATION FACILITIES

The major north-south public transportation corridor is State Highway 59. There are paved county roads and numerous other improved and unimproved private local roads and accesses in the area for both public and private use.

The Gillette-Douglas rail spur, used jointly by BNSF and UP, runs north-south through the area with spur lines connected the railroad with individual mines for transporting coal from the mines to their customers. The DM&E Railroad is presently proposing expansion into Wyoming. Although the specific route is still under consideration, the tracks would terminate at the southernmost mines of the Powder River Basin.

There are numerous oil and gas pipelines, power lines, telephone lines and ROWs near the Caballo, Rawhide and North Antelope Rochelle Mines.

3.1.15 SOCIOECONOMICS

The social and economic study area for the proposed project involves primarily Campbell County and the cities of Gillette and Wright. The community of Gillette would most likely attract the majority of any new residents due to its current population level and the availability of services and shopping amenities.

A comprehensive socioeconomic profile of the Powder River Basin area, including Campbell and Converse counties was prepared in 2005 for the BLM under contract by ENSR as part of the Powder River Basin Coal Review. (ENSR 2005b) Some of the discussion below is from the ENSR report. Additional data came from the Wyoming Department of Commerce, Wyoming Division of Economic Analysis, Wyoming Department of Employment, Wyoming Economic Development Office, and personal communications with local community development staff.

3.1.15.1 Population

As in many rural areas of the West, population in the PRB tends to be concentrated in a small number of communities. The largest communities and their respective estimated 2003 populations include: Campbell County – Gillette (21,840) and Wright (1,414); Converse County – Douglas (5,398) and Glenrock (2,274) as shown in Table 3.1.7.

Annual coal production in the PRB has increased by nearly 500 percent since 1980, accompanied by expanded mine service and rail transportation capacity, stimulating population growth. More recently, the PRB has seen renewed population growth, primarily linked to coal bed natural gas (CBNG) development. Population estimates for 2003 indicate a total population for Campbell County of 36,240, a 7.5% increase. It is estimated that the population of Converse County increased by 2.3%.

**Table 3.1.7
Campbell and Converse County Census Data**

Location	Census 1990	Census 2000	Estimate 2003	Change from 2000 to 2003	
				Number	Percentage
Campbell County	29,370	33,698	36,240	2,542	7.5
Converse County	11,128	12,052	12,330	278	2.3
Source: ENSR 2005					

3.1.15.2 Economic Conditions

Employment and the Economic Base

Energy resource development since 1970 has resulted in substantial economic expansion across the PRB. Total employment expanded by 156 percent as 38,948 net new jobs were added between 1970 and 2002. Nearly half of the net job gain occurred in Campbell County, where total employment increased from 6,026 jobs in 1970 to 25,453 jobs in 2002. Strong gains also were posted in Converse County (4,323 jobs).

The economic stimulus associated with the gains in mining and CBNG employment and the long-term population growth triggered secondary job gains in construction, trade, services, and government. In 2002, business and consumer services accounted for 55.5 percent of all jobs in the region, while mining and government accounted for 10.7 percent and 14.5 percent of all jobs, respectively. Farm employment in the region, as a share of total employment, declined from 14.3 percent in 1970 to 5.0 percent in 2002. However, that shift is primarily due to growth in non-farm employment rather than declines in farming, as total farm employment in the PRB recorded a net decline of only 333 jobs, from 3,571 to 3,238.

Labor Market Conditions

Labor market conditions in the PRB reflect a generally healthy economy, with average annual county unemployment rates between 3.2 percent and 4.8 percent in 2003. Converse County registered the highest unemployment rate of 4.8 percent. Statewide and national unemployment rates for the period were 4.4 percent and 6.0 percent, respectively.

Personal Income

A benefit associated with energy resource development, whether it is mineral mining or oil and gas development, is wages and salaries that are among the highest in the state. In terms of total personal income, Campbell County leads the six-county region with

\$1.093 billion in 2002. Sheridan County residents recorded aggregate personal income of \$878 million in 2002. Total personal income in the other counties was substantially lower, ranging from \$177.8 million in Crook County to \$347.8 million in Converse County.

3.1.15.3 Housing

While the population grew by 55 percent in the 1970s, the housing stock in the study area grew by almost 78 percent. Housing growth was especially rapid during the 1970s in Campbell County, where population grew by 88 percent and the housing stock grew by 140 percent. In 2000, the housing inventory in Campbell County was 13,288 units and 5,669 units in Converse County. (U.S. Census Bureau 2002.)

This expansion in housing supply, combined with the slowdown in the rate of population growth, produced double-digit vacancy rates for rental housing in the late 1980s and early 1990s. At the same time, vacancy rates among ownership housing remained tight. After growth resumed in the mid-1990s, most county-level vacancy rates for ownership units were at or below the state levels in 2000. Vacancy rates for rental units declined even more sharply. By 2000, rental vacancy rates in Campbell County were below the state average and were well below the average in Johnson County and Sheridan County.

At the end of 2003, monthly rental costs in Campbell County averaged \$707 per month for a house, \$590 per month for a mobile home on a lot, \$563 per month for an apartment, and \$228 per month for a mobile home lot. The average sale price of a home in 2002 was \$133,482 in Campbell County. Permits for 400 housing units were issued in Campbell County from 1998 through 2002.

3.1.15.4 Public Education

The Campbell County School District #1 (CCSD #1) in Gillette enrolled 7,368 students in the 2003 school year. CCSD #1 serves the primary energy and resource development region. Trends in public school enrollment generally mirrored population trends during the period of rapid population growth. District-wide enrollment in Campbell County grew by more than 4,600 students (131 percent) between 1975 and 1985. Enrollment in Campbell #1 subsequently peaked, but remained near the record high level for nearly a decade. In recent years, the district has experienced some declines as many Campbell County households that arrived or formed during the energy boom of the 1970s are now in life-stages where their children have or will soon complete their education. Recent CBNG development has tempered, but not reversed, the trend of declining school enrollments across the region.

Seventy-two percent of CCSD #1's revenue in the 2001 school year was locally derived, the highest among the school districts in northeastern Wyoming and twice the share of

local taxes in school district revenues statewide. That local share represents the maximum requirement under the state's funding program. Furthermore, because of the total amount of revenue generated locally, Campbell #1 remits approximately \$20 million annually to the state under the "recapture" provisions of the WSFP. Those funds are used to support public education in less affluent districts.

3.1.15.5 Facilities and Services

Energy development affects local government facilities and services in several ways. In some cases, such as law enforcement and road maintenance, local governments provide direct services to energy facilities. Local governments also provide facilities and services used by employees and population associated with energy development, and most local governments receive revenues from taxes on energy facilities and production and from taxes on company and employee spending.

Although all local government facilities and services are affected by energy development, the critical facilities and services include municipal water and sewer systems, law enforcement at the county level, and hospitals. An initial screening performed as part of the ENSR PRB Coal Review revealed no critical needs or shortfalls and indicated that most providers are engaged in an ongoing long-term process to maintain and improve facilities and services to meet community needs and to comply with various regulations and standards.

3.1.15.6 Fiscal Conditions

Federal mineral royalties and state and local taxes levied on coal and other mineral production are major sources of public revenue in Wyoming. Taxes, fees, and charges levied on real estate improvements, retail trade, and other economic activity supported by energy development provide additional revenues to support public facilities and services. These revenues benefit not only those jurisdictions within which the production or activity occurs or is located, but also the federal treasury, state coffers, school districts, and local governments across the state through revenue-sharing and intergovernmental transfer mechanisms.

Coal and other minerals produced in Wyoming, regardless of ownership, are subject to ad valorem taxation by local taxing entities and the statewide levy to support public education. Wyoming currently levies a 7.0 percent severance tax on coal and many other minerals produced in the state.

Producers pay a 12.5 percent royalty to the federal treasury on the value of all surface coal production from federal leases. The size of the resource base, the rate of surface coal production in the PRB, and the predominance of federal ownership, combine to make federal mineral royalties (FMR) an important revenue source for Wyoming. Across the entire state, 90 to 95 percent of all coal production is from federal coal. FMR

also are assessed on natural gas, oil, and other minerals produced on federal leases. One-half of the FMR receipts subsequently are disbursed to the state in which the production occurred.

Table 3.1-7 summarizes 2003 taxes and royalties collected in Campbell County from 2002 production.

TABLE 3.1-8
CAMPBELL COUNTY ESTIMATED 2003 FISCAL REVENUES¹
FROM 2002 COAL PRODUCTION
(in millions)

County	Sales and Use Collections	Severance Tax Collections	Ad Valorem Tax Collections	Royalty Collections	Total Collections
Campbell	\$6.3	\$81.3	\$72.0	\$230.9	\$390.50

¹Estimated tax receipts are based on information from the Wyoming Department of Revenue and from results of a survey conducted by the Wyoming Mining Association (WMA).

3.1.15.7 Social Setting

One of the key drivers of social change in the PRB has been energy-related population growth. When the first oil boom occurred in the late 1950s, Campbell County was a relatively stable, sparsely-populated rural county. Like many places in Wyoming and throughout the rural west, Campbell County was a small, relatively homogeneous ranching community (ROMCOE 1982). The oil booms of the 1950s and 1960s brought an influx of new people. Development of coal mines, continued oil and gas drilling, and power plant construction precipitated another round of growth. In all, Campbell County population grew by almost 600 percent between 1950 and 2000.

As a result of previous booms and the magnitude and duration of population growth, newcomers are now able to more easily integrate into local communities. Today, almost any organization, committee or government body is made up of a cross-section of energy employees, ranchers, and other community members whose tenure in the community may be long or short (Bigelow 2004; Spencer 2004). Moreover, because of the turnover in the energy companies, the community has become accustomed to newcomers.

3.1.15.8 Environmental Justice

Environmental justice issues are concerned with actions that unequally affect a given segment of society because of physical location, perception, design, and noise. On February 11, 1994, Executive Order 12898, “Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations” was published in the *Federal Register* (59 FR 7629). The executive order requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations (defined as those living below the poverty level). The executive order makes it clear that its provisions apply fully to Native American populations and Native American tribes, specifically to effects on tribal lands, treaty rights, trust responsibilities, and the health and environment of Native American communities.

Communities within Campbell County, entities with interests in the area, and individuals with ties to the area all may have concerns about the presence of a coal mine within the general analysis area. Communities potentially impacted by the presence or absence of a coal mine are identified in this section of the EIS. Environmental justice concerns are usually directly associated with impacts on the natural and physical environment, but these impacts are likely to be interrelated with social and economic impacts as well. Native American access to cultural and religious sites may fall under the umbrella of environmental justice concerns if the sites are on tribal lands or treaty right has granted access to a specific location.

Compliance with Executive Order 12898 concerning environmental justice was accomplished through opportunities for the public to receive information on this EIS in conjunction with the consultation and coordination described in Chapter 5 of this document. This EA and contributing socioeconomic analysis provide a consideration of impacts with regard to disproportionately adverse impacts on minority and/or low-income groups, including Native Americans.

3.2 GOLD MINE DRAW TRACT - OFFERED

3.2.1 GENERAL SETTING

The area proposed for exchange and lease relinquishment is located within the Caballo Mine permit area which is the northernmost of the centrally located mines within the PRB and is a part of the Northern Great Plains which includes most of northeastern Wyoming (Figure 1-1). Vegetation is primarily upland grassland, croplands, pasturelands and big sagebrush. There is some surficial clinker exposed along the eastern portion of the Gold Mine Draw tract.

3.2.2 TOPOGRAPHY AND PHYSIOGRAPHY

The exchange lands are drained by tributaries of Caballo Creek which drains into the Belle Fourche River which drains into the Cheyenne River.

3.2.3 GEOLOGY

See Section 3.1.3

The Caballo Mine staff refers to the seams as the Roland (upper) and Smith (lower).

Figure 3.1-1 shows the stratigraphic relationships and hydrologic characteristics of the surface and subsurface geologic units in the PRB area. These cross sections are representative of the geology near the tract, with the primary variables being the thickness of overburden, the parting thickness between the Roland and Smith coal seams, and the surface topography. Figure 3.2-1 presents geologic cross-sections of the Gold Mine Draw exchange tract.

On the western edge of the Gold Mine Draw tract, the Roland and Smith form one mineable coal seam that is 65 feet thick at depth of approximately 140 feet. However, the seam splits into as many as four seams varying from about 20 feet to less than five feet. The top rider surfaces in eastern part of the offered lands, where clinker has formed.

3.2.3.1 Mineral Resources

See Section 3.1.3.1

There are no CBNG wells within the offered tract.

The ownership of oil and gas resources in the offered tract is discussed Section 3.3.11.

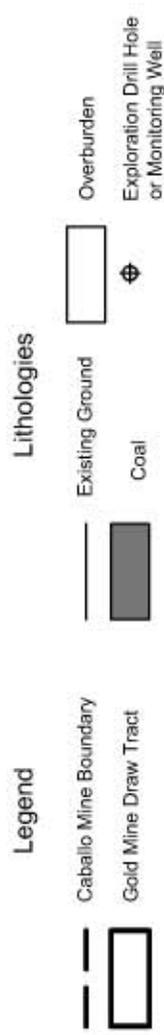
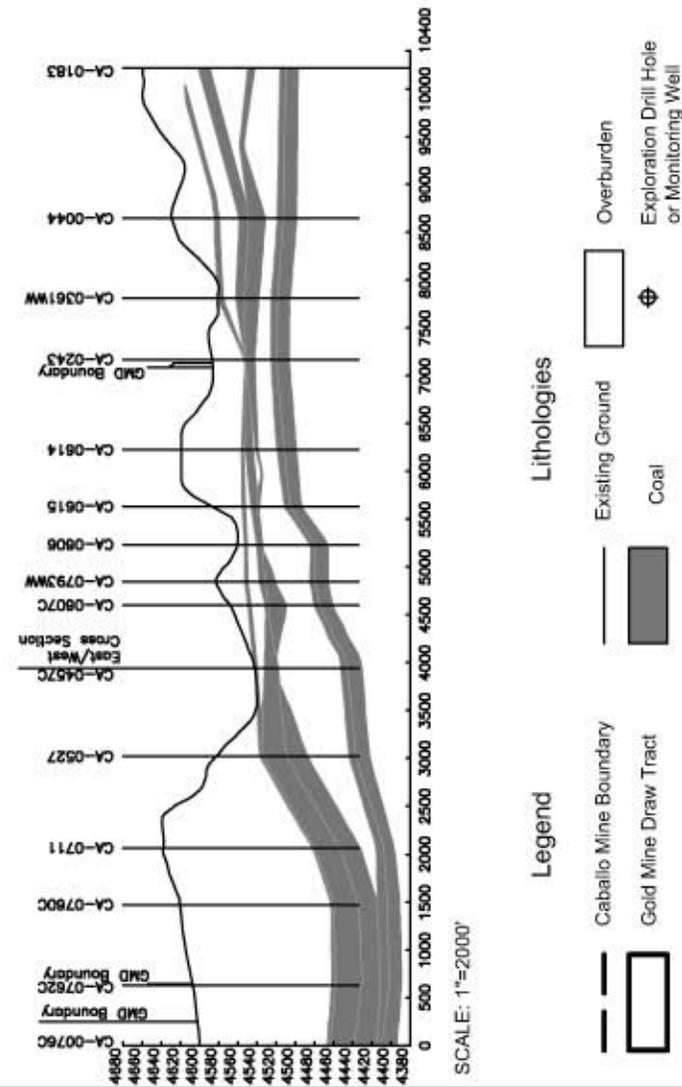
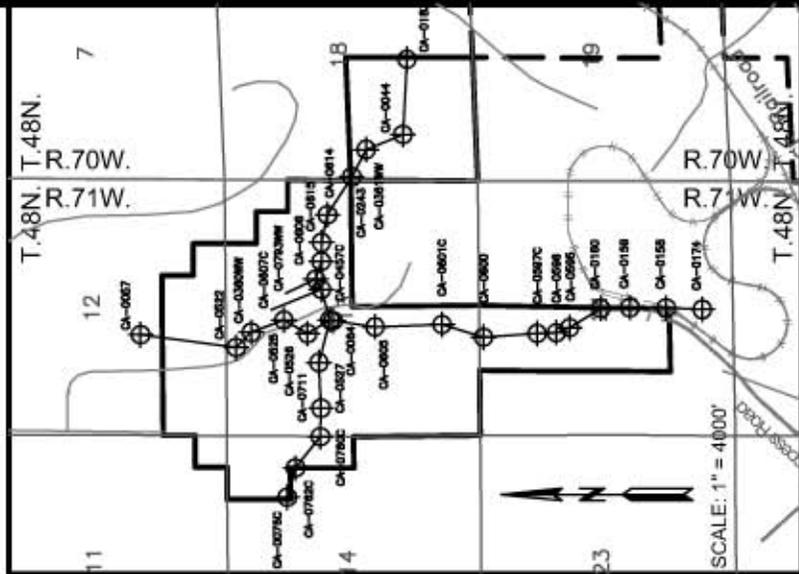
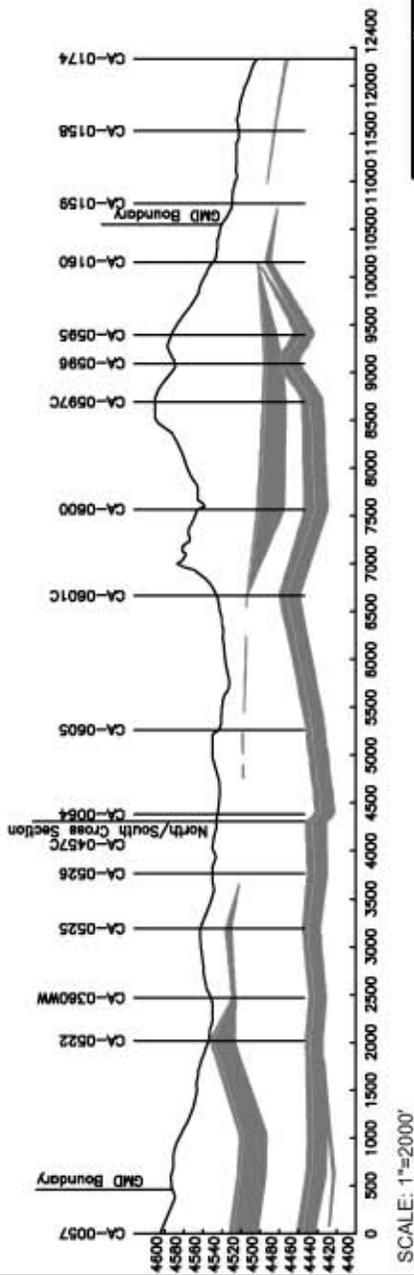


Figure 3.2-1 North-South and East-West Geologic Cross Sections, Gold Mine Draw Tract

No known uranium reserves exist on the exchange area.

Scoria is present in areas adjacent to the offered tract.

3.2.4 SOILS

The Gold Mine Draw offered tract was subjected to an order 1-2 soils survey in during the WDEQ permitting process.

The soil survey was completed to an order 1-2 resolution in accordance with WDEQ/LQD Guideline No. 1, which outlines required soils information necessary for a coal mining operation. The inventories included field sampling and observations at the requisite number of individual sites, and laboratory analysis of representative collected samples.

The following is a list of the soil series that comprise the various map units delineated on the proposed affected area associated with the Caballo Offered Lands.

- Absted clay loam, 0 to 6% slopes
- Aeric Haplaquents clay loam, 0 to 6% slopes
- Bidman loam, 0 to 7% slopes
- Briggsdale fine sandy loam, 3 to 6% slopes
- Briggsdale-Pugsley association sandy loams 3 to 15% slopes
- Cushman loam, 6 to 15% slopes
- Cushman-Bowbac association, loam, 6 to 15% slopes
- Decolney fine sandy loam, 0 to 15% slopes
- Decolney-Olney association fine sandy loams, 0 to 15% slopes
- Gaynor, silty clay, 0 to 15% slopes
- Haverson loam, 0 to 3% slopes
- Heldt very fine sandy loam, 0 to 3% slopes
- Louviers, sandy loam, 0 to 15% slopes
- Maysdorf fine sandy loam 0 to 6% slopes
- Pugsley sandy loam, 6 to 15% slopes
- Rauzi fine sandy loam, 0 to 3% slopes
- Samsil clay, 10 to 30% slopes
- Sear-Wibaux association loams, 6 to 15% slopes
- Shingle clay loam, 3 to 15% slopes
- Shingle-Rock Outcrop-Samsil association clay loam, 3 to 30% slopes
- Tassel fine sandy loam, 15 to 30% slopes
- Terry fine sandy loam, 3 to 30% slopes
- Thedlund loam, 3 to 6% slopes
- Ulm-Bidman loam, 0 to 6% slopes
- Worf loam, 3 to 15% slopes
- Worfka, clay loam, 3 to 15% slopes

According to the baseline soils studies, enough suitable soil exists for salvaging within the offered area to redistribute suitable soils to the 18 inch depth required by the Caballo Mine WDEQ permit. This area will not be mined under the proposed action therefore; the topsoil resource will not be impacted.

The soil depths and types on the Gold Mine Draw offered lands are similar to soils currently being salvaged and used for reclamation at the Caballo Mine and other mines in the PRB. The site-specific soil surveys have located hydric soils and/or inclusions of hydric soils, which are one component used in identifying wetlands. Please see Section 3.2.8 for a discussion of wetland surveys.

3.2.5 AIR QUALITY AND CLIMATE

See Section 3.1.5

3.2.5.1 Topography

The offered tract analysis area (Figure 1-1) is located in the PRB, a part of the Northern Great Plains that includes most of northeastern Wyoming. The topography is primarily rolling plains and Tablelands of moderate relief (with occasional valleys, canyons and buttes). The exchange tract is in an area consisting primarily of lowland areas and adjacent uplands along the Gold Mine Draw alluvial valley floor with an elevation ranging from 4,100 to 4,340 feet.

3.2.5.2 Climate and Meteorology

The climate in the analysis area is semi-arid, with an average annual precipitation at the Caballo Mine of about 15 inches per year. Snowfall at the Gillette 9ESE Station averaged 65 inches per year from 1961 through 2002, with most occurring in December and January. Evaporation exceeds annual precipitation, with relatively short warm summers and longer cold winters. The average daily mean temperature is around 45°F. The highest recorded hourly temperature at the mine was 104°F and the lowest was -34°F. July is the warmest month, with a mean daily temperature of 70.6°F, and January is the coldest (20°F). The average frost-free period is approximately 129 days (Caballo Coal Company 2005a).

The average annual wind speed recorded at the Caballo Mine was 10.3 mph with local variations in speed and direction due to differences in topography. Winds are predominantly from the northwest and south-southeast and tend to be strongest in the winter and spring and calmer in the summer. Wind velocity tends to increase during the day and decrease during the night. The air quality and meteorological sampling locations and associated wind rose diagrams for the Caballo Mine are shown in Figure 3.2-2.

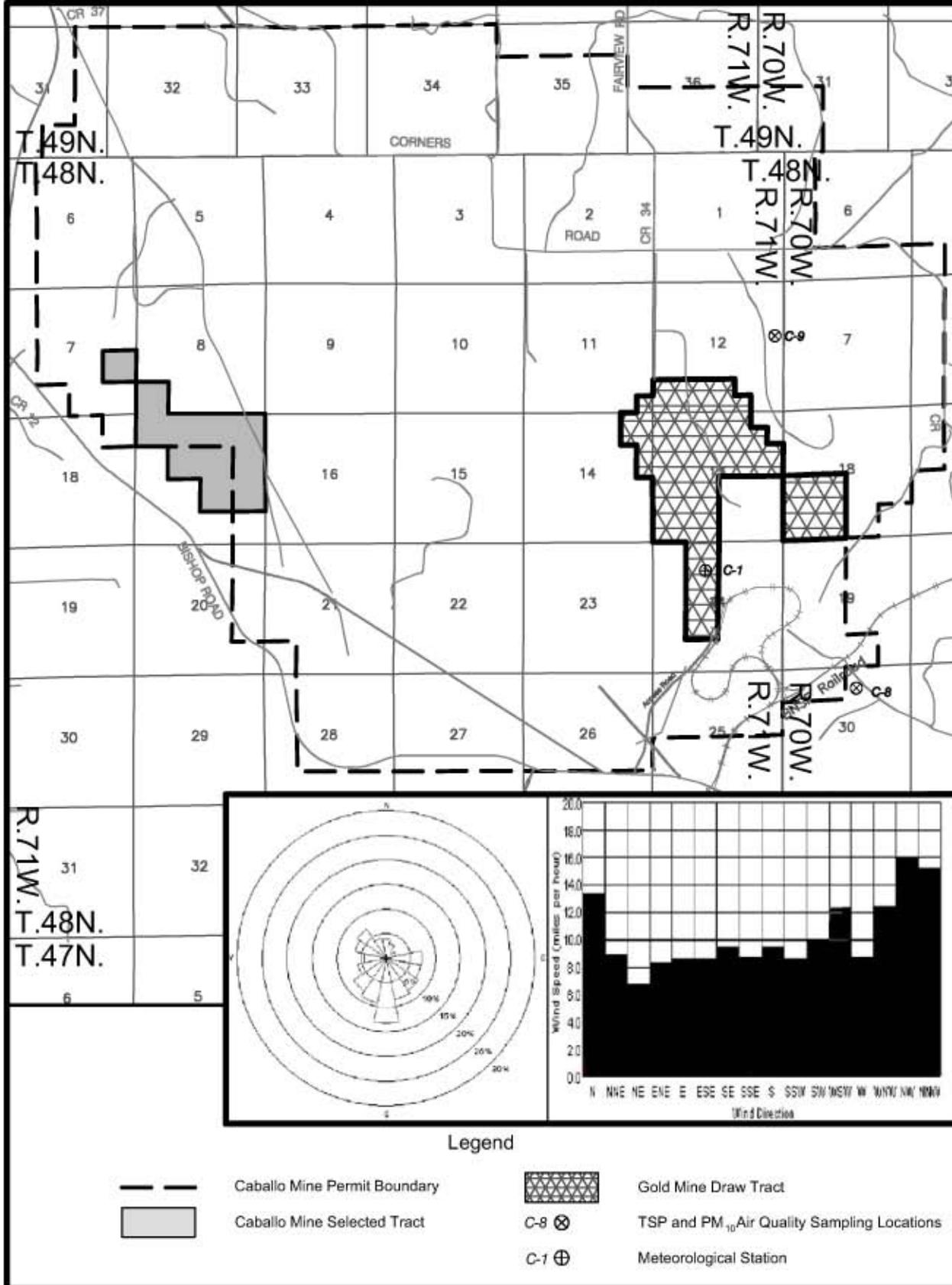


Figure 3.2-2 Wind Rose, Air Quality, and Meteorological Stations at the Caballo Mine

3.2.6 WATER RESOURCES

3.2.6.1 Groundwater

See Section 3.1.6.1

3.2.6.2 Surface Water

See Section 3.1.6.2

Gold Mine Draw flows north to south through the center of the Caballo Offered Lands. Gold Mine Draw is a typical stream for the region, and its flow events are closely reflective of precipitation patterns.

3.2.6.3 Water Rights

Records at the Wyoming State Engineer's Office (SEO) were searched for groundwater rights within a 3-mile radius of the Caballo Offered Tract. This information is required for WDEQ permitting. SEO data from a records search conducted August and December 2005 indicate there are 1356 permitted water wells within 3 miles of the offered lands, of which 20 permitted wells are within the Caballo Offered Tract. Water rights which have been abandoned or cancelled have been excluded from the search. The USGS owns one of the wells on the offered lands, while the other 19 wells are owned by coal companies.

Of the total number of wells within the search area, coal mining and oil and gas companies own 1218 wells (90%). Table C-1 in Appendix C contains a listing of the 138 non-coal or oil wells and associated water rights information.

SEO records were searched for surface water rights using the SEO's computer database. The search was conducted for surface-water rights within ½ mile of the offered lands and 3 miles downstream.

SEO records indicate 69 permitted surface water rights within the search area. Forty-four of the surface water rights are held by coal mining companies. Table C-2 of Appendix C shows a listing of the 27 non-coal mine surface water rights.

3.2.7 ALLUVIAL VALLEY FLOORS (AVFS)

See Section 3.1.7

Investigations conducted on and surrounding the Caballo Mine, including the offered tract, determined there was an AVF within the Gold Mine Draw area. The WDEQ has concurred with that finding. The declared AVF is located within the central portion of the offered tract. A detailed discussion of the AVF investigations is available in Section D-11 of the Caballo Mine WDEQ/LQD permit document. Preserving the AVF and adjacent lands is an important benefit to completing the exchange as proposed.

3.2.8 WETLANDS

See Section 3.1.8

Jurisdictional wetland inventories were conducted within the Caballo Mine permit area in 1990, 1992, 1996 and 1998. The wetlands delineations were completed in accordance with the procedures and criteria contained in the *Wetland Delineation Manual*. The consolidated delineations were subsequently approved by the COE in January, 1998. Caballo Mine then submitted an application for reauthorization and on April 4, 2002 received approval for an additional five years through April 4, 2007. A mitigation plan covering mining activities through the current permit term, which expires in 2008 has been submitted for WDEQ-LQD and COE. Approximately 8.6 acres of waters of the US have been identified within the offered area, of which 4.6 acres are jurisdictional wetlands (Figure 3.2-3). Identified jurisdictional wetlands include Riverine (2.0 acres) and Riverine/stock pond (2.6 acres). Under current mine plans, these wetlands would be avoided and not disturbed. If the exchange is completed as proposed, these wetlands will also be preserved

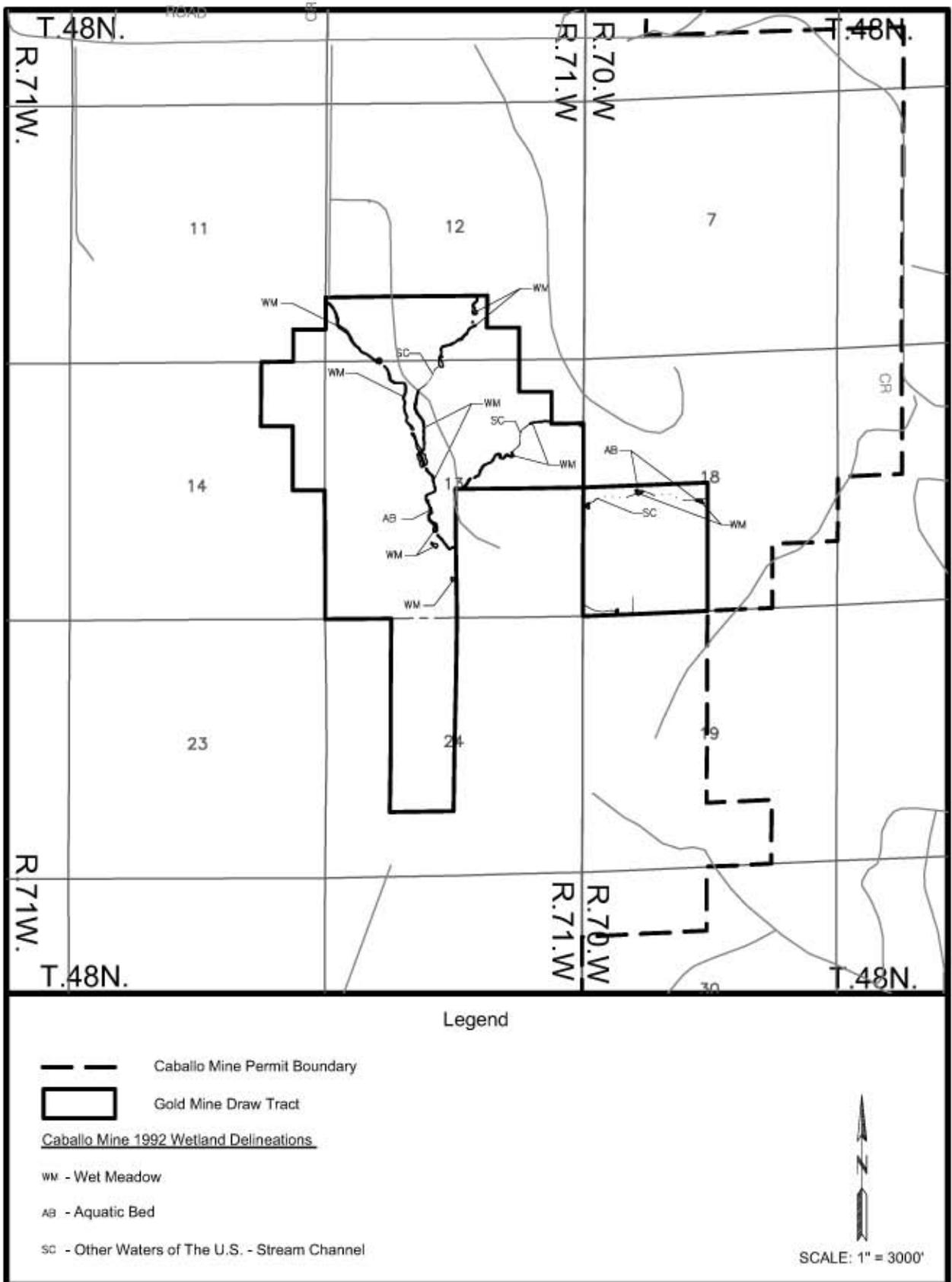


Figure 3.2-3 Wetlands Within the Gold Mine Draw Tract

3.2.9 VEGETATION

A vegetation baseline study was completed by the Caballo Mine on the lands contained within the offered area as applied for under the Proposed Action as a part of the WDEQ permitting process. The baseline study area is located within the current Caballo Mine permit area. The vegetation communities in this area were delineated, mapped, and sampled in accordance with the current WDEQ/LQD requirements. The results of the baseline studies, including the Proposed Action lands, were reviewed and approved by WDEQ/LQD as part of an earlier permit amendment. Sampling was conducted on a large enough area to include sufficient room for overburden layback and other mining needs to recover the coal under the offered tract.

A total of four native and two agricultural vegetation types have been identified and mapped within the offered area. The vegetation types include upland grassland, scoria grassland, big sagebrush, meadow, agricultural hay land, and agricultural pasture. In addition to the six vegetation communities, there are also a small number of plains cottonwood and willow trees located within the analysis area.

3.2.9.1 Vegetation Types

The Upland Grassland Type occurs on rolling upland terrain. Dominant perennial graminoids include blue grama (*Bouteloua gracilis*), needle-and-thread (*Stipa comata*), western wheatgrass (*Agropyron smithii*), and threadleaf sedge (*Carex filifolia*).

Absolute vegetative cover in the upland grassland type averages 58.2% and is dominated by graminoids which contributed 47.4%. shrubs contributed 3.3% absolute cover and forbs accounted for 4.3%.

The above-ground net productivity (ANP) ranged from 37.1 g/m² to 99.3 g/m² and averaged 63.9 g/m². Graminoids provided most of the production.

Shrub density, including half shrubs, averaged 9,783 individuals/acre. Fringed sagewort (*Artemisia frigida*) was the most frequently encountered shrub. Broom snakeweed (*Gutierrezia sarothrae*), silver sagebrush (*Artemisia cana*), Garner's saltbush (*Atriplex gardneri*), rubber rabbitbrush (*Chrysothamnus nauseosus*), granite pricklygilia (*Leptodactylon pungens*), Louisiana sagewort (*Artemisia ludoviciana*), common winterfat (*Ceratoides lanata*), and big sagebrush (*Artemisia tridentata wyomingensis*) were also present.

The Scoria Grassland Type occupies relatively rough scoria hills and ridges within the offered area. Dominant perennial grasses include bluebunch wheatgrass (*Agropyron spicatum*), needleandthread, and little bluestem (*Andropogon scoparius*). Big sagebrush occurs in draws between ridges where moisture and soil conditions are more favorable. Broom snakeweed and skunkbush sumac (*Rhus trilobata*) are scattered throughout the community. Rock cover is generally high.

Absolute vegetation cover averaged 50.2% and was dominated by graminoids (38.5%). Total ground cover averages 93.3%. Major perennial species included bluebunch wheatgrass, blue grama and needleandthread

The ANP of the scoria grassland community ranged from 31.5 g/m² to 85.9 g/m² and averaged 63.9 g/m². Graminoids accounted for 44.0 g/m². Species with the greatest productivity included bluebunch wheatgrass, threadleaf sedge, prairie junegrass (*Koeleria macrantha*) and needle-and-thread.

Shrub density averages 8922 plants per acre. Fringed sagewort and broom snakeweed were the two most frequently encountered shrubs. Other shrubs encountered include big sagebrush, rubber rabbitbrush, skunkbush sumac, Gardner's saltbush Louisiana sagewort, common winterfat, and silver sagebrush.

The Big Sagebrush Type occurs on the rolling upland terrain. Big sagebrush is generally dense with minor species such as silver sagebrush and broom snakeweed also present.

Absolute vegetative cover in the big sagebrush type averages 57%; total ground cover averages 89.2%. Graminoids contribute 38.8% followed by shrubs (8.7%), subshrubs (1.9%), and forbs with 6.5%. Dominant grass/grasslike species include, western wheatgrass, blue grama, threadleaf sedge, and prairie junegrass. Common forbs include Hood's phlox (*Phlox hoodii*), scarlet globemallow (*Sphaeralcea coccinea*), and American vetch (*Vicia americana*)

The ANP of the big sagebrush community ranged from 10.0g/m² to 138.0 g/m² and averaged 58.2g/m². Graminoids accounted for 51.8 g/m² (89%). Species with the greatest productivity included western wheatgrass, bluebunch wheatgrass, prairie junegrass and green needlegrass (*Stipa viridula*).

Shrub density averages 7,519 plants per acre. Fringed sagewort and big sagebrush were the most frequently encountered shrubs. Broom snakeweed, common winterfat, Gardner's saltbush, silver sagebrush and rubber rabbitbrush were also represented.

The Meadow Type is a variable shrub grassland community located along stream drainage bottoms that may or may not contain water and upland terraces that are rarely inundated. Silver sagebrush is the dominant shrub. Dominant perennial grasses include western wheatgrass, inland saltgrass (*Distichlis spicata*), Kentucky bluegrass (*Poa pratensis*), and prairie cordgrass (*Spartina pectinata*).

Absolute vegetative cover averages 67%; total ground cover averages 91.7%. Cover was dominated by graminoids with 53.2%. major species included western wheatgrass, inland saltgrass and Kentucky bluegrass. Silver sagebrush was the dominant shrub.

The ANP averages 180.6 g/m² but ranged from 47.5 g/m² to 111.9 g/m², most of which was provided by grasses with 160.3 g/m². Western wheatgrass, inland saltgrass,

Kentucky bluegrass and alkaligrass (*Puccinellia nuttalliana*).

An average of 10,155 shrubs per acre was determined for the meadow community. Silver sagebrush was the most frequently encountered. Big sagebrush, broom snakeweed, fringed sagewort, Gardner's saltbush, rubber rabbitbrush and other minor species were also present.

Agricultural - Pastureland Type. All agricultural pastures within the analysis area are under either moderate or high management levels. Based on the level of management, absolute vegetation cover averages 46.2%. Ground cover averages 86.6%. Graminoid species provide 39.5% absolute cover. Major perennial species included crested wheatgrass (*Agropyron cristatum*) and smooth brome (*Bromus inermis*).

The ANP ranged from 39.0 g/m² to 361.5 g/m² but averaged 122.1 g/m². Graminoids accounted for 106.6 g/m² (87%). Species contributing the most productivity included crested wheatgrass, western wheatgrass, smooth brome and alfalfa medic (*Medicago sativa*).

Within the pastureland, an average of 2,144 shrub individuals per acre was determined. Fringed sagewort was the most frequently encountered with silver sagebrush, big sagebrush, Gardner's saltbush, rubber rabbitbrush and broom snakeweed also encountered.

Agricultural - Hayland Type. The productivity of crested wheatgrass hay lands was based on Campbell County averages provide in "Agricultural Statistics" compiled by the Wyoming Crop and Livestock Reporting Service. Productivity can range from 1,000 pounds per acre on the poorest soils during poor growing seasons to 1,500 pounds per acre on good soils following a good growing season. The hay lands are often managed as hay lands/pasturelands and may often be grazed during poor growth years and following haying.

3.2.9.2 Threatened, Endangered, and Candidate Plant Species

No federally listed threatened, endangered, or candidate plant species are known to occur within the offered area. The offered area was surveyed in during baseline studies for threatened, endangered and candidate species using the *Wyoming Rare Plant Field Guide* (Thorne 1994) as their reference. Ute ladies'-tresses surveys for potential habitat and species occurrence were conducted by BKS Environmental Associates, Inc. on September 9 and October 28 2005. The October 28 survey was required because of a modification to the project area boundary. That survey indicated that there is no orchid habitat over the majority of the offered area, due to lack of an adequate water source. One small area in Gold Mine Draw tract provides suitable habitat but no orchids were identified in this area. Currently acceptable Ute ladies'-tresses survey methods and practices were utilized in the survey. All individuals who conducted the survey have received written recognition as being qualified to conduct Ute ladies'-tresses surveys

and are on the FWS's list of qualified consultants. Completing the exchange as proposed will preserve the potential habitat.

3.2.10 WILDLIFE

Background information on wildlife near the offered tract was gathered from several sources including: Caballo Mine WDEQ/LQD permit and annual reports, Wyoming Game and Fish Department (WGFD) and FWS records.

Site-specific data for the offered tract were obtained from sources including the WDEQ/LQD permit and annual reports for the Caballo Mine. The offered tract has been surveyed during annual wildlife monitoring for the Caballo Mine. Thunderbird Wildlife Consulting, Inc. (TWC), formerly Powder River Eagle Studies (PRES) have conducted annual wildlife monitoring surveys at Caballo Mine from 1993 through 2005. Their current monitoring plan complies with Appendix B of the WDEQ/LQD Coal Rules and Regulations. The study area has included the offered tract throughout TWC's monitoring timeframe. Thus, extensive wildlife data are available for the offered area. The data presented herein is from TWC's baseline and annual monitoring data.

The Caballo offered tract and adjacent area consists primarily of uplands. The topography is level to rolling, with some areas sloping to steeply sloping. Upland grassland, scoria grassland, and big sagebrush are the principal native habitat types in the offered tract. A meadow type is found in narrow bands along drainages. Two areas of agricultural pasturelands are located in the western portion of the area and hay land areas have been established along Gold Mine Draw, primarily within the area designated as an AVF. No designated critical, crucial, or unique habitats are present. Gold Mine Draw and other unnamed channels on the tract are ephemeral.

Big Game

Pronghorn (*Antilocapra Americana*) and mule deer (*Odocoileus hemionus*) are the only big game species that regularly occur on or near the analysis area. Small numbers of white-tailed deer (*Odocoileus virginianus*) have been documented quite regularly during annual surveys of the Caballo Mine permit area and adjacent lands. Elk (*Cervus elaphus*) have also been recorded in the survey area but the offered area lacks adequate cover to attract that species. (Caballo Coal Company 2005a)

The WGFD has classified the majority area as yearlong pronghorn range. The Caballo Mine is at the north end of a larger multi-mine survey area that has been surveyed each winter since 1993. Summaries of annual monitoring results are presented in the mine's annual reports to WDEQ/LQD.

The analysis area is located within the WGFD's Highlight antelope herd and is in hunt area 24. The analysis area is located within the Thunder Basin mule deer herd and deer hunt area 21.

WGFD has classified the majority of the analysis area as yearlong mule deer habitat.

The WGFD responded to BLM's scoping letter on August 30, 2005. In that letter, WGFD stated that the proposed exchange is unlikely to have large effects on the Thunder Basin mule deer and Highlight pronghorn herds as the selected tracts are adjacent to existing coal mines.

Other Mammals

A variety of small and medium-sized mammal species occur near the analyses area. These include predators and furbearers, such as coyote (*Canis latrans*), red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), and feral cats. Prey species include rodents such as mice, pocket gophers, voles, chipmunks, and lagomorphs (jackrabbits and cottontails). Surveys for prairie dog towns were conducted on the offered tract and adjacent lands. No prairie dog towns were identified within the offered tract or on adjacent lands.

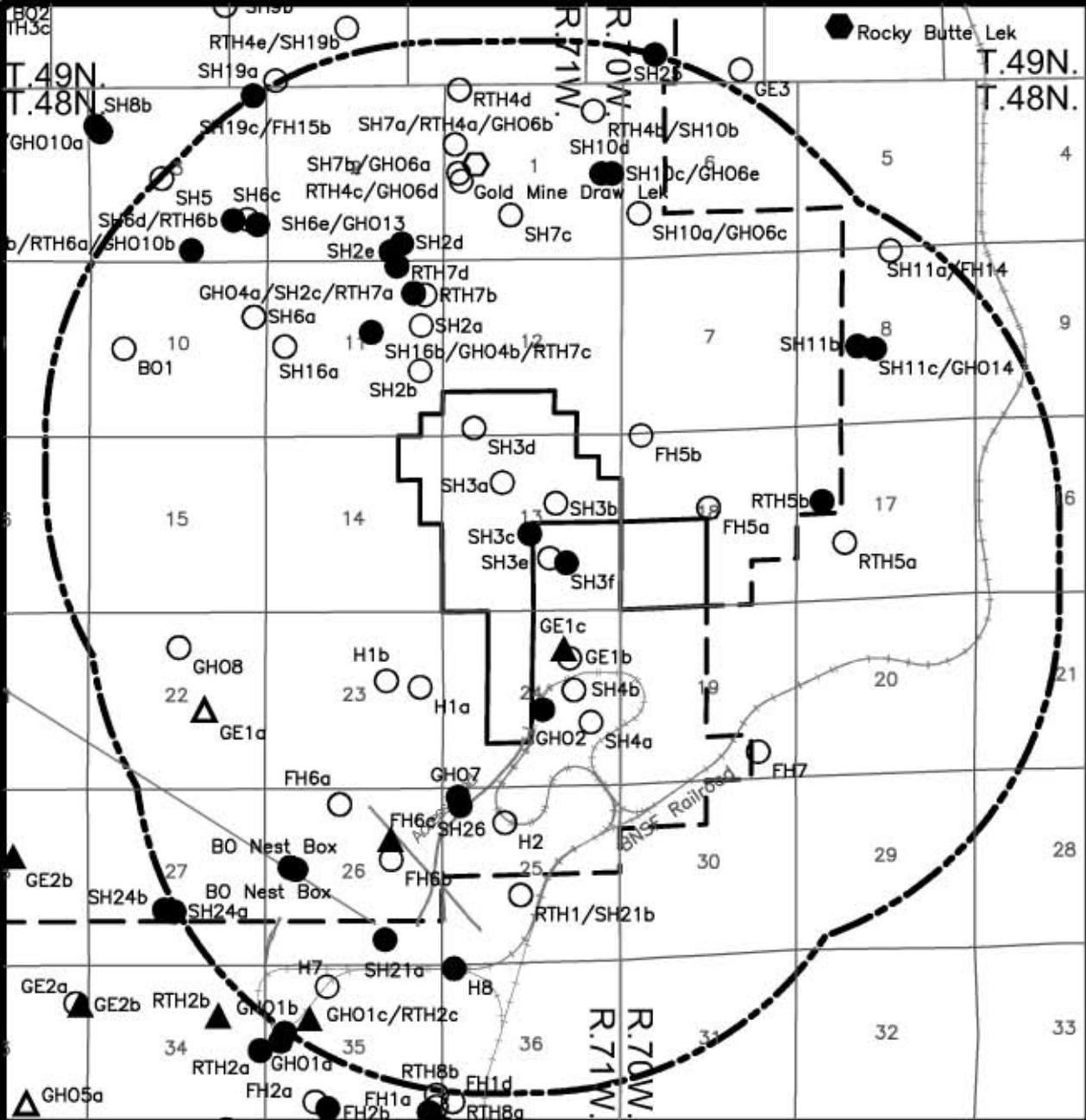
Raptors

Numerous raptor species have been observed on or adjacent to the offered tract. These species include the golden eagle (*Aquila chrysaetos*), bald eagle (*Haliaeetus leucocephalus*), Swainson's hawk (*Buteo swainsoni*), red-tailed hawk (*Buteo jamaicensis*), ferruginous hawk (*Buteo regalis*), rough-legged hawk (*Buteo lagopus*), prairie falcon (*Falco peregrinus*), American kestrel (*Falco sparverius*), turkey vulture (*Carthartes aura*), great horned owl (*Bubo virginianus*), and burrowing owl (*Athene cunicularia*). Although numerous raptor species have been observed in the offered tract, none have nested on the site since 2002 due to limited suitable habitat (cliffs and tall trees). Figure 3.2-4 shows the locations of raptor nest sites identified within or adjacent to the offered tract. Four former Swainson's hawk nests were previously identified that were since destroyed by natural causes in 2002, 1995, 1994 and prior to 1994. The nest destroyed in 1994 was rebuilt and utilized in 2002 but was inactive in 2003 and 2004. Additional information on these nests is presented in the Caballo Mine permit document and various annual reports on file at WDEQ.

Game Birds

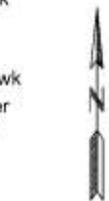
Two species of upland game birds were observed during the 2004 baseline study and are: the sage-grouse (*Centrocercus urophasianus*), and mourning doves (*Zenaida macroura*). No sage-grouse leks have been identified within the offered tract (see Figure 3.2-4).

Mourning doves (*Zenaida macroura*) were on or near the analysis area during spring and summer surveys (Caballo Coal Company 2005b). This species is a relatively common breeding bird in Campbell County.



Legend

- | | | | | | |
|--|---------------------------------------|----------------------|--------------------|-----------|------------------------|
| | Caballo Mine Permit Boundary | | Rocky Butte Lek | | Intact Rocky Butte Lek |
| | Gold Mine Draw Tract | | Gold Mine Draw Lek | | Former Sage Grouse Lek |
| | Search Boundary - EPA (2 Mile Radius) | <u>Species Codes</u> | | | |
| | Former Raptor Nest | GE | = Golden Eagle | SH | = Swainson's Hawk |
| | H2 | RTH | = Red-tailed Hawk | H | = Northern Harrier |
| | Intact Raptor Nest | GHO | = Great Horned Owl | BO | = Burrowing Owl |
| | Former Nesting Platform | FH | = Ferruginous Hawk | | |



SCALE: 1" = 5000'

Figure 3.2-4 Raptor Nest Sites, Grouse Leks, and Prairie Dog Colonies Within and Adjacent to the Gold Mine Draw Tract

Migratory Birds of Management Concern

Table 3.2-1 provides a list of the 40 migratory bird species of management concern in Wyoming that the FWS uses for reviews concerning existing and proposed coal mine leased land (FWS 2002). This listing was taken directly from the Wyoming Bird Conservation Plan (Cerovski et al. 2000.) The regional status and expected occurrence, historical observations, and breeding records on and near the offered tract for each listed species are included in Table 3.2-1.

Wyoming BLM has prepared a list of sensitive species to focus species management efforts towards maintaining habitats under a multiple use mandate. The authority for this policy and guidance comes from the ESA of 1973, as amended; Title II of the Sikes Act, as amended; the Federal Land Policy and Management Act (FLPMA) of 1976; and the Department Manual 235.1.1A., General Program Delegation, Director, BLM.

The goals of the sensitive species policy are to:

- Maintain vulnerable species and habitat components in functional BLM ecosystems.
- Ensure sensitive species are considered in land management decisions.
- Prevent a need for species listing under the ESA.
- Prioritize needed conservation work with an emphasis on habitat.

Sensitive species were listed for the BLM Buffalo Field Office within its range. Sensitive species do or could occur on or in the area of the selected tracts. Specialized habitat requirements (caves, cliffs, calcareous rock outcrops) make occupation for other sensitive species unlikely. BLM sensitive species discussions are presented in Appendix D.

Suitable nesting habitat exists in the Caballo Mine survey, which includes the offered tract, for only 15 of the 40 listed species. Those same species have been observed to nest regularly throughout the Powder River Basin (Cerovski et al. 2004 and TWC, unpublished data) and have been observed with some regularity in the vicinity of the Caballo Mine in past surveys. The remaining species could migrate through the area, however no habitats exist that might attract large concentrations of these species (Caballo Coal Company 2005b).

The following eleven listed species were observed during the 2004 monitoring conducted by TWC; the greater sage-grouse, Swainson's hawk (*Buteo swainsoni*), ferruginous hawk (*Buteo regalis*), merlin (*Falco columbarius*), bald eagle (*Haliaeetus leucocephalus*), short-eared owl (*Asio flammeus*), loggerhead shrike (*Lanius ludovicianus*), grasshopper sparrow (*Ammodramus savannarum*), Brewer's sparrow (*Spizella brewerii*), vesper sparrow (*Pooecetes gramineus*), and lark bunting (*Calamospiza melanochorys*).

TABLE 3.2-1

**REGIONAL STATUS OF 40 MIGRATORY BIRDS OF MANAGEMENT CONCERN
IN WYOMING FOR COAL MINES AND EXPECTED AND ACTUAL OCCURRENCE
ON AND WITHIN ½ MILE OF THE GOLD MINE DRAW TRACT**

Species	Seasonal Status/ Breeding Records in Northeastern WY¹	Expected Occurrence in Vicinity of Caballo Mine²	Occurrence and Historical Breeding Status at Caballo Mine
LEVEL I			
Mountain plover* ³ <i>Charadrius montanus</i>	summer/observed	rare	observed
Sage grouse* ³ <i>Centrocercus urophasianus</i>	resident/breeder	common	nesting
Baird's sparrow ³ <i>Ammodramus bairdii</i>	never recorded	rare	never recorded
Ferruginous hawk* ³ <i>Buteo regalis</i>	resident/breeder	common	nesting
Brewer's sparrow* ³ <i>Spizella breweri</i>	summer/breeder	common	nesting
Sage sparrow ³ <i>Amphispiza belli</i>	summer/observed	uncommon	never recorded
McCown's longspur* ³ <i>Calcarius mccownii</i>	summer/breeder	uncommon	infrequently observed
Swainson's hawk* <i>Buteo swainsoni</i>	summer/breeder	common	nesting
Long-billed curlew* ³ <i>Numenius americanus</i>	summer/breeder	uncommon	infrequent spring migrant
Short-eared owl* <i>Asio flammeus</i>	resident/breeder	uncommon	nesting
Peregrine falcon ³ <i>Falco peregrinus</i>	resident/observed	rare	never recorded
Burrowing owl ³ <i>Athene cunicularia</i>	summer/breeder	uncommon	never recorded
Bald eagle* <i>Haliaeetus leucocephalus</i>	resident/observed	seasonally common	frequent in winter
Upland sandpiper* <i>Bartramia longicauda</i>	summer/breeder	uncommon	infrequently observed
LEVEL II			
Cassins's Kingbird <i>Tyrannus vociferans</i>	summer/breeder	uncommon	never recorded
Lark bunting* <i>Calamospiza melanocorys</i>	summer/breeder	common	nesting
Dickcissel <i>Spiza americana</i>	summer/observed	rare	never recorded
Chestnut-collared longspur* ³ <i>Calcarius ornatus</i>	summer/breeder	uncommon	possible nesting
Black-chinned Hummingbird <i>Archilochus alexandri</i>	never recorded	not expected	never recorded
Pygmy nuthatch <i>Sitta pygmaea</i>	resident/observed	not expected	never recorded

TABLE 3.2-1 (cont)

Species	Seasonal Status/ Breeding Records in Northeastern WY ¹	Expected Occurrence in Vicinity of Caballo Mine ²	Occurrence and Historical Breeding Status at Caballo Mine
LEVEL II (continued)			
Marsh wren <i>Cistothorus palustris</i>	summer/observed	uncommon	never recorded
Western bluebird <i>Sialia mexicana</i>	summer/observed	uncommon	never recorded
Sage thrasher* ³ <i>Oreoscoptes montanus</i>	summer/breeder	common	probable nesting
Grasshopper sparrow* <i>Ammodramus savannarum</i>	summer/breeder	common	possible nesting
Bobolink* <i>Dolichonyx oryzivorus</i>	summer/observed	uncommon	observed
Common loon <i>Gavia immer</i>	summer/observed	not expected	never recorded
Black-billed cuckoo <i>Coccyzus erythrophthalmus</i>	summer/breeder	uncommon	never recorded
Red-headed woodpecker* <i>Melanerpes erythrocephalus</i>	summer/observed	uncommon	observed
Yellow-billed cuckoo ³ <i>Coccyzus americanus</i>	never recorded	uncommon	never recorded
Eastern screech-owl <i>Otus asio</i>	never recorded	uncommon	never recorded
Western screech-owl <i>Otus kennicottii</i>	never recorded	uncommon	never recorded
Western scrub-jay <i>Apheloma californica</i>	never recorded	uncommon	never recorded
Loggerhead shrike* ³ <i>Lanius ludovicianus</i>	summer/breeder	uncommon	nesting
Vesper sparrow* <i>Pooecetes gramineus</i>	summer/breeder	common	nesting
Lark sparrow* <i>Chondestes grammacus</i>	summer/breeder	common	probable nesting
Ash-throated flycatcher <i>Myiarchus cinerascens</i>	never recorded	abundance unknown	never recorded
Bushtit <i>Psaltiriparus minimus</i>	never recorded	uncommon	never recorded
Merlin* <i>Falco columbarius</i>	resident/breeder	uncommon	observed
Sprague's pipit <i>Anthus spragueii</i>	migrant/observed	uncommon	never recorded
Barn owl* <i>Tyto alba</i>	summer/breeder	abundance unknown	observed

¹Compiled from Luce et al. (1999), for lat-long block that encompasses northern Campbell County.

²Expected occurrence on or within ½ mile of Caballo Mine was based on range, history of occurrence, and habitat availability.

³BLM Sensitive Species (discussed in Appendix D).

*Species highlighted with asterisks were recorded on or within ½ mile of Caballo Mine during baseline or monitoring studies at least once before or during 2004.

Source: Luce, B., A. Cerovski, B. Oakleaf, J. Priday, and L. Van Fleet. 1999. Atlas of Birds, Mammals, Reptiles, and Amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne, Wyoming.

Other Species

Wildlife surveys completed specifically in the analyses area and surveys completed for the adjacent mines have documented numerous other wildlife species that inhabit the area. All of these species were generally common inhabitants of the area and none were of specific concern to state or federal agencies. Lists of species recorded at the Caballo Mine and within the offered tract are in the mine's permit and annual report documents available at WDEQ/LQD.

Under current natural conditions, the offered tract provides limited waterfowl and shorebird habitat. This habitat is mainly available during spring migration as ponds and ephemeral streams. Many of these water features generally get quite low or dry up during the summer.

Fish species are not normally found on the offered tract. Due to the ephemeral drainages within the analyses area, fish surveys were not required during the baseline study by the WGFD or WDEQ/LQD

Appendix D contains a discussion of threatened, endangered and sensitive species.

3.2.11 OWNERSHIP AND LAND USE

Caballo Coal Company owns the surface on the offered tract (Figure 3.2-5). The principal land uses within the tract are domestic grazing, wildlife habitat and hay land. Areas of disturbance within the offered tract include plugged and abandoned oil and gas well sites, ranch access roads, and mine monitoring access roads.

All of the coal estate included in the Caballo offered tract is federally owned. Figure 3.2-6 shows that the oil and gas estate within the analyses area is both federally and privately owned. All of the federally owned oil and gas estate is leased. Table 3.2-2 provides a list of the lessees of record for the federally owned oil and gas estate.

The Supreme Court has ruled that CBNG rights belong to the owner of the oil and gas rights (98-830). Therefore, the oil and gas lessees have the right to develop the CBNG in the coal as well as the right to develop conventional oil and gas on the tract.

According to the WOGCC database, there are no producing conventional oil or gas wells or CBNG wells in the analyses area.

Coal mining is a dominant land use in the area surrounding the offered tract.

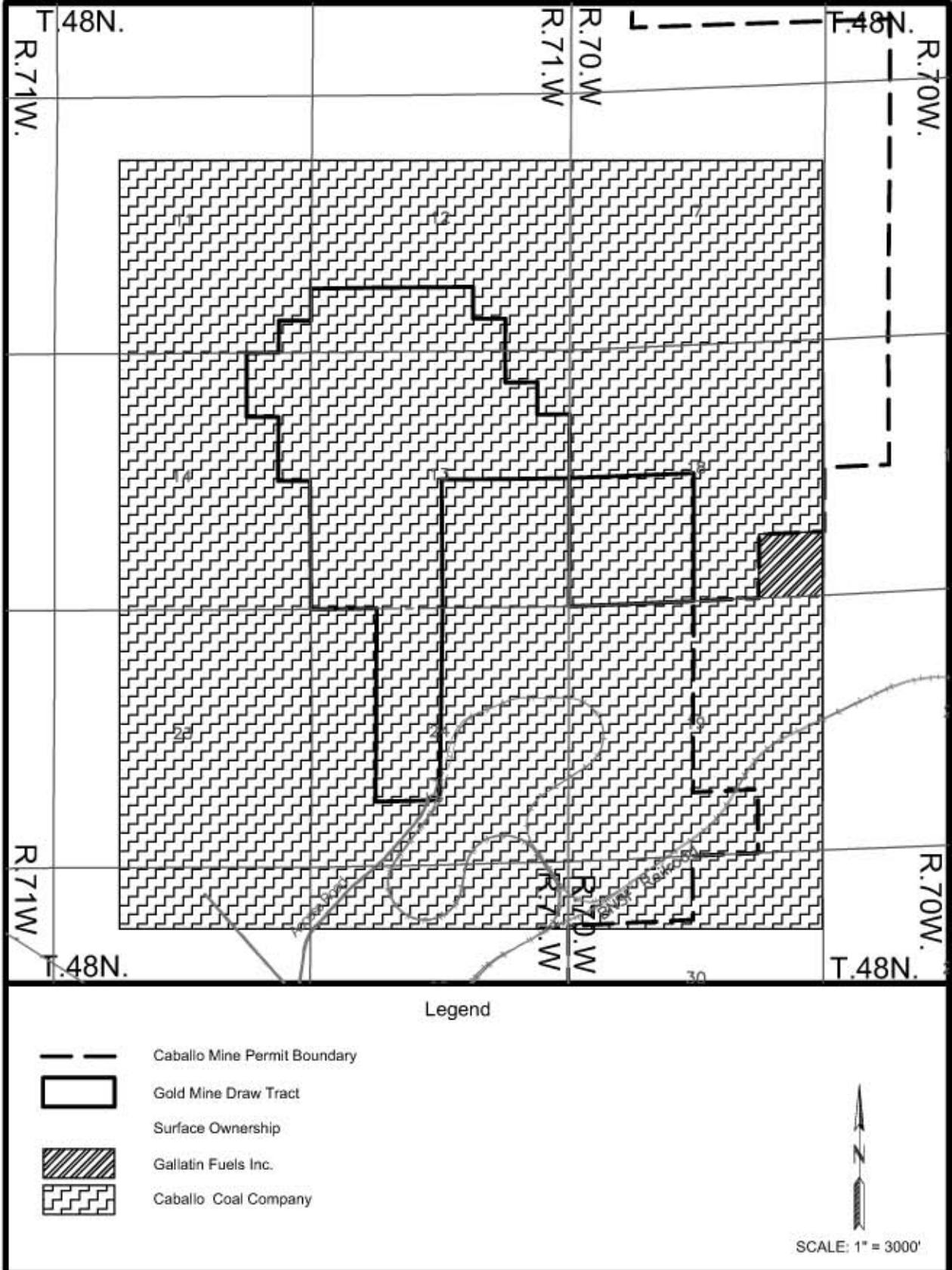
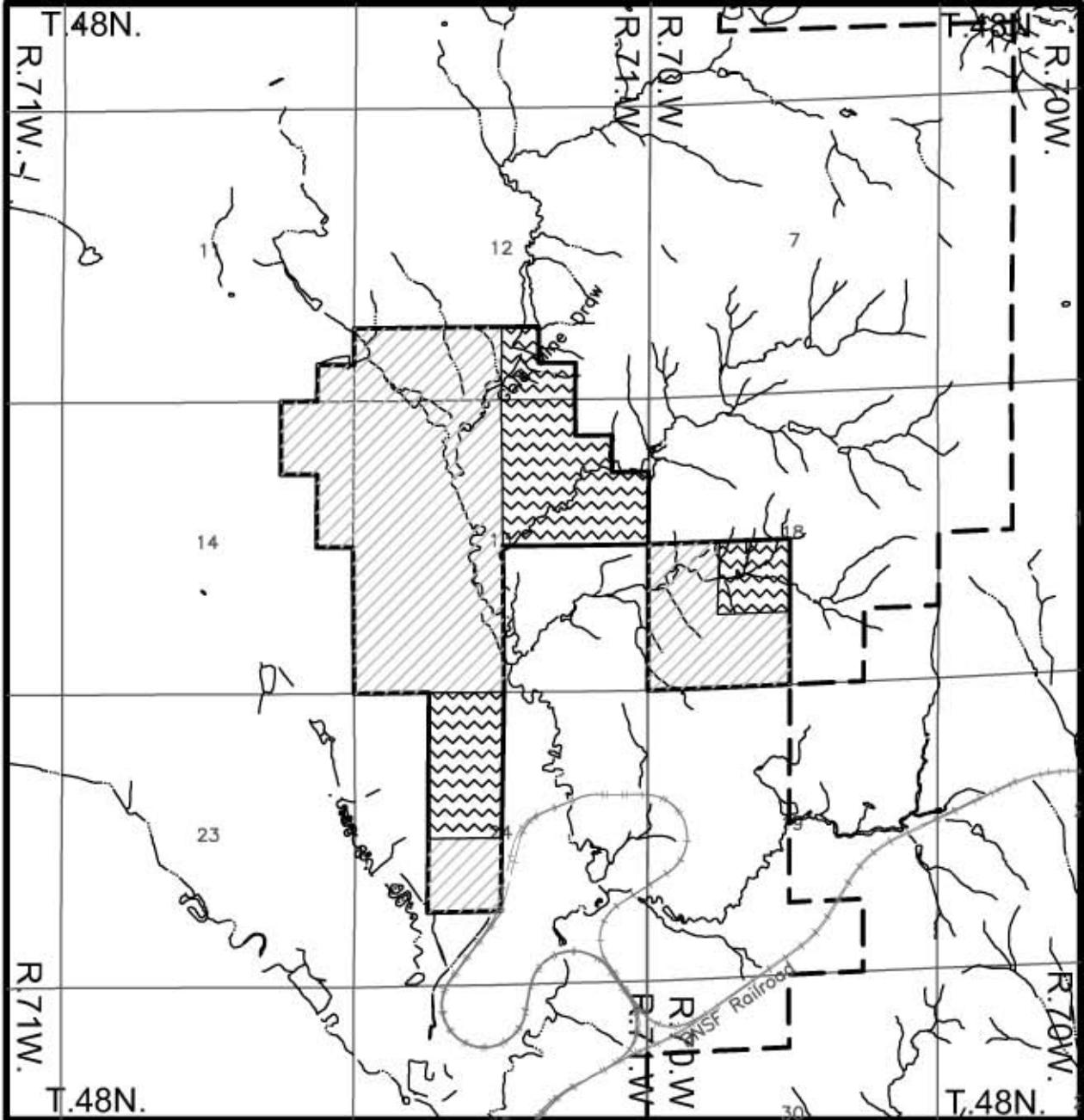


Figure 3.2-5 Surface Ownership on the Gold Mine Draw Tract



Legend

-  Caballo Mine Permit Boundary
-  Gold Mine Draw Tract
-  Private Ownership
-  Federal Ownership
-  Stream Flow



SCALE: 1" = 3000'

Figure 3.2-6 Oil and Gas Ownership on the Gold Mine Draw Tract

TABLE 3.2-2

OIL AND GAS OWNERSHIP ON THE GOLD MINE DRAW TRACT
(T52N, R72W)

Location	Lease Number	Lessee of Record
<u>Section 17</u> Lot 8	WYW 134209	Majestic Petro Operations, LLC; Preston Reynolds & Co., Inc.; Redstone Resources, Inc.; Woodward Enterprises, LLC, CH4 Energy, LLC
Lots 6, 7, 10, 11, 14	WYW 138419	Maurice W. Brown
<u>Section 19</u> Lots 13, 20	WYW 138419	Maurice W. Brown
<u>Section 20</u> Lots 3, 6, 10, 11	WYW 138419	Maurice W. Brown

Note: Oil and gas rights (including coal bed natural gas) for the remainder of the Caballo offered tract are privately owned.

Campbell County has no applicable countywide land use plans, and the offered tract has no designated zoning classification. The *City of Gillette/Campbell County Comprehensive Planning Program* (City of Gillette 1978) provides general land use goals and policies for state and federal coal leases in the county.

Big game hunting is the principal recreational use in the general area. Landownership within the PRB is 80% private, but some private landowners permit sportsmen to cross and/or hunt on their land. Others charge an access fee, and some do not allow any access. There has been a trend over the past two decades towards a substantial reduction in lands open and reasonably available for hunting. Access fees continue to rise, and many resident hunters feel these access fees are unreasonable. This trend has created problems for the WGFD in their attempt to distribute and control harvest at optimal levels, as well as to sportsmen who desire access to these animals (WGFD 1996). Due to safety concerns, public lands contained within an active mining area are often closed to the public, further limiting recreational use. In the PRB, the publicly owned Thunder Basin National Grasslands, BLM-administered public lands, and state school sections (normally sections 16 and 36) are generally open to hunting if legal access is available. As shown in Figure 3.2-5, there are no public surface lands included in the Caballo Mine offered tract and. Due to the area's close proximity to active mining areas, hunting is generally limited.

The surface estate of all of the lands within the offered tract is privately owned, and recreational use is allowed only with landowner permission. Sport hunting in varying degrees occurs on adjacent lands. Pronghorn and mule deer occur on and adjacent to

the tract. Sage grouse, mourning dove, waterfowl, rabbit, and coyote are hunted in the vicinity, and some coyote and red fox trapping may occur.

3.2.12 CULTURAL RESOURCES

See Section 3.1.9

The offered tract was covered by Class III cultural resource inventories and assessments conducted in the Caballo Mine permit conducted over several years. The goal of the inventories was to locate and evaluate for the NRHP all cultural resources 50 years and older within the study area. WDEQ, OSM, and the Wyoming SHPO reviewed and approved the survey results. One site was recorded and evaluated within the offered tract. Site 48CA297 was determined to be not eligible to the NRHP and no further work is required.

3.2.13 PALEONTOLOGICAL RESOURCES

See Section 3.1.11

A paleontological survey was conducted within and adjacent to the offered tract as part of the cultural resource surveys for the Caballo Mine mining permit to determine the potential for recovery of significant fossils prior to disturbance. No vertebrate or invertebrate fossils or plant material was identified or collected within the permit area as all of it was fragmentary and considered to be of limited scientific significance.

3.2.14 VISUAL RESOURCES

See Section 3.1.12

The Caballo and Belle Ayr Mine facilities and some mining activities are visible from the offered tract.

The lands in the offered tract are generally classified as VRM Class IV. The existing mining activity is visible from several sites on the Caballo offered tract.

3.2.15 NOISE

See Section 3.1.13

Existing noise sources in the area include adjacent coal mining activities, traffic on Wyoming 59, and the Bishop county road, rail traffic, ranching activities, and wind. No site-specific noise level data are available for the area. Because the Caballo Mine is adjacent to the offered tract, a median noise level is estimated to be 40 to 60 dBA for

day, evening, and nighttime, with the noise level increasing with proximity to active mining at the Caballo Mine.

Figure 3.1-4 presents noise levels associated with some commonly heard sounds.

The nearest occupied dwelling to the offered tract is located approximately 2 miles south of the offered tract., in the SW $\frac{1}{4}$ SE $\frac{1}{4}$ of Section 25, T48N, R71W. Occupied dwellings and publicly accessible roads near the offered tract are shown in Figure 3.2-7.

3.2.16 TRANSPORTATION FACILITIES

Transportation resources near the offered tract include Wyoming 59, and Bishop county road. Wyoming 59 lies approximately 5.5 miles west of the tract and is a paved two-lane road. Bishop county road is also a paved two-lane road in the area of the Caballo Mine. Bishop Road is located approximately 1 mile south of the offered tract. The only roads within the offered tract are two-track ranch roads or environmental monitoring roads.

The nearest railroad facilities are the Burlington Northern/Santa Fe Railroad spurs accessing the Caballo Mine. The railroad spur crosses over a portion of the offered tract in Section 24, T48N, R71W. Power lines, and associated rights of way (ROWs) are found in the analysis area. No telephone lines, oil or gas pipelines are located within the area.

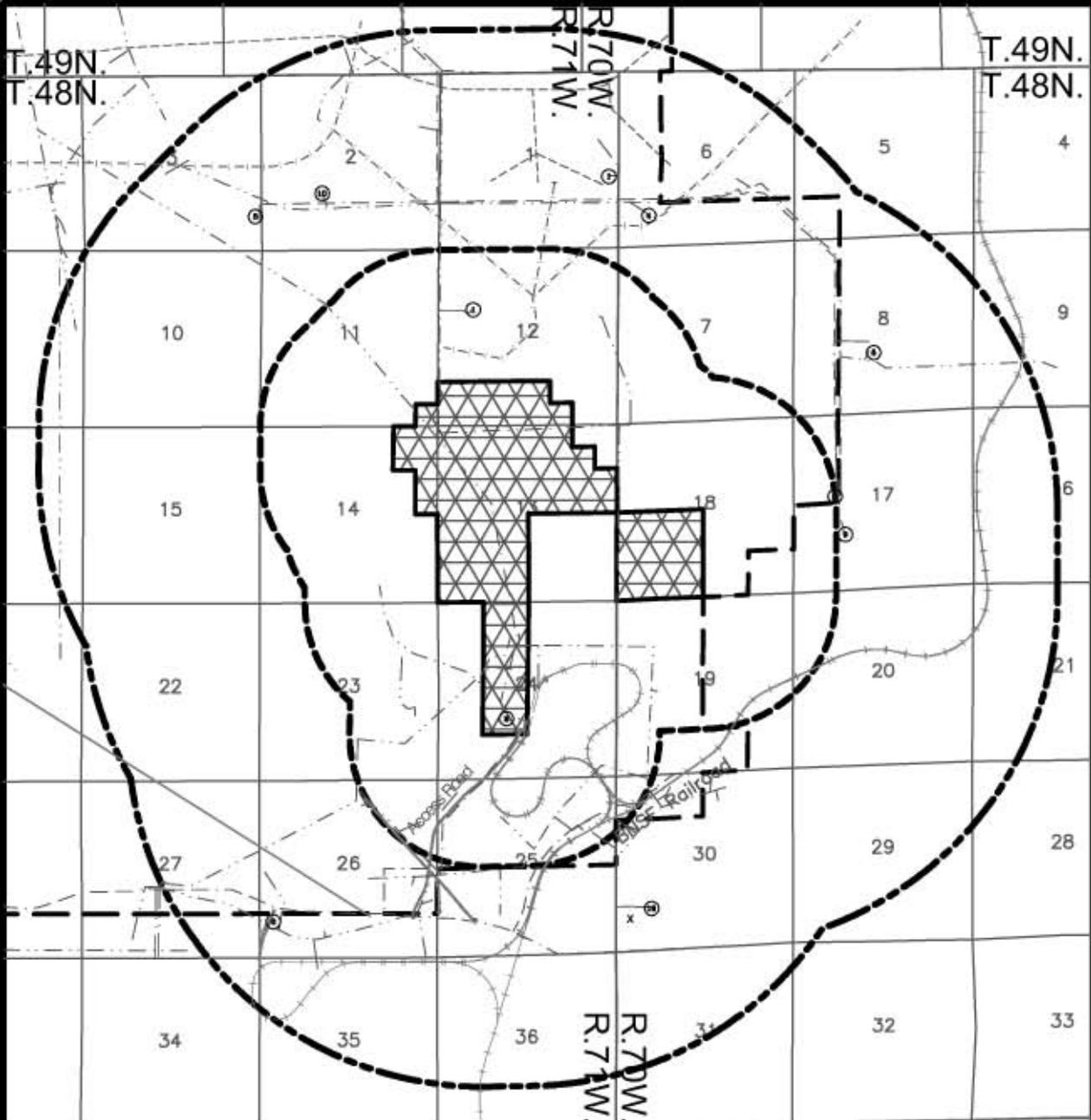
Figure 3.2-7 shows the location of transportation facilities within and adjacent to the offered tract.

3.2.17 SOCIOECONOMICS

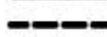
See Section 3.1.13.

3.2.18 HAZARDOUS AND SOLID WASTE

Potential sources of hazardous or solid waste on Caballo offered lands would include spilling, leaking, or dumping hazardous substances, petroleum products, and/or solid waste associated with mineral, coal, oil and/or gas exploration and development, or agricultural or livestock activities. No such hazardous or solid wastes are known to be present on the Caballo offered tract. If the offered lands are selected for exchange as proposed, there would be no hazardous or solid waste generated on these lands as a result of mining or mining exploration.



Legend

- | | | | |
|--|---------------------------------------|---|--------------------------|
|  | Caballo Mine Permit Boundary |  | Power Transmission Lines |
|  | Caballo Mine Offered Tract |  | CBM Pipelines |
|  | Search Boundary (3/4 Mile Radius) |  | CBM Roads |
|  | Search Boundary - EPA (2 Mile Radius) |  | Residence (11) |
|  | Utility Pipelines |  | Bus Stop (1) |
|  | Telephone Lines | | |



SCALE: 1" = 5000'

Figure 3.2-7 Transportation Facilities Within and Adjacent to the Gold Mine Draw Tract

3.3 SELECTED TRACTS #1-4 – NARM EAST BURN TRACTS

3.3.1 GENERAL SETTING

See Section 3.1.1

The East Burn tracts are located on the east edge of the North Antelope / Rochelle Mine. The North Antelope Rochelle Mine is adjacent to the southernmost operating mine within the Wyoming PRB, a part of the Northern Great Plains which includes most of northeastern Wyoming (Figure 1-1). Vegetation is primarily breaks grassland, big sagebrush and scoria grassland. The climate is semi-arid, with an average annual precipitation at the North Antelope Rochelle Mine ranging from 12 to 14.5 inches. As much as 70% or more of the annual average precipitation falls between April and August. Based on 28 years of records at Rochelle, average snowfall is approximately 34 inches with the highest averages falling in March and April. Potential evapotranspiration, at approximately 31 inches (NOAA 1969), exceeds annual precipitation (Martner 1986).

The average historical hourly temperature recorded at the Dull Center was 46.7°F. The highest recorded hourly temperature was 111°F and the lowest was -49°F. July is the warmest month with an average temperature of approximately 73°F; January is the coldest with an average of approximately 22°F. The frost-free period averages 125 days.

The mean annual wind speed is between 10 and 12 miles per hour. Surface winds in the region are west northwesterly to north northwesterly approximately 40% of the time. High winds associated with severe weather generally come out of the west, southwest. During periods of strong wind, dust may affect air quality across the region.

An average of 15 air-stagnation events occur annually in the PRB and typically last two days each (BLM 1974). General information describing the area's resources was gathered from draft BLM Buffalo Field office planning documents (BLM 1996a, 1996b, 1996c, 1996d, 1996g) and a BLM coal leasing study (BLM 1996e).

There are six selected tracts at the North Antelope Rochelle Mine, the first four to be described are the East Burn tracts (#1-4) located at the eastern edge of the current mine permit area. The fifth and sixth tracts are located along the mine railroad spur south of the mine facilities (South Spur tracts). Much of the affected environment is the same for all six tracts. Therefore, most of the discussion presented for the East Burn tracts is representative of the South Spur tracts as well. The discussion for the South Spur tracts will follow in Section 3.4 and will reference back to Section 3.3 where possible.

3.3.2 TOPOGRAPHY AND PHYSIOGRAPHY

See Section 3.1.2

The North Antelope Rochelle Mine is located on the gently dipping eastern limb of the structural basin. The regional dip in the area of the mine is approximately 1° to the northwest. There are local areas where the shallow strata dip at higher angles due to local folding or faulting.

The selected tracts are in an area consisting primarily of elevated ridges broken by minor drainages with an elevation ranging from 4,100 to 4,340 feet.

3.3.3 GEOLOGY

See Section 3.1.3

NARM staff refer to the two coal seams as the Anderson-Wyodak and the Canyon. On the East Burn tracts, the two seams form one mineable seam that varies in thickness from 10 feet to 70 feet. Thin parting occurs in some areas. Figures 3.3-1A through 3.3-1C illustrate geologic cross-sections of the North Antelope Rochelle Mine East Burn tracts (#1-4).

3.3.3.1 Mineral Resources

See Section 3.1.3.1

There are no conventional oil or gas wells.

There are no CBNG wells.

The ownership of oil and gas resources in the East Burn tracts is discussed in Section 3.3.11.

No mineable bentonite reserves have been identified.

No known uranium reserves exist.

Scoria is present on the southern portion of the East Burn tracts.

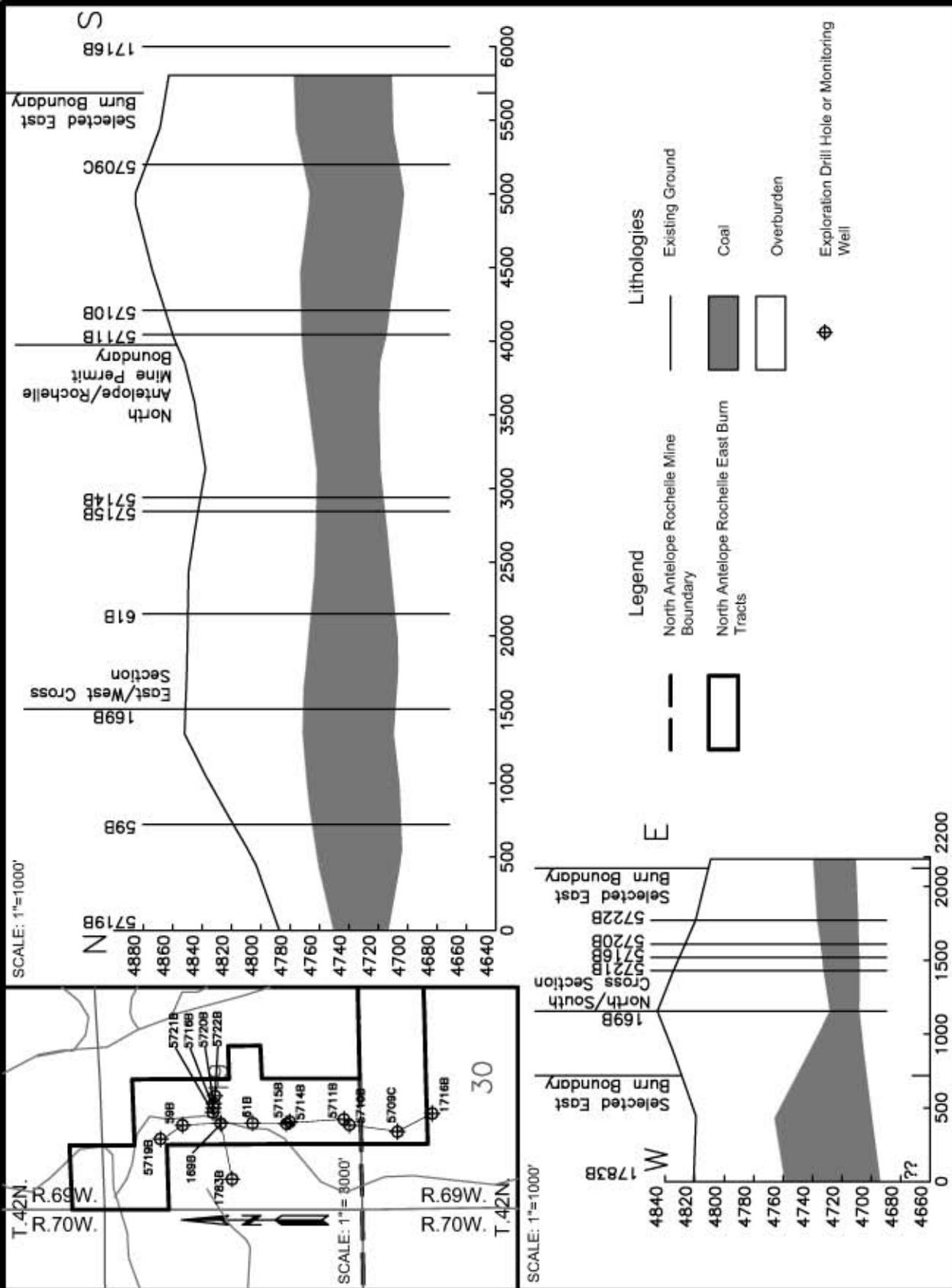


Figure 3.3-1A North-South and East-West Geologic Cross Sections, North Antelope Rochelle Mine East Burn Tracts

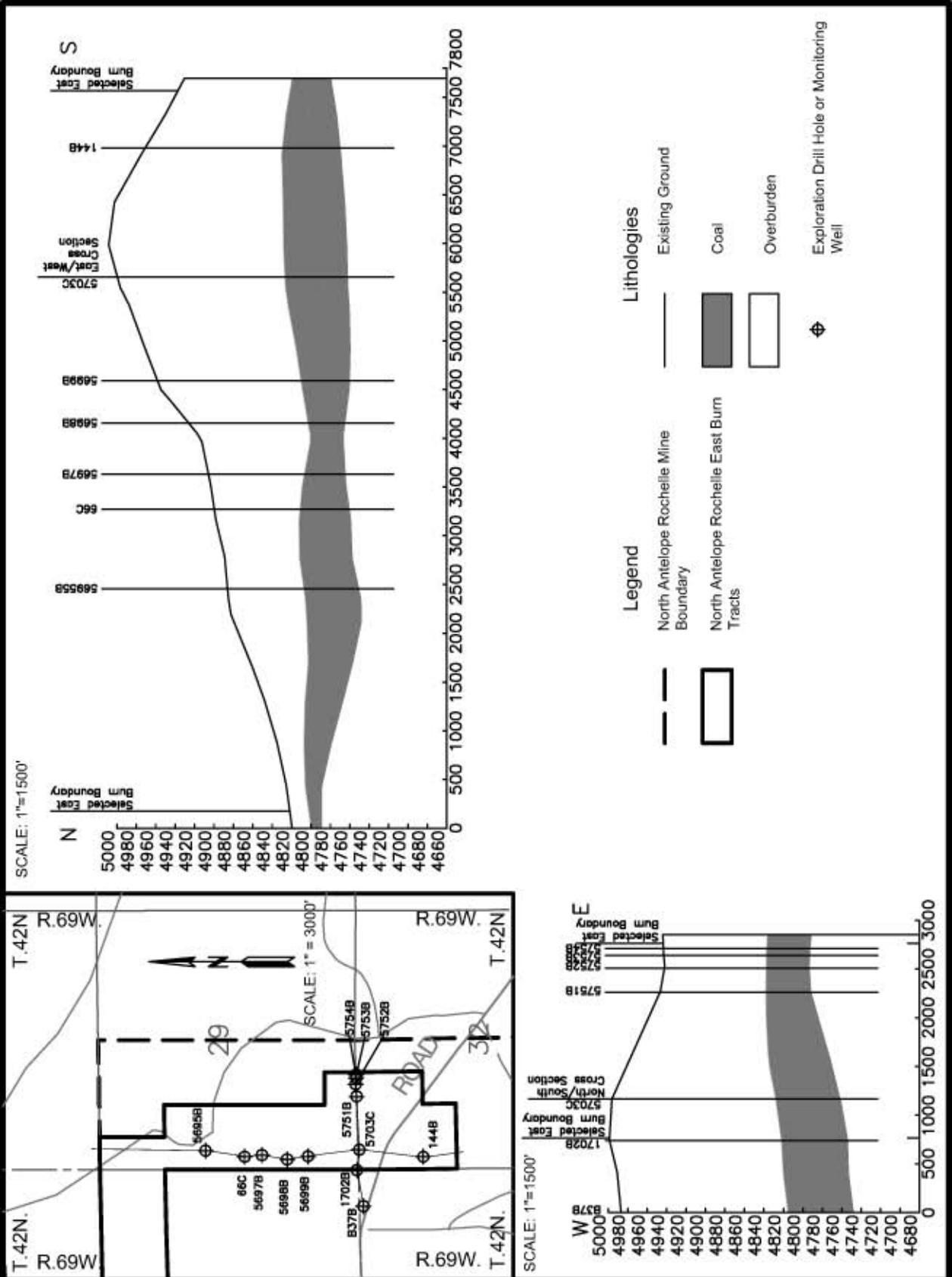


Figure 3.3-1B North-South and East-West Geologic Cross Sections, North Antelope Rochelle Mine East Burn Tracts

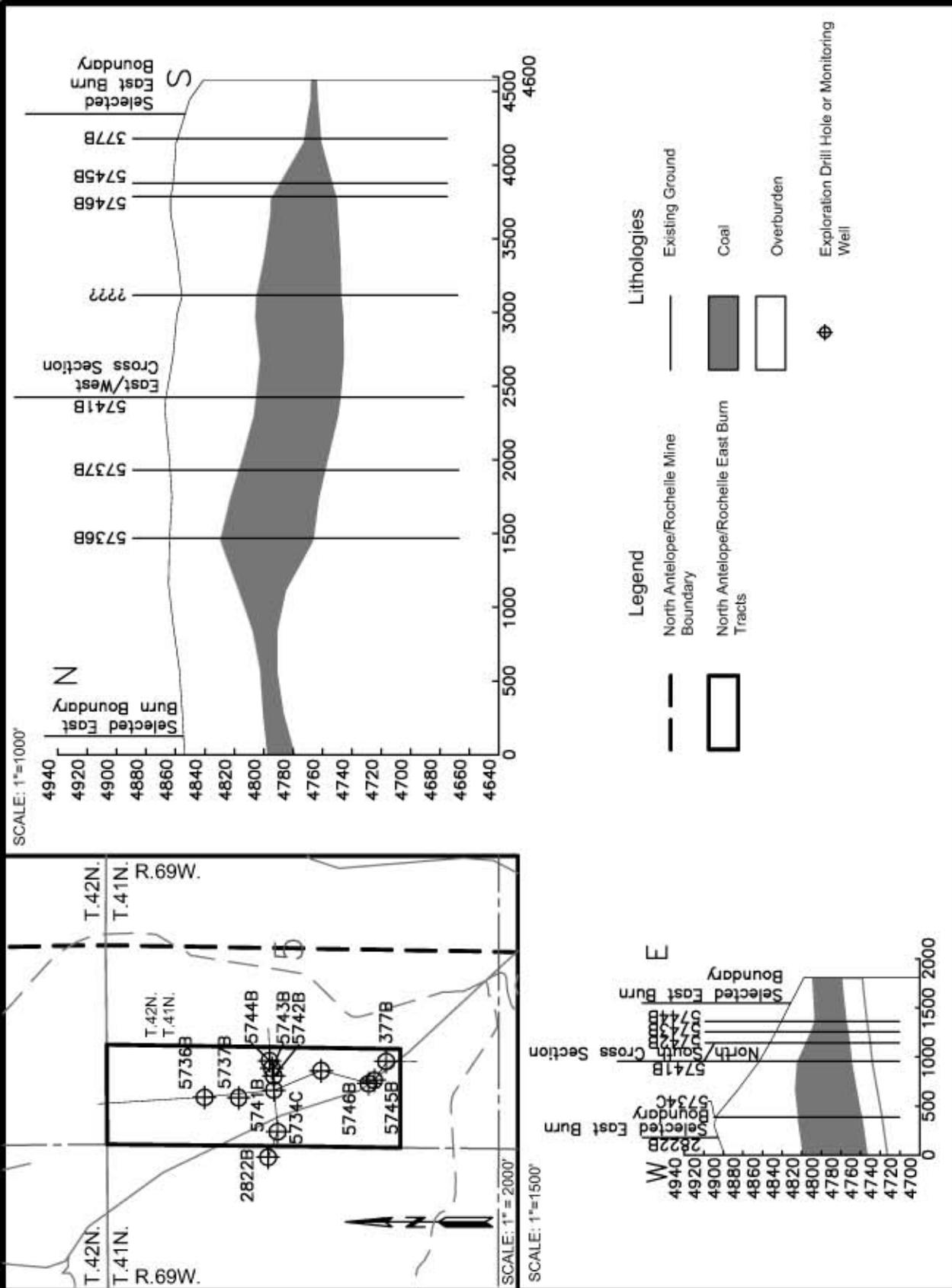


Figure 3.3-1C North-South and East-West Geologic Cross Sections, North Antelope Rochelle Mine East Burn Tracts

3.3.4 SOILS

A portion of the selected tracts were subjected to an order 1-2 soils survey. However because only part of the area was surveyed at that detail, NRCS soils data will be used to characterize the soils in the selected tracts.

The following is a list of the soil series that comprise the various map units delineated on the selected tracts under the Proposed Action;

- Hilight-Wags-Badland complex, 3 to 45% slopes
- Wibaux, thick solum-Wibaux channery fine sandy loam, 3 to 40% slopes
- Forkwood-Cambria loams, 0 to 6% slopes
- Ulm-Renohill clay loams, 0 to 6% slopes
- Ulm loams, 0 to 6% slopes
- Bidman-Ulm loams, 0 to 6% slopes
- Clarkelen-Embry fine sandy loam, 0 to 4% slopes
- Forkwood loam, 0 to 6% slopes
- Cambria-Kishona-Zigweid loams, 0 to 6% slopes
- Lawver-Wibaux complex, 6 to 30% slopes
- Hiland-Bowbac fine sandy loam, 0 to 6% slopes
- Forkwood-Cushman loams, 0 to 6% slopes
- Lawver-Teckla-Wibaux complex, 0 to 6% slopes
- Forkwood-Ulm loams, 0 to 6% slopes
- Bidman-Parmleed loams, 6 to 15% slopes
- Wibaux-Wibaux, thin solum complex, 6 to 40% slopes

Many of the soils in the selected tracts are thin and of low quality. The topsoil salvage depths will be better defined during baseline studies conducted for the WDEQ permit to mine. The North Antelope Rochelle Mine currently has an 18 inch topsoil replacement requirement in their approved permit.

The soil depths and types on the selected tracts are similar to soils currently being salvaged and used for reclamation at the adjacent mine and other mines in the area.

The site-specific soil surveys have located hydric soils and/or inclusions of hydric soils, which are one component used in identifying wetlands. Please see Section 3.3.8 for discussion of wetland surveys.

3.3.5 AIR QUALITY AND CLIMATE

See Section 3.1.5

Climate and meteorology information for the NARM is presented in Section 3.3.1. Figure 3.3-2 illustrates a wind rose and air quality and meteorological station at the NARM.

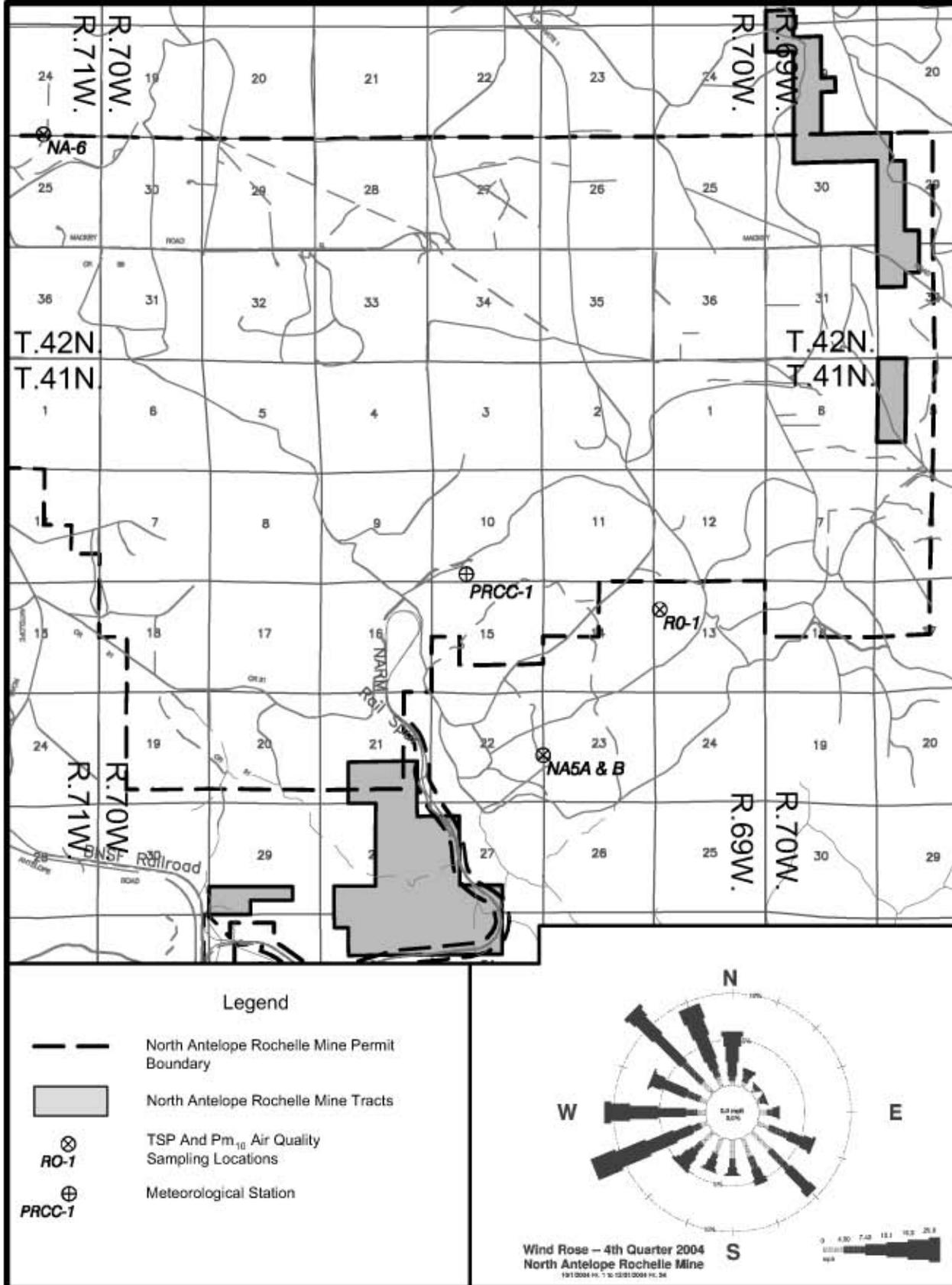


Figure 3.3-2 Wind Rose, Air Quality, and Meteorological Stations at the North Antelope Rochelle Mine

3.3.6 WATER RESOURCES

3.3.6.1 Groundwater

See Section 3.1.6.1.

3.3.6.2 Surface Water

A regional hydrologic divide occurs between the north and south portions of the East Burn tracts (#1-4). The northern portion slopes toward the northeast, with surface water flowing toward School Creek. School Creek flows toward the northwest along the eastern boundary of the northern part of the NARM East Burn selected tract.

The southern portion of the East Burn tracts is located in Section 5 of T42N, R69W. The topography of the southern portion slopes toward the southwest with surface water flowing toward the West Fork of Beckwith Creek. The West Fork of Beckwith Creek flows toward the southeast west and south of the southern portion of the NARM East Burn tracts.

West Fork of Beckwith Creek and School Creek are typical for the region, and their flow events are closely reflective of precipitation patterns

3.3.6.3 Water Rights

Records at the Wyoming State Engineer's Office (SEO) were searched for groundwater rights within a 3-mile radius of the North Antelope Rochelle Mine East Burn Area selected tract. This information is required for WDEQ permitting. A three-mile radius around the East Burn tracts encompasses the South Spur tracts (#5-6) and part of its associated three-mile search radius. This discussion includes water wells within a three-mile radius of all six NARM tracts. SEO data from a records search conducted August 2005 indicate there are 455 permitted water wells within three miles of the NARM tracts, of which two permitted wells are within the East Burn selected lands. Five wells are located in the South Spur selected lands. Water rights which have been abandoned or cancelled have been excluded from the search.

Of the total number of wells within the search area, coal mining companies own 348 wells (76%) and 10 wells are owned by oil and gas companies. Table C-5 in Appendix C contains a listing of the 100 non-coal mine wells and associated water rights information.

SEO records were searched for surface water rights using the SEO's computer database. The search was conducted for surface-water rights within ½ mile of the offered lands and 3 miles downstream of the NARM East Burn selected lands.

SEO records indicate 66 permitted surface water rights within the search area. Eleven of the surface water rights are held by coal mining companies. The remaining 55 water rights are owned by the USDA. Six of the water rights owned by the USDA are permitted for recreation and fish propagation, while the remaining rights are permitted for stock watering. Table C-6 of Appendix C shows a listing of the 55 non-coal mine surface water rights.

3.3.7 ALLUVIAL VALLEY FLOORS (AVFS)

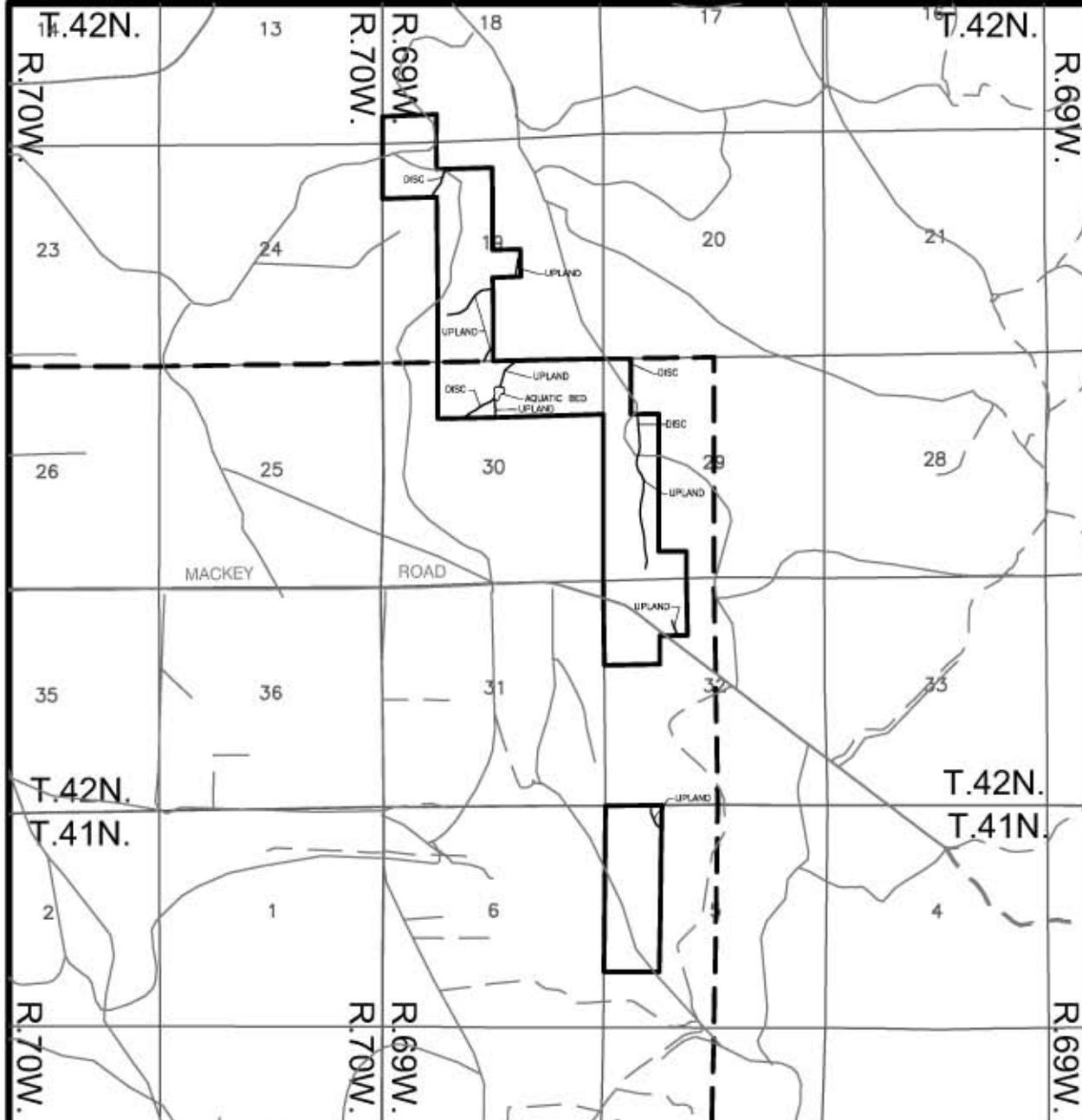
See Section 3.1.7

Investigations conducted by the NARM to determine the presence of AVFs within that portion of the selected tract located within the current NARM permit area determined there were no AVFs within the selected tracts. The WDEQ has concurred with that finding. The results of that investigation are on file at WDEQ/LQD. An AVF study has been completed on that portion of the selected tracts located in Sections 18 and 19, T. 42 N., R. 69 W. that was not covered in earlier studies. That study has been submitted to WDEQ/LQD for review. The survey results support a negative determination for an AVF. It was determined that the areas surveyed did not meet the regulatory definition of an alluvial valley floor because of the lack of sufficient areas of subirrigation, channels are primarily incised, limited extent of unconsolidated stream-laid deposits, and limited water availability. The report also determined that no lands in the area are significant to farm production.

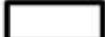
3.3.8 WETLANDS

See Section 3.1.8

Jurisdictional wetland inventories were conducted within the selected tract in 1996, 1997, and 2000. The wetlands delineation was completed in accordance with the procedures and criteria contained in the *Wetland Delineation Manual*. The North Antelope Rochelle Mine has a current COE authorization through the 5-year term of permit 569-T6 which was issued August 20, 2004. A total of 0.41 acres of jurisdictional wetlands have been delineated in the East Burn selected tract. Stock pond wetlands account for 0.25 acre and ephemeral stream wetlands total 0.16 acre. Upon authorization of the Proposed Action, North Antelope Rochelle Mine will incorporate the selected tract wetlands into the WDEQ/LQD permit and develop restoration plans for those to be impacted by mining activities. Wetlands on the East Burn Tracts are illustrated on Figure 3.3-3.



Legend

-  North Antelope Rochelle Mine Permit Boundary
-  North Antelope Rochelle Mine East Burn Tracts
-  Ephemeral Wetland - Continuous
-  Ephemeral Wetland - Discontinuous
-  Ephemeral Wetland - Upland
-  Wetland - Aquatic Bed



SCALE: 1" = 4000'

Figure 3.3-3 Wetlands Within the North Antelope Rochelle Mine East Burn Tracts

3.3.9 VEGETATION

Several vegetation baseline studies have been conducted in the NARM permit area from 1978 through 1997. The vegetation type descriptions in the 1997 study will be used to describe three of the vegetation types in the selected tract. Scoria grassland was not sampled in 1997 so the 1991 data for the scoria reference area are presented. All of the studies are on file in the approved permit document at WDEQ/LQD.

Four vegetation types are mapped in the selected tracts. Disturbed areas and water are also mapped out. Breaks grassland is the predominate type followed by big sagebrush grassland, scoria grassland and meadow grassland. The vegetation communities were delineated, mapped, and sampled in accordance with the current WDEQ/LQD requirements. The results of the baseline studies, including the Proposed Exchange tracts, were reviewed and approved by WDEQ/LQD as part of an earlier permit amendment. Sampling was conducted on a large enough area to include sufficient room for overburden layback and other mining needs to recover the coal under the current leases and extended into the selected tracts.

3.3.9.1 Vegetation Types

The Breaks Grassland Type occurs on rough broken topography dissected by numerous small drainages. Steep slopes and generally heavy clay soils provide low vegetation cover. Major species include blue grama (*Bouteloua gracilis*), thickspike wheatgrass (*Agropyron dasystachyum*), western wheatgrass (*Agropyron smithii*), big sagebrush (*Artemisia tridentata wyomingensis*), and sedge (*Carex sp.*).

Absolute vegetative cover in the breaks grassland averaged 36.4%. Perennial graminoids were dominant with 33.4%. Major species included blue grama, thickspike wheatgrass, western wheatgrass, threadleaf sedge (*Carex filifolia*), and (needle-and-thread (*Stipa comata*). Annual graminoids accounted for 1.2%. Two shrubs provided 2.7%. Halfshrubs, primarily broom snakeweed (*Gutierrezia sarothrae*), contributed 1.8% and 23 perennial forbs provided 5.0%. Bare soil accounted for 46% and litter/rock contributed 17.6%.

The above-ground net productivity (ANP) of the breaks grassland averaged 49.3 g/m². Perennial graminoids accounted for 34.5 g/m² or 70% of the total productivity. Perennial forbs contributed 7.5 g/m² and halfshrubs provided 2.9 g/m².

The Big Sagebrush Grassland Type is generally dense with blue grama and western wheatgrass. Shrub growth varies depending on soil type and moisture availability. The big sagebrush often transitions into the meadow and upland grassland types.

Absolute total vegetation cover of 59.6% was dominated by perennial graminoid with 37.1%. Major perennial species included blue grama, western wheatgrass, Canby bluegrass (*Poa canbyi*), threadleaf sedge, needle-and-thread, and Sandberg bluegrass

(*Poa sandbergii*). Annual graminoids contributed 5.3%. Shrubs, primarily big sagebrush, provided 3.1% and halfshrubs, primarily fringed sage (*Artemisia frigida*), added 1.1% absolute cover. Ten perennial forbs provided 2.1% and annual forbs added 5.6%. Bare soil accounted for 21.6% and litter/rock added 18.7% cover.

The ANP of the big sagebrush area averaged 69.4 g/m² with perennial graminoids accounting for 47.9 g/m² or approximately 69% of the ANP. Perennial forbs provided 4.0 g/m² and halfshrubs accounted for 1.7 g/m². Annual grasses and forbs added 15.7 g/m².

The Meadow Grassland Type occurs in ephemeral drainage bottoms and upland terraces. The dominant shrub is big sagebrush. Dominant perennial grasses include western wheatgrass, green needlegrass (*Stipa viridula*), thickspike wheatgrass, and slender wheatgrass (*Agropyron trachycaulum*).

Absolute total vegetation cover of 83.3% was dominated by perennial graminoids with 66.3%. Dominant perennial species included western wheatgrass, thickspike wheatgrass, green needlegrass, and slender wheatgrass. Annual graminoids accounted for 4.5%. Four shrub species, primarily big sagebrush, provided 1.3% absolute cover. Halfshrubs contribute 2.1% and nineteen forbs provided 7.2% absolute cover. Bare soil accounted for 7.7% and litter/rock added 9.0%.

The ANP of the meadow grassland averaged 251.0 g/m². Perennial graminoids accounted for 211.0 g/m² or 84% of the total production. Perennial forbs added 14.7 g/m² and shrubs contributed 10.2 g/m². Annual grasses and forbs totaled 13.6 g/m². Perennial species with the highest productivity included western wheatgrass, thickspike wheatgrass, green needlegrass, Baltic rush (*Juncus balticus*), and alkali bluegrass (*Poa juncifolia*).

The Scoria Grassland Type is characterized by low amounts of vegetation cover and high litter and rock ground cover. Large portions of this vegetation type are generally a monoculture of downy brome (*Bromus tectorum*) and scoria rock. Approximately 40 acres of this type are present in the selected tract.

Absolute total vegetation cover averaged 59.1% with perennial graminoids providing 22.5%. Major perennial species included western wheatgrass, blue grama, bluebunch wheatgrass (*Agropyron spicatum*), and prairie junegrass (*Koeleria macrantha*). Annual graminoids accounted for 18.9% absolute cover. Shrubs provided 5.5% and halfshrubs added 4.1%. Fifteen perennial forbs provided 5.6% and six annual and biennial forbs added another 1.1% absolute total vegetation cover.

The ANP of the scoria grassland averaged 90.2 g/m² with perennial graminoids accounting for 48.4 g/m² or 54% of the production. Perennial forbs added 19.7 g/m² (11%). Annual and biennial grasses and forbs accounted for 27.3 g/m² (30%).

3.3.9.2 Threatened, Endangered, and Candidate Plant Species

No federally listed threatened, endangered, or candidate plant species are known to occur within the analysis area. The analysis area was surveyed in 1999 for threatened, endangered and candidate species using the *Wyoming Rare Plant Field Guide* (Thorne 1994) as their reference. Ute ladies'-tresses surveys were conducted by BKS Environmental Associates, Inc. on September 6, 2005. The FWS memorandum published November 23, 1992 entitled "Interim Survey Requirements for *Spiranthes diluvialis*" was also used as a guide in conducting the survey. All individuals who conducted the survey are qualified to conduct Ute ladies'-tresses surveys. The contractor did not identify any orchid habitat in the selected tract. All areas surveyed lacked the hydrology sufficient to support orchid establishment. Soil clay content also limited habitat. The surface in the survey area is primarily USFS with some private ownership.

3.3.9.3 USDA FS Sensitive Species

Refer to Appendix D.

3.3.10 WILDLIFE

Background information on wildlife for the NARM East Burn tracts was gathered from several sources including: NARM WDEQ/LQD permit and annual reports, Wyoming Game and Fish Department (WGFD) and FWS records.

Baseline and monitoring surveys cover large perimeters around the current mine permit area. Consequently, the selected tracts have been surveyed during annual wildlife monitoring for the NARM. Thunderbird Wildlife Consulting, Inc. (TWC), formerly Powder River Eagle Studies (PRES) have conducted annual wildlife monitoring surveys at North Antelope Rochelle Mine from 1984 through 2005. Their current monitoring plan complies with Appendix B of the WDEQ/LQD Coal Rules and Regulations. The study area has included most of the selected tracts throughout TWC's monitoring timeframe. The data presented herein is from TWC's baseline and annual monitoring data presented in the NARM permit and annual reports on file at WDEQ.

The selected tracts and adjacent areas consists primarily of rough broken topography dissected by numerous small drainages. Breaks grassland is the predominated vegetation type. Small areas of big sagebrush, meadow and scoria vegetation types are also present. Several small stock ponds and natural pools exist on lands adjacent to the selected tract but water availability is generally limited and seasonal. There are very few trees in the entire NARM permit area. Most trees occur in the meadow community. Drainage channels in the selected tracts are ephemeral.

Big Game

Pronghorn (*Antilocapra Americana*) and mule deer (*Odocoileus hemionus*) are the only big game species that regularly occur on or near the analysis area. Sightings of one or two small herds of elk (*Cervus elaphus*) were recorded on several winter surveys in the eastern portion of the permit area and adjacent lands.

The WGFD has classified most of the current permit area as yearlong pronghorn range. The North Antelope Rochelle Mine is near the south end of a larger multi-mine survey area that has been surveyed each winter since 1993.

The analysis area is located within the WGFD's Cheyenne River antelope herd and is in hunt area 27. There are large tracts of public lands in and adjacent to the permit area, primarily USFS and State land, that allows for more public access than at many of the mines.

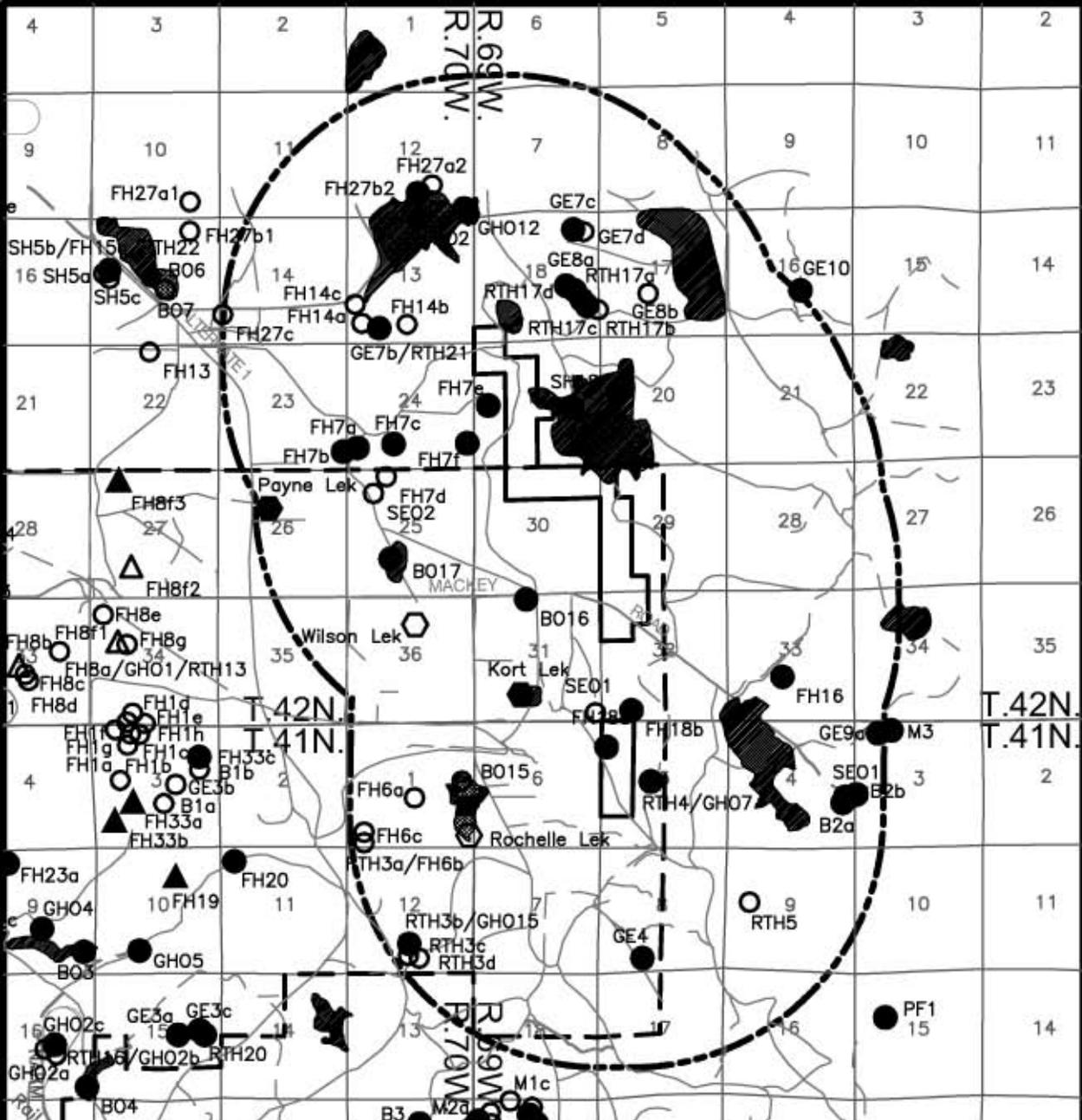
The analysis area is located within the Thunder Basin mule deer herd and deer hunt area 10. As with antelope, there are large blocks of public lands open to hunting. Deer were not numerous in the analysis area during baseline studies and annual monitoring. Crucial or critical mule deer habitat does not occur on or adjacent to the analysis area.

The eastern limits of the permit area and adjacent lands are sometimes utilized by the Rochelle Hills elk herd. The area is not considered whitetail deer habitat but whitetail are common south of the permit area along Antelope Creek.

In their letter dated August 30, 2005, the WGFD stated that making these tracts available for leasing is unlikely to have additional effects on the Thunder Basin mule deer, Cheyenne River pronghorn herd and the Rochelle Hills elk herd because the selected lands are adjacent to existing mines. Impacts to public recreation may occur on the northern portion of the selected tract if the coal is leased. The southern portion is directly adjacent to existing mines so little or no additional effect on public recreation is expected. As mining approaches public lands, access is generally restricted in a large enough area to provide a safety zone for the mining operation.

Other Mammals

A variety of small and medium-sized mammal species occur near the analyses area. These include predators and furbearers, such as coyote (*Canis latrans*), red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), and feral cats. Prey species include rodents such as mice, pocket gophers, voles, chipmunks, and lagomorphs (jackrabbits and cottontails). Surveys for prairie dog towns were conducted on the selected tract and adjacent lands. Two black-tailed prairie dog (*Cynomys ludovicianus*) towns were identified within the selected tract. As shown on Figure 3.3-4, one small town contacts the selected tract in Section 18 and another in the center of Section 17, T42 N, R69W. There are also several prairie dog towns on the adjacent lands within two miles of the selected tract. These mammal species are cyclically



Legend

- | | | | |
|--|---|-------------------------------|------------------------------|
| | North Antelope Rochelle Mine Permit Boundary | | Intact Raptor Nest |
| | North Antelope Rochelle Mine East Burn Tracts | | FH18a |
| | Search Boundary - EPA (2 Mile Radius) | | Wilson Lek |
| | Sage Grouse Lek | | Former Raptor Nest |
| | Prairie Dog Colony | <u>Species Codes</u> | |
| | Former Prairie Dog Colony | GE = Golden Eagle | SH = Swainson's Hawk |
| | | RTH = Red-tailed Hawk | PF = Prairie Falcon |
| | | GHO = Great Horned Owl | BO = Burrowing Owl |
| | | FH = Ferruginous Hawk | B = Buteo Species |
| | | M = Merlin | SEO = Short-eared Owl |

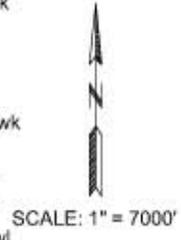


Figure 3.3-4 Raptor Nest Sites, Grouse Leks, Prairie Dog Colonies Within and Adjacent to the North Antelope Rochelle Mine East Burn Tracts

common and widespread throughout the region. These prey species are important for raptors and other predators.

Raptors

Numerous raptor species have been observed on the North Antelope Rochelle Mine survey including the selected tracts. These species include the golden eagle (*Aquila chrysaetos*), bald eagle (*Haliaeetus leucocephalus*), northern harrier (*Circus cyaneus*), Swainson's hawk (*Buteo swainsoni*), red-tailed hawk (*Buteo jamaicensis*), ferruginous hawk (*Buteo regalis*), prairie falcon (*Falco peregrinus*), merlin (*Falco columbarius*), American kestrels (*Falco sparverius*), great horned owl (*Bubo virginianus*), short-eared owl (*Asio flammeus*) and burrowing owl (*Athene cunicularia*). Figure 3.3-4 shows the locations of raptor nest sites identified and tracked during annual monitoring at the North Antelope Rochelle Mine in an area that includes the selected tracts.

Game Birds

Two species of upland game birds were observed during the 2005 annual monitoring: the sage grouse (*Centrocercus urophasianus*), and mourning doves (*Zenaida macoura*).

Sharp-tailed grouse (*Pedioecetes phasianellus*), wild turkeys (*Meleagris gallopavo*), and gray partridge, (*Perdix perdix*) have also been recorded in the general area during baseline studies.

The sage grouse is the most commonly encountered upland game bird species in the study area. No sage grouse leks were identified within the selected tract. As shown on Figure 3.3-4, two leks have been identified within two miles of the selected tract.

Mourning doves (*Zenaida macroura*) are expected or near the selected tract during spring and summer surveys. This species is a relatively common breeding bird in Campbell County.

Migratory Birds of Management Concern

Table 3.3-1 provides a list of the 40 migratory bird species of management concern in Wyoming that the FWS uses for reviews concerning existing and proposed coal mine leased land (FWS 2002). This listing was taken directly from the Wyoming Bird Conservation Plan (Cerovski et al. 2000). The regional status and expected occurrence, historical observations, and breeding records on and near the NARM East Burn tracts for each listed species are included in Table 3.3-1

Historically, 13 of the 14 Level I species have been recorded at least once in the vicinity of the North Antelope Rochelle Mine but only 8 were seen with any regularity over the years (2005 NARM Annual Report). In 2005, nine level I species were documented in or within one-half mile of the permit area: The greater sage-grouse, Brewer's sparrow, McCowans longspur (*Calcarius mccownii*), ferruginous hawk, long-billed curlew

(*Numenius americanus*), Swainson's hawk, short-eared owl, burrowing owl, and bald eagle.

Nine of the Level II species have historically been recorded in the survey area. Seven seen with some regularity: the lark bunting, chestnut-collared longspur, grasshopper sparrow, loggerhead shrike, vesper sparrow, lark sparrow, and merlin.

TABLE 3.3-1			
REGIONAL STATUS OF 40 MIGRATORY BIRDS OF MANAGEMENT CONCERN IN WYOMING FOR COAL MINES AND EXPECTED AND ACTUAL OCCURRENCE ON AND WITHIN ½ MILE OF THE NORTH ANTELOPE ROCHELLE EAST BURN TRACTS (#1-4) AND SOUTH SPUR TRACTS (#5-6)			
Species	Seasonal Status/ Breeding Records in Northeastern WY¹	Expected Occurrence in Vicinity of North Antelope Rochelle Mine²	Occurrence and Historical Breeding Status at North Antelope Rochelle Mine
LEVEL I			
Mountain plover ^{*,3} <i>Charadrius montanus</i>	summer/observed	rare	historic recorded
Sage grouse ^{*,3} <i>Centrocercus urophasianus</i>	resident/breeder	common	historic breeder
Baird's sparrow ³ <i>Ammodramus bairdii</i>	never recorded	rare	observed
Ferruginous hawk ^{*,3} <i>Buteo regalis</i>	resident/breeder	common	historic breeder
Brewer's sparrow ^{*,3} <i>Spizella breweri</i>	summer/breeder	common	common breeder
Sage sparrow ³ <i>Amphispiza belli</i>	summer/observed	uncommon	never recorded
McCown's longspur ^{*,3} <i>Calcarius mccownii</i>	summer/breeder	uncommon	infrequently observed
Swainson's hawk [*] <i>Buteo swainsoni</i>	summer/breeder	common	historic breeder
Long-billed curlew ³ <i>Numenius americanus</i>	summer/breeder	uncommon	observed
Short-eared owl [*] <i>Asio flammeus</i>	resident/breeder	uncommon	infrequently breeder
Peregrine falcon ³ <i>Falco peregrinus</i>	resident/observed	rare	occasional migrant
Burrowing owl ^{*,3} <i>Athene cunicularia</i>	summer/breeder	uncommon	historic breeder
Bald eagle [*] <i>Haliaeetus leucocephalus</i>	resident/observed	seasonally common	common in winter

TABLE 3.3-1 (cont.)

Species	Seasonal Status/ Breeding Records in Northeastern WY ¹	Expected Occurrence in Vicinity of North Antelope Rochelle Mine ²	Occurrence and Historical Breeding Status at North Antelope Rochelle Mine
LEVEL II			
Upland sandpiper* <i>Bartramia longicauda</i>	summer/breeder	uncommon	possible breeder
Cassins's Kingbird <i>Tyrannus vociferans</i>	summer/breeder	uncommon	never recorded
Lark bunting* <i>Calamospiza melanocorys</i>	summer/breeder	common	common breeder
Dickcissel <i>Spiza americana</i>	summer/observed	rare	never recorded
Chestnut-collared longspur*. ³ <i>Calcarius ornatus</i>	summer/breeder	uncommon	possible breeder
Black-chinned Hummingbird <i>Archilochus alexandri</i>	never recorded	not expected	never recorded
Pygmy nuthatch <i>Sitta pygmaea</i>	resident/observed	not expected	never recorded
Marsh wren <i>Cistothorus palustris</i>	summer/observed	uncommon	never recorded
Western bluebird <i>Sialia mexicana</i>	summer/observed	uncommon	never recorded
Sage thrasher*. ³ <i>Oreoscoptes montanus</i>	summer/breeder	common	potential breeder
Grasshopper sparrow* <i>Ammodramus savannarum</i>	summer/breeder	common	possible breeder
Bobolink <i>Dolichonyx oryzivorus</i>	summer/observed	uncommon	never recorded
Common loon <i>Gavia immer</i>	summer/observed	not expected	never recorded
Black-billed cuckoo <i>Coccyzus erythrophthalmus</i>	summer/breeder	uncommon	never recorded
Red-headed woodpecker <i>Melanerpes erythrocephalus</i>	summer/observed	uncommon	observed
Yellow-billed cuckoo ³ <i>Coccyzus americanus</i>	never recorded	uncommon	never recorded
Eastern screech-owl <i>Otus asio</i>	never recorded	uncommon	never recorded
Western screech-owl <i>Otus kennicottii</i>	never recorded	uncommon	never recorded
Western scrub-jay <i>Apheloma californica</i>	never recorded	uncommon	never recorded
Loggerhead shrike*. ³ <i>Lanius ludovicianus</i>	summer/breeder	uncommon	common breeder
Vesper sparrow* <i>Pooecetes gramineus</i>	summer/breeder	common	common breeder

TABLE 3.3-1 (cont.)

Species	Seasonal Status/ Breeding Records in Northeastern WY¹	Expected Occurrence in Vicinity of North Antelope Rochelle Mine²	Occurrence and Historical Breeding Status at North Antelope Rochelle Mine⁴
Lark sparrow* <i>Chondestes grammacus</i>	summer/breeder	common	occasional breeder
Ash-throated flycatcher <i>Myiarchus cinerascens</i>	never recorded	abundance unknown	never recorded
Bushtit <i>Psaltriparus minimus</i>	never recorded	uncommon	never recorded
Merlin* <i>Falco columbarius</i>	resident/breeder	uncommon	historic breeder
Sprague's pipit <i>Anthus spragueii</i>	migrant/observed	uncommon	never recorded
Barn owl <i>Tyto alba</i>	summer/breeder	abundance unknown	never recorded

¹Compiled from Luce et al. (1999), for lat-long block that encompasses northern Campbell County.

²Expected occurrence on or within ½ mile North Antelope Rochelle Mine was based on range, history of occurrence, and habitat availability.

³BLM Sensitive Species (discussed in Appendix D).

⁴Historical occurrence/status in the NARM survey area is based on records from baseline studies or annual monitoring conducted in 1980 to 2005.

*Species highlighted with asterisks were recorded as nesting on or within ½ mile of North Antelope Rochelle Mine during baseline or monitoring studies.

Source: Luce, B., A. Cerovski, B. Oakleaf, J. Priday, and L. Van Fleet. 1999. Atlas of Birds, Mammals, Reptiles, and Amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne, Wyoming.

Other Species

Wildlife surveys completed specifically in the analyses area and surveys completed for the adjacent mines have documented numerous other wildlife species that inhabit the area. All of these species were generally common inhabitants of the area and none were of specific concern to state or federal agencies. Lists of species recorded at the North Antelope Rochelle Mine and within the selected tracts are in the mine's permit document available at WDEQ/LQD.

Under current natural conditions, the selected tracts provide limited waterfowl and shorebird habitat. This habitat is mainly available during spring migration as ponds and ephemeral streams. Many of these water features generally get quite low or dry up during the summer.

Fish species are not normally found on the selected tract due to the ephemeral drainages within the area.

Appendix D contains a discussion of threatened, endangered and sensitive species.

3.3.11 OWNERSHIP AND LAND USE

Powder River Coal Company owns 20 acres of the surface in the selected tract. The remaining surface is USFS lands. The principal land uses within the selected tract and on adjacent lands is livestock grazing, oil and gas development, wildlife habitat and recreation (NARM permit 2005). Areas of disturbance within the selected tract include, access roads, and mine monitoring access roads. Surface ownership of the East Burn Tracts is illustrated in Figure 3.3-5

All of the coal estate included in the East Burn selected tracts is federally owned. Figure 3.3-6 shows that the oil and gas estate within the analyses area is federally owned. All of the federally owned oil and gas estate is leased. There are no oil, gas or CBNG wells in the selected tracts.

The Supreme Court has ruled that CBNG rights belong to the owner of the oil and gas rights (98-830). Therefore, the oil and gas lessees have the right to develop the CBNG in the coal as well as the right to develop conventional oil and gas on the tract.

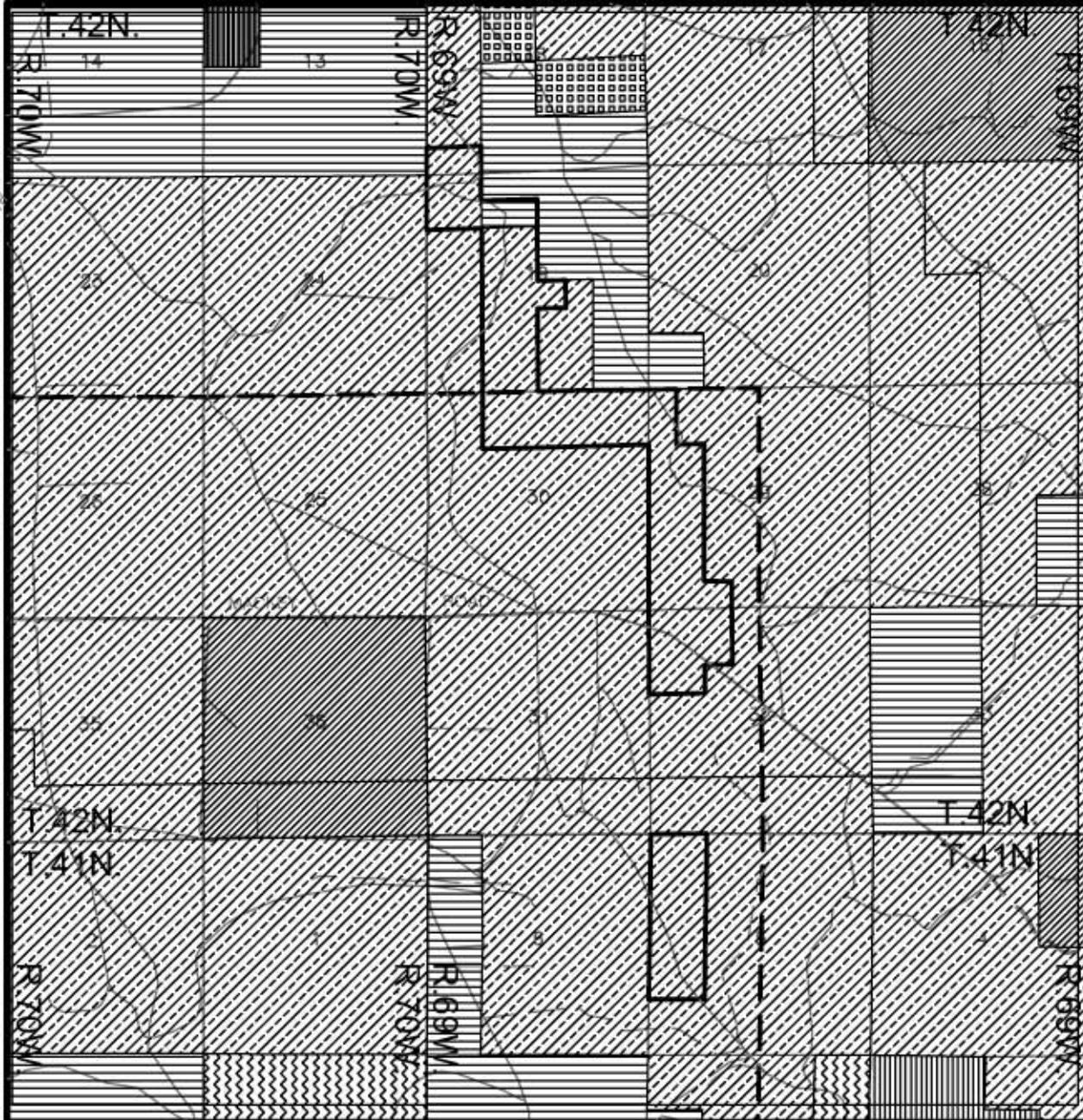
Coal mining is a dominant land use in the general area surrounding the selected tract.

Campbell County has no applicable countywide land use plans, and the selected tracts have no designated zoning classification. The *City of Gillette/Campbell County Comprehensive Planning Program* (City of Gillette 1978) provides general land use goals and policies for state and federal coal leases in the county.

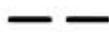
Big game hunting is the principal recreational use in the selected tract. Land ownership within the PRB is 80% private, but some private land owners permit sportsmen to cross and/or hunt on their land. Others charge an access fee, and some do not allow any access. There has been a trend over the past two decades towards a substantial reduction in lands open and reasonably available for hunting. Access fees continue to rise, and many resident hunters feel these access fees are unreasonable. This trend has created problems for the WGFD in their attempt to distribute and control harvest at optimal levels, as well as to sportsmen who desire access to these animals (WGFD 1996). Due to safety concerns, public lands contained within an active mining area are often closed to the public, further limiting recreational use. In the PRB, the publicly owned Thunder Basin National Grasslands (TBNG), BLM-administered public lands, and state school sections (normally Sections 16 and 36) are generally open to hunting if legal access is available. As shown in Figure 3.3-5, most of the selected tract is public surface.

Sport hunting in varying degrees occurs on the selected tracts. Pronghorn and mule deer occur on and adjacent to the tracts. Sage grouse, mourning dove, waterfowl, rabbit, and coyote are hunted in the vicinity, and some coyote and red fox trapping may occur.

ALTERNATE



Legend



North Antelope Rochelle Mine Permit Boundary



North Antelope Rochelle Mine East Burn Tracts



Daniel E & Joyce Ann Tracy



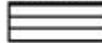
Dilts



US Forest Service



North American L&L



Powder River Coal Company



Triton Coal Company



State of Wyoming



SCALE: 1" = 4000'

Figure 3.3-5 Surface Ownership on the North Antelope Rochelle Mine East Burn Tracts

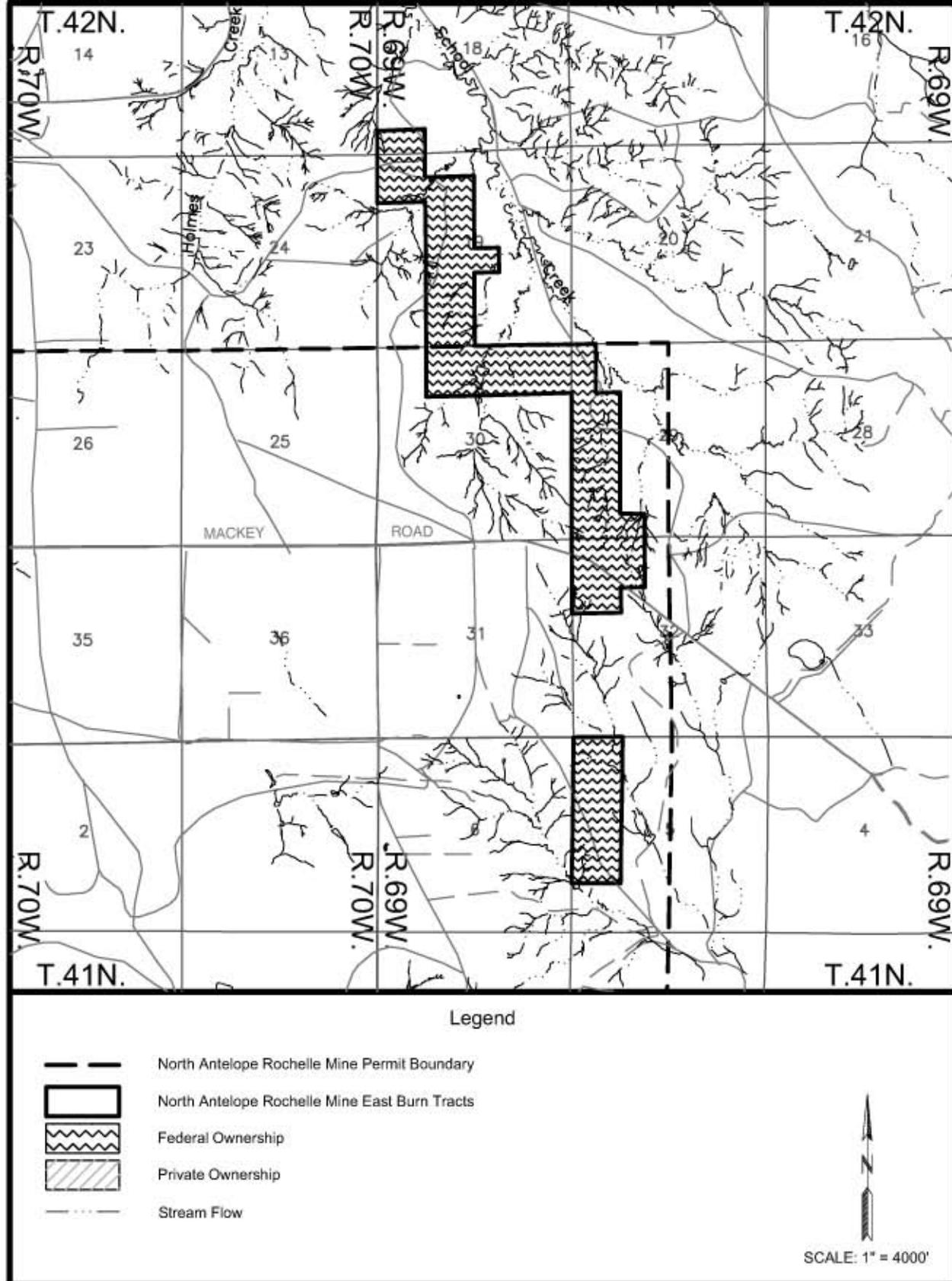


Figure 3.3-6 Oil and Gas Ownership on the North Antelope Rochelle Mine East Burn Tracts

3.3.12 CULTURAL RESOURCES

See Section 3.1.9

The selected tracts were surveyed for cultural resources in two separate surveys. Larson Tibesar Associates surveyed a portion of the area in 1981 and GCM Services, Inc. surveyed the remaining area in 1994. Both surveys were conducted to a Class III level. The goal of the inventory was to locate and evaluate for the NRHP all cultural resources 50 years and older within the study area. WDEQ, OSM, and the Wyoming SHPO reviewed and approved the survey results as part of permit amendment reviews.

Eighteen sites were identified within the selected tracts. Fourteen sites were classified as prehistoric, two as historic and two multi-component sites with both prehistoric and historic components. None of the sites met the criteria for eligibility to the NRHP.

3.3.13 NATIVE AMERICAN CONCERNS

See Section 3.1.10

Native American tribes were consulted at a general level in 1995-1996 as part of an effort to update the BLM Buffalo RMP. Tribes that have been potentially identified as having concerns about actions in the PRB include: the Crow, Northern Cheyenne, Shoshone, Arapaho, Oglala Lakota, Rosebud Sioux, Flandreau Santee Sioux, Santee Sioux, Crow Creek Sioux, Lower Brule Sioux, Standing Rock Sioux, and Cheyenne River Sioux.

OSM completed the Native American consultation on lands within the analysis area previously submitted as a permit amendment. Sites on lands outside of the current permit area will be reviewed during the permitting process if the Proposed Action is authorized by BLM.

3.3.14 PALEONTOLOGICAL RESOURCES

See Section 3.1.11

A paleontological survey was conducted in the East Burn tracts during the cultural resource surveys. No vertebrate or invertebrate fossils or plant material was collected, as all of it was fragmentary and considered to be of limited scientific significance.

3.3.15 VISUAL RESOURCES

See Section 3.1.12

The NARM facilities and some mining activities are visible from Highway 59, Mackey, Antelope and Road 31 county roads. This is also true for portions of the selected tracts.

The lands in the selected tracts are generally classified as VRM Class IV. The existing mining activity is visible from several sites on the tracts.

Lands on the Thunder Basin National Grasslands are managed for visual resources under the Thunder Basin Land and Resource Management Plan for scenic integrity levels. Scenic integrity levels are a set of measurable goals for management of grassland and forest scenic resources. The levels include:

- Very High: A scenic integrity level that generally provides for ecological change only.
- High: A scenic integrity level that means human activities are not scenically evident.
- Moderate: A scenic integrity level that refers to landscapes where the valued landscape character "appears slightly altered."
- Low: A scenic integrity level that refers to landscapes where the valued landscape character "appears moderately altered."
- Very Low: A scenic integrity level that refers to landscapes where the valued landscape character "appears heavily altered."

Specific activities and projects will require a detailed analysis of the impacts to the scenic resource to determine which types, location, and size of management activities are permitted. Mitigation would occur in all alternatives and during project implementation. Grassland-wide and forest-wide standards and guidelines would direct rehabilitation, enhancement of scenic integrity, integration of aesthetics in resource planning, and efforts to achieve vegetative

The East Burn tracts are located in an area where the scenic integrity level is low.

3.3.16 NOISE

See Section 3.1.13

Existing noise sources in the area include adjacent coal mining activities, traffic on Wyoming 59, and the mine access roads, rail traffic, ranching activities, and wind. No site-specific noise level data are available for the area. Because the NARM is adjacent to the selected tracts, a median noise level is estimated to be 40 to 60 dBA for day, evening, and nighttime, with the noise level increasing with proximity to active mining. Mining activities are characterized by noise levels of 85 to 95 dBA at 50 feet from actual mining operations and activities (BLM 1992b). Figure 3.1-4 presents noise levels associated with some commonly heard sounds.

There are no residences within two miles of the selected tracts.

3.3.17 TRANSPORTATION FACILITIES

Transportation resources near the East Burn tracts include three county roads: Reno Road, County Road 83, Mackey Road, County Road 31 and Antelope Road. Wyoming Highway 59 is approximately 13.5 miles west of the selected tract. Highway 59 is a paved two-lane road that runs north-south. As shown on Figure 3.3-7, Mackey Road crosses through the selected tracts. Several unnamed two-track roads either cross the selected tract or are adjacent to them.

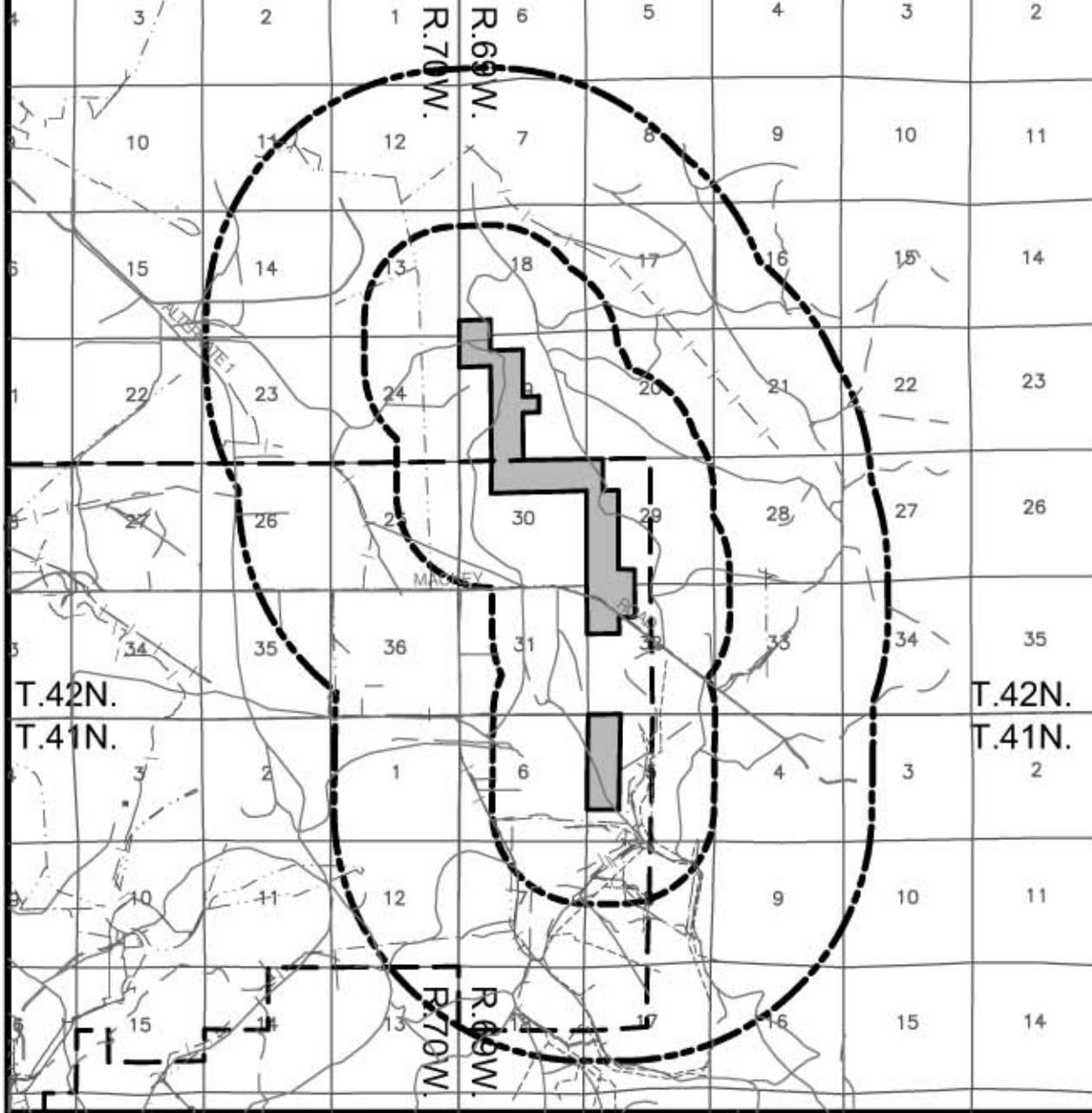
The nearest railroad facilities are the Burlington Northern/Santa Fe Railroad spurs accessing the North Antelope Rochelle Mine approximately 4.5 miles southwest of the selected tract area. Figure 3.3-7 shows the location of transportation facilities within and adjacent to the tracts. Since the tracts as applied for would be an extension of the existing North Antelope Rochelle Mine operations, the existing coal transportation facilities and infrastructure would be used during mining of the selected tracts.

3.3.18 SOCIOECONOMICS

See Section 3.1.13.

3.3.19 HAZARDOUS AND SOLID WASTE

Potential sources of hazardous or solid waste on the NARM East Burn tracts would include spilling, leaking, or dumping hazardous substances, petroleum products, and/or solid waste associated with mineral, coal, oil and/or gas exploration and development, or agricultural or livestock activities. No such hazardous or solid wastes are known to be present on the selected tract. Wastes produced by current mining activities at the North Antelope Rochelle Mine are handled according to the procedures described in Chapter 2.



Legend

- | | | | |
|--|---|---|--------------------------|
|  | North Antelope Rochelle Mine Permit Boundary |  | Power Transmission Lines |
|  | North Antelope Rochelle Mine East Burn Tracts |  | CBM Pipelines |
|  | Search Boundary (3/4 Mile Radius) |  | CBM Roads |
|  | Search Boundary - EPA (2 Mile Radius) |  | Residence (0) |
|  | Utility Pipelines |  | Bus Stop (0) |
|  | Telephone Lines | | |



SCALE: 1" = 7000'

Figure 3.3-7 Transportation Facilities Within and Adjacent to the North Antelope Rochelle Mine East Burn Tracts

3.4 SELECTED TRACTS #5-6 – NARM SOUTH SPUR

3.4.1 GENERAL SETTING

See Section 3.4.1.

3.4.2 TOPOGRAPHY AND PHYSIOGRAPHY

See Section 3.4.2

3.4.3 GEOLOGY

See Section 3.1.3

NARM staff refer to the two coal seams as the Anderson-Wyodak and the Canyon. On the South Spur tracts, the Anderson-Wyodak does not exist or is very thin, being less than 5 feet thick. The Anderson-Wyodak may not be recoverable in some areas of the NARM South Spur Tracts. The parting between the coal seams is relatively thick, varying from 15 to 50 feet. The Canyon also tapers out in some areas on the selected tract, but in other areas it occurs in thicknesses up to 30 feet. Figure 3.4-1 illustrates two geologic cross-sections of the South Spur tracts.

3.4.3.1 Mineral Resources

See Section 3.1.3.1

There is one conventional oil/gas well within the South Spur tracts. According to WOGCC as of December 2005, the well is a flowing producing well operated by DNR Oil and Gas, Inc.

There are no CBNG wells.

The ownership of oil and gas resources in the tract is discussed in “Ownership and Use of Land” Section 3.4.11.

No mineable bentonite reserves have been identified.

No known uranium reserves exist.

Scoria is present across a large portion of the tracts.

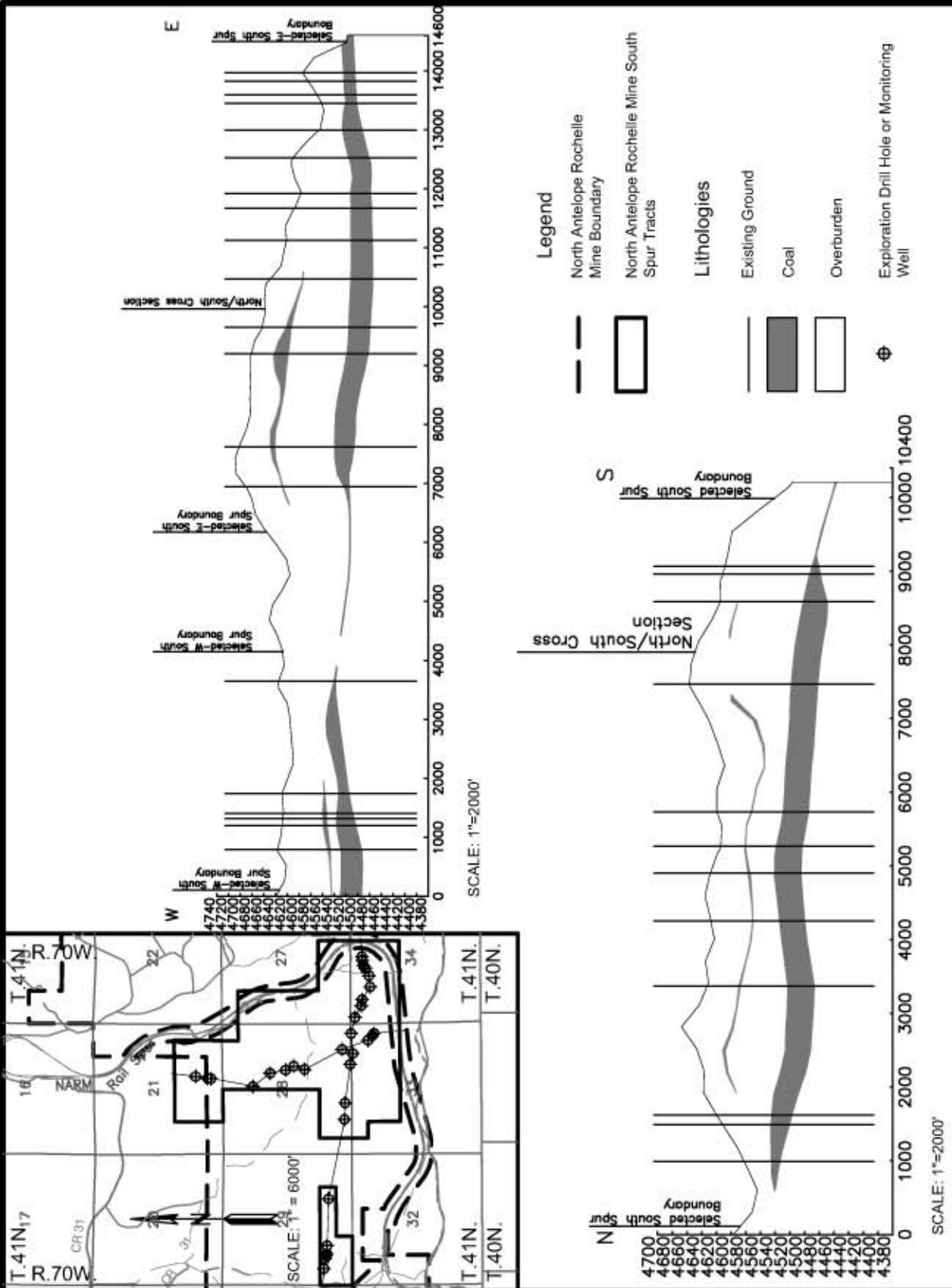


Figure 3.4-1 North-South and East-West Geologic Cross Sections, North Antelope Rochelle Mine South Spur Tracts

3.4.4 SOILS

A portion of the selected tracts were subjected to an order 1-2 soils survey. However because only part of the area was surveyed at that detail, NRCS soils data will be used to characterize the soils in the selected tracts.

The following is a list of the soil series that comprise the predominate map units delineated on the South Spur Tracts under the Proposed Action;

- Wibaux-Rock outcrop-Shingle complex, 6 to 45% slopes
- Wibaux-Wibaux, thin solum complex, 6 to 40% slopes
- Theedle-Kishona loams, 6 to 15% slopes
- Arvada, thick surface-Arvada-Slickspots complex, 0 to 6% slopes
- Sear-Wibaux complex, 0 to 15% slopes
- Zigweid-Cambria association, 0 to 6% slopes
- Ustic Torriorthents, gullied
- Hilight-Wags-Badland complex, 3 to 45% slopes
- Forkwood-Ulm complex, 0 to 6% slopes
- Zigweid-Bahl association, 0 to 6% slopes

Many of the soils in the selected tracts are thin and of low quality. The topsoil salvage depths will be better defined when the selected tracts are amended to the permit area and a topsoil balance is developed. The North Antelope Rochelle Mine currently has an 18 inch topsoil replacement requirement in their approved permit.

The soil depths and types on the selected tract are similar to soils currently being salvaged and used for reclamation at the adjacent mine and other mines in the area.

The site-specific soil surveys have located hydric soils and/or inclusions of hydric soils, which are one component used in identifying wetlands. Please see Section 3.4.8 for discussion of wetland surveys.

3.4.5 AIR QUALITY AND CLIMATE

See Section 3.1.5 for a discussion of regional air quality. Climate and meteorology information for the NARM is presented in Section 3.4.1.

3.4.6 WATER RESOURCES

3.4.6.1 Groundwater

See Section 3.1.6.1.

3.4.6.2 Surface Water

See Section 3.1.6.2

The topography of the NARM South Spur tracts is marked by elevated ridges and minor drainages. In general, surface water flows west and south toward Antelope Creek, which flows to the west near the southern edge of the South Spur tracts. Antelope Creek is typical for the region, and their flow events are closely reflective of precipitation patterns

3.4.6.3 WATER RIGHTS

See Section 3.4.6.3 for a discussion of groundwater rights for the NARM East Burn and South Spur Tracts.

SEO records were searched for surface water rights using the SEO's computer database. The search was conducted for surface-water rights within ½ mile of the offered lands and 3 miles downstream of the South Spur tracts. There were 162 water rights were identified within the search area. Of these, 15 of the water rights are owned by coal mining companies. Of the remaining 147 water rights, 36 are owned by the USDA. The remaining rights are permitted for stock watering and irrigation. Table C-6 of Appendix C shows a listing of the 147 non-coal mine surface water rights.

3.4.7 ALLUVIAL VALLEY FLOORS (AVFS)

See Section 3.1.7

Investigations conducted by the North Antelope Rochelle Mine to determine the presence of AVFs within the South Spur tracts located within the current NARM permit area determined there were no AVFs within the selected tracts. The WDEQ has concurred with that finding. The results of that investigation are on file at WDEQ/LQD. It was determined that the areas surveyed did not meet the regulatory definition of an alluvial valley floor because of the lack of sufficient areas of subirrigation, channels are primarily incised, limited extent of unconsolidated stream-laid deposits, and limited water availability. The report also determined that no lands in the area are significant to farm production.

3.4.8 WETLANDS

See Section 3.1.8

Jurisdictional wetland inventories were conducted within the selected tract in 1996, 1997, and 2000. The wetlands delineation was completed in accordance with the procedures and criteria contained in the *Wetland Delineation Manual*. The North Antelope Rochelle Mine has a current COE authorization through the 5-year term of permit 569-T6 which was issued August 20, 2004. A total of 14.8 acres of jurisdictional wetlands have been delineated in the selected tract. Stock pond wetlands account for 11.2 acre and ephemeral stream wetlands total 3.6 acre. The wetlands identified on the NARM South Spur tracts are shown on Figure 3.4-2. Upon authorization of the Proposed Action, NARM will incorporate the selected tracts wetlands into the WDEQ/LQD permit and develop restoration plans for those to be impacted by mining activities.

3.4.9 VEGETATION

Several vegetation baseline studies have been conducted in the NARM permit area from 1978 through 1997. The vegetation type descriptions in the 1991 study will be used to describe the vegetation types in the South Spur tracts. All of the studies are on file in the approved permit document at WDEQ/LQD.

Six vegetation types are mapped in the South Spur tracts. Disturbed areas and water are also mapped out. Scoria grassland is the predominate type followed by greasewood grassland. Minor communities of breaks grassland, upland grassland, meadow grassland and a small area of undeveloped pastureland are also present. The vegetation communities were delineated, mapped, and sampled in accordance with the current WDEQ/LQD requirements. The small area of undeveloped pastureland was not sampled. The results of the baseline studies, including the Proposed Exchange tracts, were reviewed and approved by WDEQ/LQD as part of an earlier permit amendment. Sampling was conducted on a large enough area to include sufficient room for overburden layback and other mining needs to recover the coal under the current leases and extended into the selected tracts.

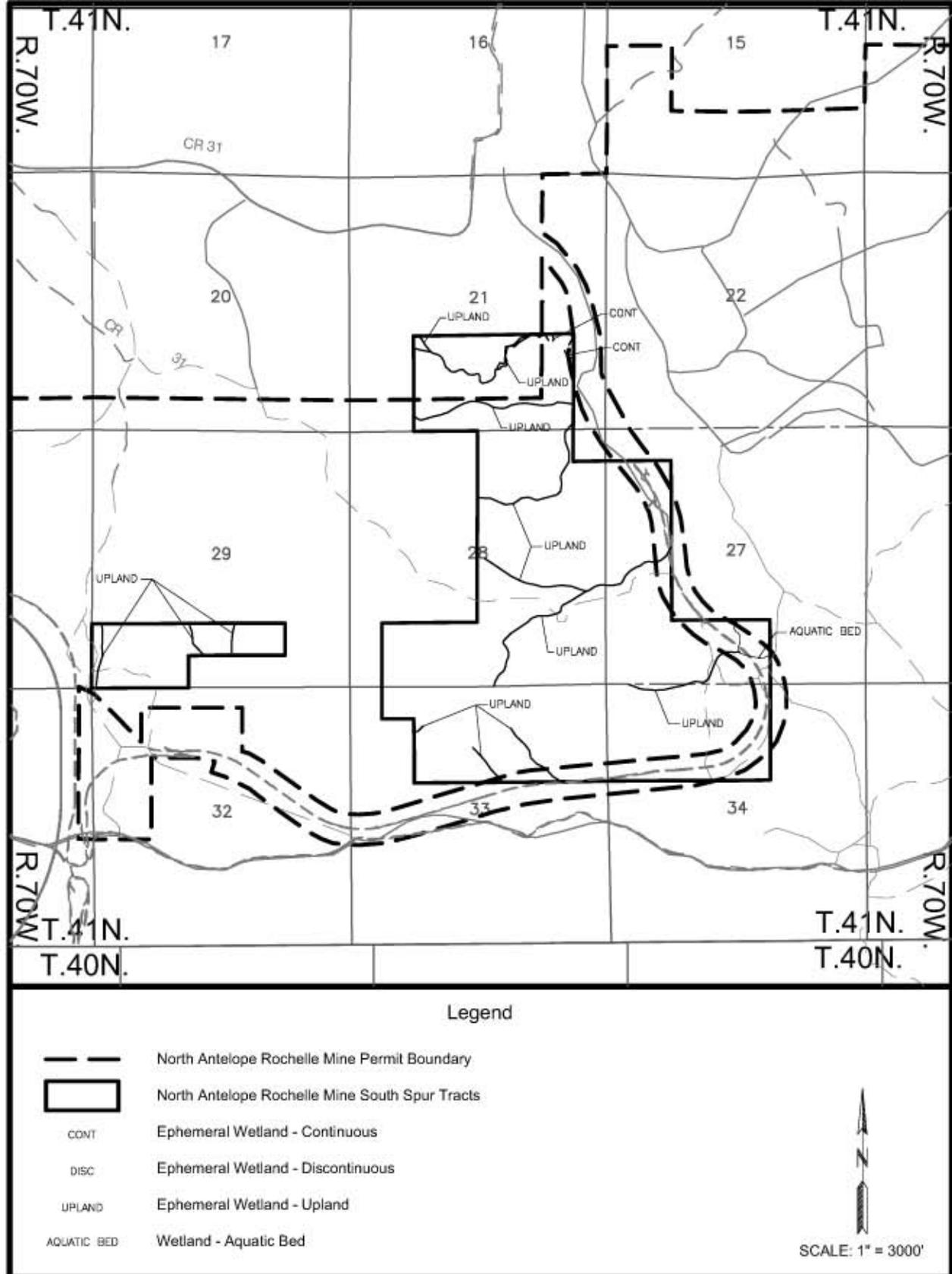


Figure 3.4-2 Wetlands Within the North Antelope Rochelle Mine South Spur Tracts

3.4.9.1 Vegetation Types

The Scoria Grassland Type is characterized by low amounts of vegetation cover and high litter and rock ground cover. Large portions of this vegetation type are generally a monoculture of downy brome (*Bromus tectorum*) and scoria rock. Approximately 80% of the selected tracts are covered by scoria grassland.

Absolute total vegetation cover averaged 59.1% with perennial graminoids providing 22.5%. Major perennial species included western wheatgrass, blue grama, bluebunch wheatgrass (*Agropyron spicatum*), and prairie junegrass (*Koeleria macrantha*). Annual graminoids accounted for 18.9% absolute cover. Shrubs provided 5.5% and halfshrubs added 4.1%. Fifteen perennial forbs provided 5.6% and six annual and biennial forbs added another 1.1% absolute total vegetation cover.

The ANP of the scoria grassland averaged 90.2 g/m² with perennial graminoids accounting for 48.4 g/m² or 54% of the production. Perennial forbs added 19.7 g/m² (11%). Annual and biennial grasses and forbs accounted for 27.3 g/m² (30%).

The Greasewood Grassland Type consisted mostly of annual grasses and greasewood (*Sarcobatus vermiculatus*). Greasewood is the dominant shrub and downy brome (*Bromus tectorum*) and Japanese brome (*Bromus japonicus*) make of the majority of the grasses. Approximately 10% of the selected tracts consist of this vegetation type.

Absolute total vegetation cover was 69.95 with perennial graminoids contributing 17.2%. Major perennial grasses include western wheatgrass, blue grama, sideoats grama (*Bouteloua curtipendula*), and thickspike wheatgrass. Annual graminoids accounted for 42.9% absolute species cover and shrubs provided another 6.4%. Bare soil was 7.3% and litter/rock added 22.8%.

The ANP of the greasewood type averaged 89.4 g/m². Perennial graminoids accounted for 37.3 g/m². Annual and biennial grasses and forbs accounted for 51.0 g/m² or approximately 57% of the total productivity. Western wheatgrass, sideoats grama, blue grama and thickspike wheatgrass also provided most of the perennial grass production.

The Breaks Grassland Type occurs on rough broken topography dissected by numerous small drainages. Steep slopes and generally heavy clay soils provide low vegetation cover. Major species include blue grama (*Bouteloua gracilis*), thickspike wheatgrass (*Agropyron dasystachyum*), western wheatgrass (*Agropyron smithii*), big sagebrush (*Artemisia tridentata wyomingensis*), and sedge (*Carex* sp.).

Absolute vegetative cover in the breaks grassland averaged 36.4%. Perennial graminoids were dominant with 33.4%. Major species included blue grama, thickspike wheatgrass, western wheatgrass, threadleaf sedge (*Carex filifolia*), and (needle-and-thread (*Stipa comata*). Annual graminoids accounted for 1.2%. Two shrubs provided 2.7%. Halfshrubs, primarily broom snakeweed (*Gutierrezia sarothrae*), contributed

1.8% and 23 perennial forbs provided 5.0%. Bare soil accounted for 46% and litter/rock contributed 17.6%.

The above-ground net productivity (ANP) of the breaks grassland averaged 49.3 g/m². Perennial graminoids accounted for 34.5 g/m² or 70% of the total productivity. Perennial forbs contributed 7.5 g/m² and halfshrubs provided 2.9 g/m².

The Upland Grassland Type occurs on rolling terrain with limited shrub cover. There are only three small areas of this community type in the South Spur Tracts. Dominant perennial graminoids include western wheatgrass, needle-and-thread and blue grama.

Absolute total vegetation cover of 62.4% was dominated by perennial graminoids at 32.4%. Major perennial species included western wheatgrass, needle-and-thread, thickspike wheatgrass, red threeawn (*Aristida purpurea*), blue grama, and threadleaf sedge. Annual graminoids accounted for 17.5%, shrubs only 0.8% and halfshrubs 1.3%. Seventeen perennial forbs provided 3.2% and six annual and biennial forbs contributed 1.3% absolute species cover.

The ANP averaged 77.9 g/m² with perennial graminoids accounting for 50.1 g/m² or 64% of the total production. Annual and biennial grasses and forbs accounted for 22.3 g/m² and perennial forbs added 4.6 g/m².

The Meadow Grassland Type occurs in ephemeral drainage bottoms and upland terraces. The dominant shrub is big sagebrush. Dominant perennial grasses include western wheatgrass, green needlegrass (*Stipa viridula*), thickspike wheatgrass, and slender wheatgrass (*Agropyron trachycaulum*).

Absolute total vegetation cover of 83.3% was dominated by perennial graminoids with 66.3%. Dominant perennial species included western wheatgrass, thickspike wheatgrass, green needlegrass, and slender wheatgrass. Annual graminoids accounted for 4.5%. Four shrub species, primarily big sagebrush, provided 1.3% absolute cover. Halfshrubs contribute 2.1% and nineteen forbs provided 7.2% absolute cover. Bare soil accounted for 7.7% and litter/rock added 9.0%.

The ANP of the meadow grassland averaged 251.0 g/m². Perennial graminoids accounted for 211.0 g/m² or 84% of the total production. Perennial forbs added 14.7 g/m² and shrubs contributed 10.2 g/m². Annual grasses and forbs totaled 13.6 g/m². Perennial species with the highest productivity included western wheatgrass, thickspike wheatgrass, green needlegrass, Baltic rush (*Juncus balticus*), and alkali bluegrass (*Poa juncifolia*).

3.4.9.2 Threatened, Endangered, and Candidate Plant Species

No federally listed threatened, endangered, or candidate plant species are known to occur within the analysis area. The analysis area was surveyed in 1999 for threatened,

endangered and candidate species using the *Wyoming Rare Plant Field Guide* (Thorne 1994) as their reference. Ute ladies'-tresses surveys were conducted by BKS Environmental Associates, Inc. on September 6, 2005. The FWS memorandum published November 23, 1992 entitled "Interim Survey Requirements for *Spiranthes diluvialis*" was also used as a guide in conducting the survey. All individuals who conducted the survey are qualified to conduct Ute ladies'-tresses surveys. All areas surveyed lacked the hydrology sufficient to support orchid establishment. Soil clay content also limited habitat. The contractor did not identify any orchid habitat in the selected tracts. The surface in the South Spur survey area is all private ownership.

3.4.10 WILDLIFE

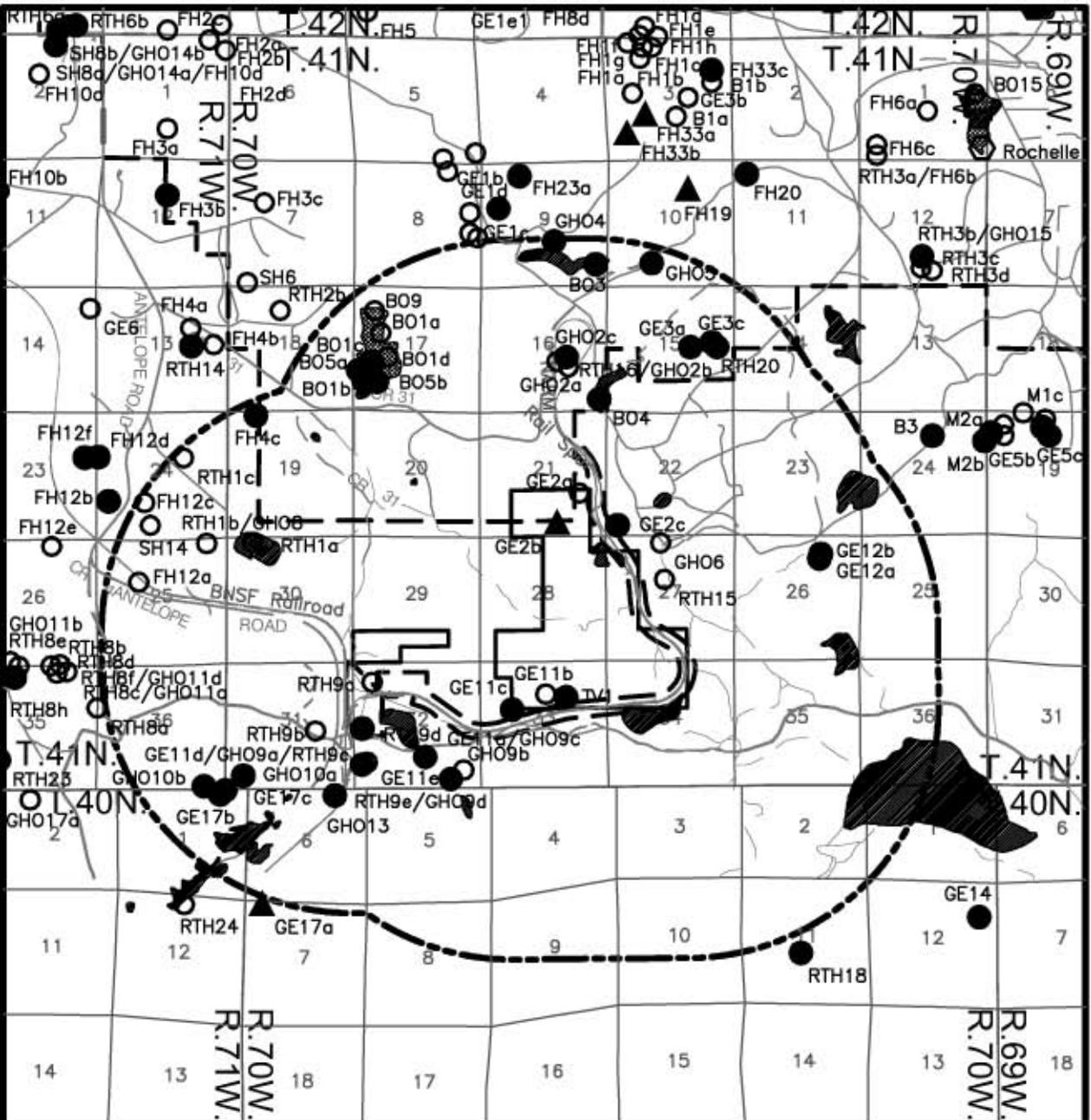
Background information on wildlife for the South Spur tracts was gathered from several sources including: NARM WDEQ/LQD permit and annual reports, Wyoming Game and Fish Department (WGFD) and FWS records. Wildlife information for the South Spur tracts is the same as the information presented for the East Burn tracts in Section 3.3.10. Refer to that section for a discussion of wildlife resources. Raptor nest sites, grouse leks and prairie dog towns adjacent to the NARM South Spur Tracts are illustrated on Figure 3.4-3.

3.4.11 OWNERSHIP AND LAND USE

Powder River Coal Company owns most of the surface in the South Spur tracts. The remaining surface is owned by the Dilts family. The principal land uses within the selected tracts and on adjacent lands is livestock grazing, oil and gas development, and wildlife habitat. (NARM permit 2005). Areas of disturbance within the selected tract include, the NARM railroad spur, access roads, and mine monitoring access roads. Surface ownership is shown on Figure 3.4-4.

All of the coal estate included in the NARM South Spur tracts is federally owned. Figure 3.4-5 shows that the oil and gas estate within the analyses area is federally owned. All of the federally owned oil and gas estate is leased. There is one conventional oil/gas well within the tracts. According to WOGCC as of December 2005, the well is a flowing producing well operated by DNR Oil and Gas, Inc.

The Supreme Court has ruled that CBNG rights belong to the owner of the oil and gas rights (98-830). Therefore, the oil and gas lessees have the right to develop the CBNG in the coal as well as the right to develop conventional oil and gas on the tract.



Legend

- | | | | |
|--|--|-------------------------------|-----------------------------|
| | North Antelope Rochelle Mine Permit Boundary | | Intact Raptor Nest |
| | North Antelope Rochelle Mine South Spur Tracts | | Former Sage Grouse Lek |
| | Search Boundary - EPA (2 Mile Radius) | | Former Raptor Nest |
| | Raptor Nesting Platform | <u>Species Codes</u> | |
| | Prairie Dog Colony | GE = Golden Eagle | SH = Swainson's Hawk |
| | Former Prairie Dog Colony | RTH = Red-tailed Hawk | M = Merlin |
| | | GHO = Great Horned Owl | BO = Burrowing Owl |
| | | FH = Ferruginous Hawk | B = Buteo Species |

SCALE: 1" = 7000'

Figure 3.4-3 Raptor Nest Sites, GE Leks, Prairie Dog Colonies Within and Adjacent to the North Antelope Rochelle Mine South Spur Tracts

Coal mining is a dominant land use in the general area surrounding the selected tract.

Campbell County has no applicable countywide land use plans, and the selected tracts have no designated zoning classification. The *City of Gillette/Campbell County Comprehensive Planning Program* (City of Gillette 1978) provides general land use goals and policies for state and federal coal leases in the county.

Big game hunting is the principal recreational use in the selected tracts. Land ownership within the PRB is 80% private, but some private landowners permit sportsmen to cross and/or hunt on their land. Others charge an access fee, and some do not allow any access. There has been a trend over the past two decades towards a substantial reduction in lands open and reasonably available for hunting. Access fees continue to rise, and many resident hunters feel these access fees are unreasonable. This trend has created problems for the WGFD in their attempt to distribute and control harvest at optimal levels, as well as to sportsmen who desire access to these animals (WGFD 1996). Due to safety concerns, public lands contained within an active mining area are often closed to the public, further limiting recreational use. In the PRB, the publicly owned Thunder Basin National Grasslands, BLM-administered public lands, and state school sections (normally Sections 16 and 36) are generally open to hunting if legal access is available. As shown in Figure 3.4-4, all of the selected tracts are private surface.

Sport hunting in varying degrees occurs on the selected tract. Pronghorn and mule deer occur on and adjacent to the tract. Sage grouse, mourning dove, waterfowl, rabbit, and coyote are hunted in the vicinity, and some coyote and red fox trapping may occur.

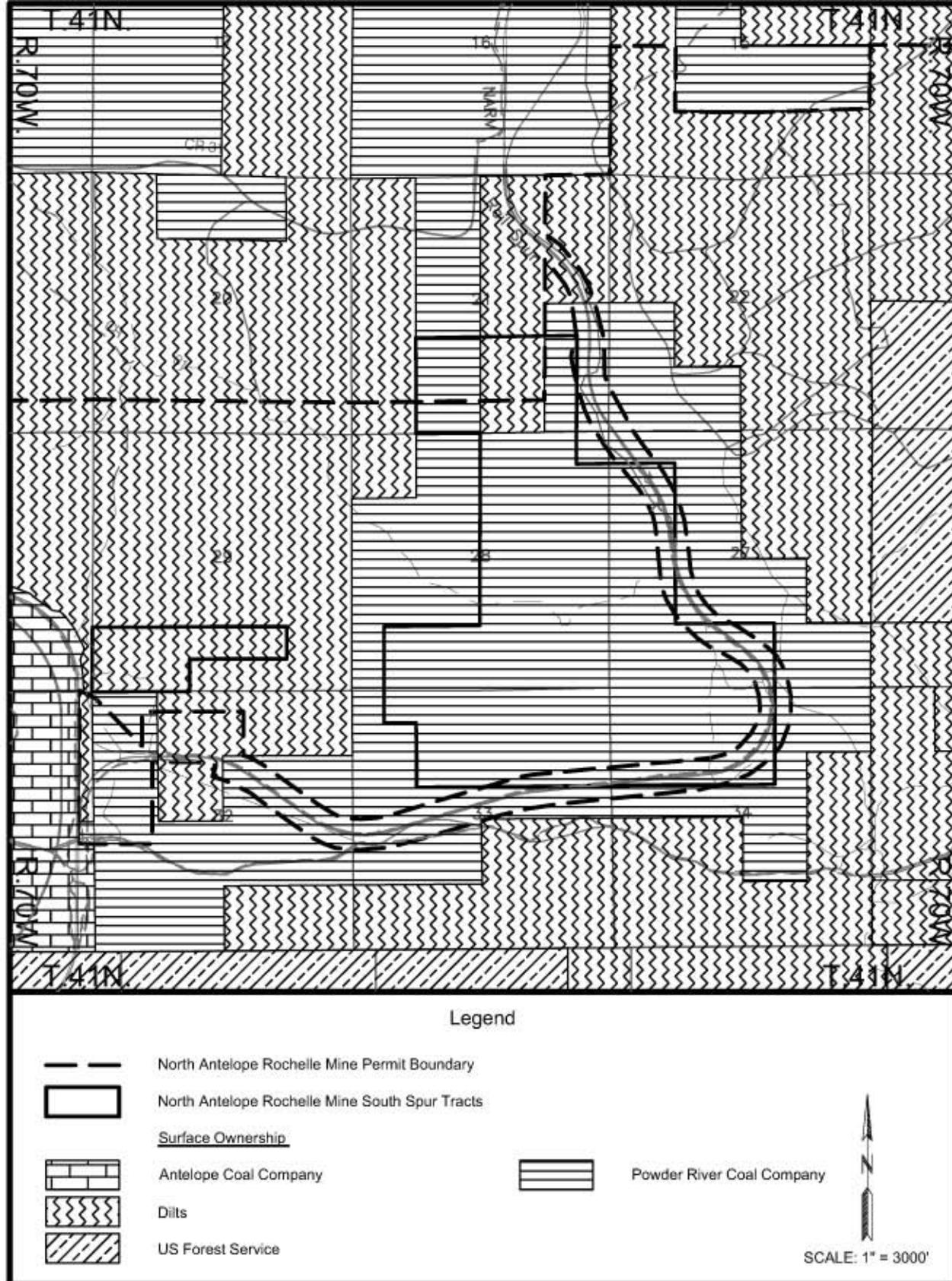


Figure 3.4-4 Surface Ownership on the North Antelope Rochelle Mine South Spur Tracts

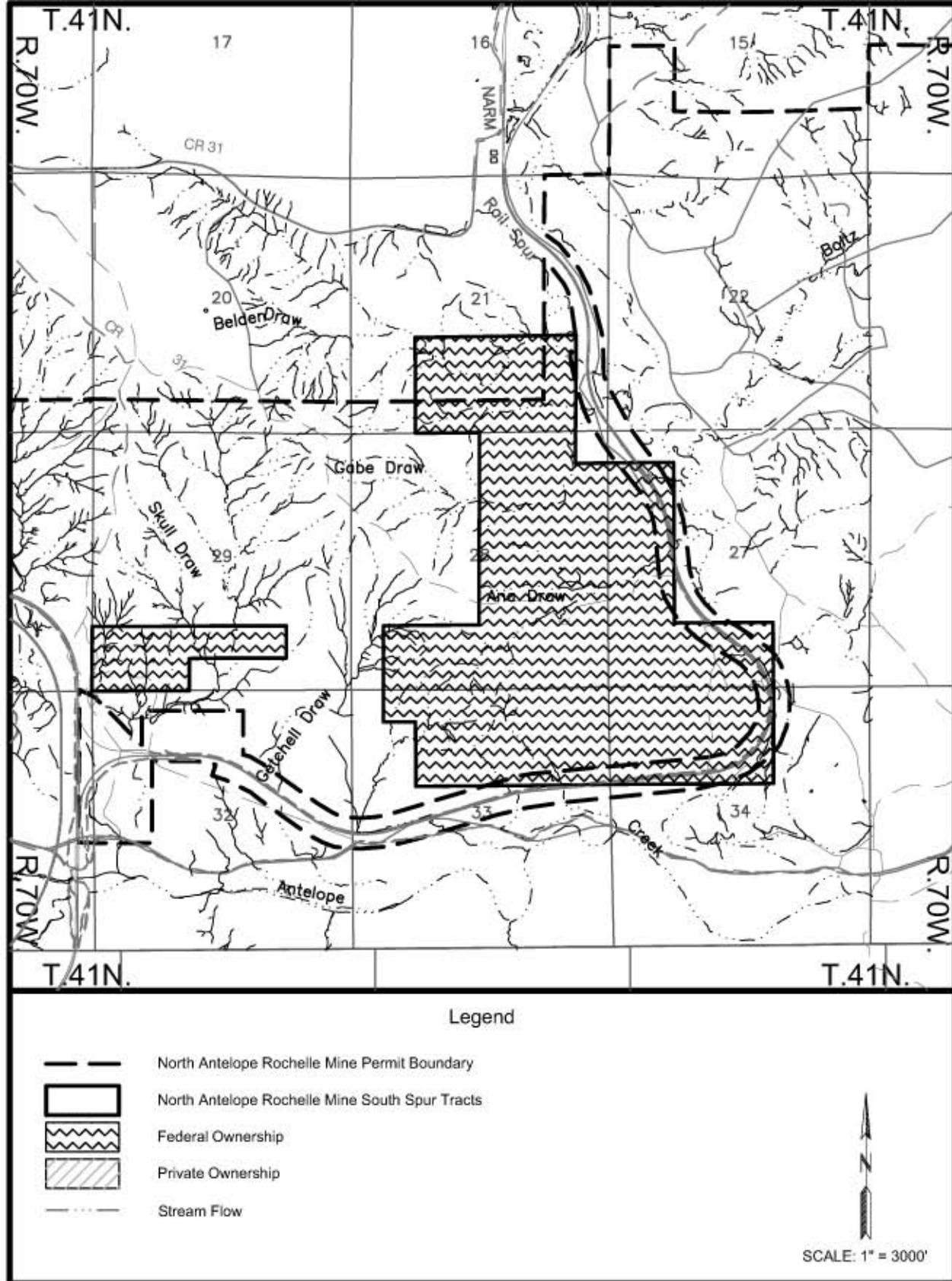


Figure 3.4-5 Oil and Gas Ownership on the North Antelope Rochelle Mine South Spur Tracts

3.4.12 CULTURAL RESOURCES

See Section 3.1.9

The South Spur tracts were surveyed for cultural resources in two separate surveys. Larson Tibesar Associates surveyed a portion of the area in 1981 and GCM Services, Inc. surveyed the remaining area in 1994 and 2004. Both surveys were conducted to a Class III level. The goal of the inventory was to locate and evaluate for the NRHP all cultural resources 50 years and older within the study area. WDEQ, OSM, and the Wyoming SHPO reviewed and approved the survey results as part of permit amendment reviews.

Sixteen sites were identified within the selected tracts. Eleven sites were classified as prehistoric, five as historic. Three prehistoric sites were determined to be eligible for nomination for the NRHP. Two of the eligible sites have been mitigated and cleared. One site, 48CA1930, remains eligible and will be mitigated if it falls within the mine disturbance limit boundary. The remaining 13 sites did not meet the criteria for eligibility to the NRHP.

3.4.13 NATIVE AMERICAN CONCERNS

See Section 3.1.10

Native American tribes were consulted at a general level in 1995-1996 as part of an effort to update the BLM Buffalo RMP. Tribes that have been potentially identified as having concerns about actions in the PRB include: the Crow, Northern Cheyenne, Shoshone, Arapaho, Oglala Lakota, Rosebud Sioux, Flandreau Santee Sioux, Santee Sioux, Crow Creek Sioux, Lower Brule Sioux, Standing Rock Sioux, and Cheyenne River Sioux.

OSM completed the Native American consultation on lands within the analysis area previously submitted as a permit amendment. Sites on lands outside of the current permit area will be reviewed during the permitting process if the Proposed Action is authorized by BLM.

3.4.14 PALEONTOLOGICAL RESOURCES

See Section 3.1.11

A paleontological survey was conducted in the South Spur tracts during the cultural resource surveys. No vertebrate or invertebrate fossils or plant material was collected, as all of it was fragmentary and considered to be of limited scientific importance.

3.4.15 VISUAL RESOURCES

See Section 3.1.12

The NARM facilities and some mining activities are visible from Highway 59, Mackey, Antelope and Road 31 county roads. This is also true for portions of the selected tracts.

The lands in the selected tracts are generally classified as VRM Class IV. The existing mining activity is visible from several sites on the tract.

3.4.16 NOISE

See Section 3.1.13

Existing noise sources in the area include adjacent coal mining activities, traffic on Wyoming 59, and the mine access roads, rail traffic, ranching activities, and wind. No site-specific noise level data are available for the area. Because the North Antelope Rochelle Mine is adjacent to the selected tracts, a median noise level is estimated to be 40 to 60 dBA for day, evening, and nighttime, with the noise level increasing with proximity to active mining. Mining activities are characterized by noise levels of 85 to 95 dBA at 50 feet from actual mining operations and activities (BLM 1992b).

Figure 3.1-4 presents noise levels associated with some commonly heard sounds.

There are no residences within two miles of the selected tract.

3.4.17 TRANSPORTATION FACILITIES

Transportation resources near the selected tracts include county roads: County Road 31 and Antelope Road. Wyoming Highway 59 is approximately 7 miles west of the selected tract. Highway 59 is a paved two-lane road that runs north-south. As shown on Figure 3.4-6, Antelope Road crosses through the selected tracts. Several unnamed two-track roads either cross the selected tracts or are adjacent to them.

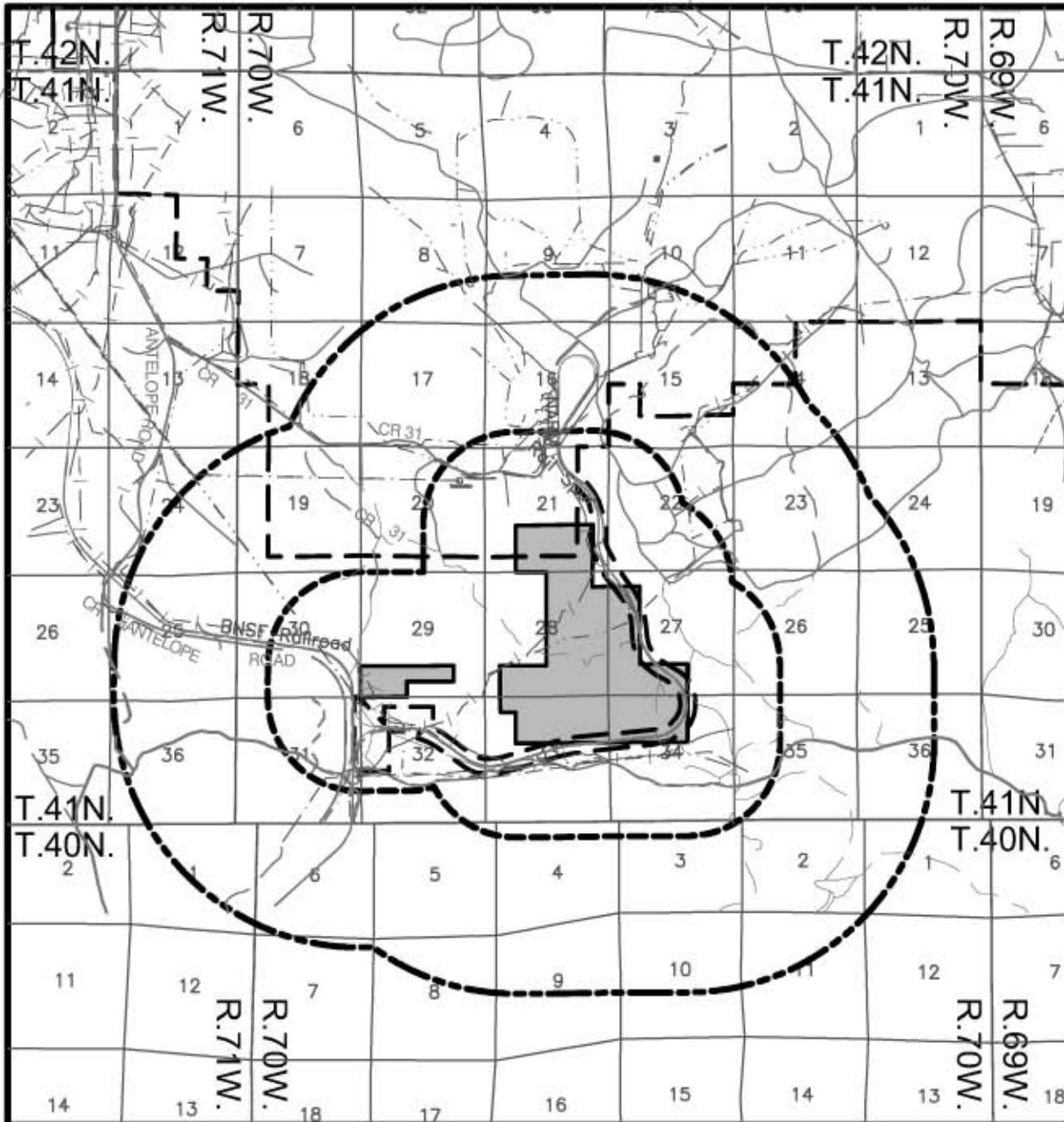
The nearest railroad facilities are the Burlington Northern/Santa Fe Railroad spurs accessing the North Antelope Rochelle Mine which runs along the southern and eastern edges of the selected tracts. Figure 3.4-6 shows the location of transportation facilities within and adjacent to the selected tracts. Since the selected tracts as applied for would be an extension of the existing NARM operations, the existing coal transportation facilities and infrastructure would be used during mining of the selected tracts.

3.4.18 SOCIOECONOMICS

See Section 3.1.13.

3.4.19 HAZARDOUS AND SOLID WASTE

Potential sources of hazardous or solid waste on the South Spur tracts would include spilling, leaking, or dumping hazardous substances, petroleum products, and/or solid waste associated with mineral, coal, oil and/or gas exploration and development, or agricultural or livestock activities. No such hazardous or solid wastes are known to be present on the selected tracts. Wastes produced by current mining activities at the North Antelope Rochelle Mine are handled according to the procedures described in Chapter 2.



Legend

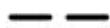
- | | | | |
|--|--|---|--------------------------|
|  | North Antelope Rochelle Mine Permit Boundary |  | Power Transmission Lines |
|  | North Antelope Rochelle Mine South Spur Tracts |  | CBM Pipelines |
|  | Search Boundary (3/4 Mile Radius) |  | CBM Roads |
|  | Search Boundary - EPA (2 Mile Radius) |  | Residence (0) |
|  | Utility Pipelines |  | Bus Stop (0) |
|  | Telephone Lines | | |



Figure 3.4-6 Transportation Facilities Within and Adjacent to the North Antelope Rochelle Mine South Spur Tracts

3.5 SELECTED TRACT #7 – RAWHIDE SOUTH SAND CHANNEL TRACT

3.5.1 GENERAL SETTING

The analysis area for the South Sand Channel tract is adjacent to the Rawhide Mine which is located north of Gillette within the Wyoming PRB, a part of the Northern Great Plains which includes most of northeastern Wyoming (Figure 1-1). Vegetation is primarily upland grassland with small areas of erosional grassland and big sagebrush. The climate is semi-arid, with an average annual precipitation at the Rawhide Mine of about 14 inches. May and June are the wettest months, and January and February are the driest. Snowfall at the Gillette 9ESE station averages 58 inches per year, with most occurring in March (10.3 inches) and April (8.6 inches) (Western Regional Climate Center 2002). Potential evapotranspiration, at approximately 31 inches (NOAA 1969), exceeds annual precipitation (Martner 1986). Temperature data has been recorded at the Rawhide Mine since 1975. Temperatures range from an average high of 70 degrees F in July to an average low of 11 degrees F in January. The highest recorded hourly temperature at the mine was 110°F and the lowest was -31 degrees F. August is the warmest month and December is the coldest. The average frost-free period is 129 days. (Caballo Coal Company 2005c).

The average annual wind speed at the Rawhide Mine (refer to Figure 3.5-2) is approximately 10 mph. Wind speeds are highest in the winter and spring and are predominantly from the northwest and south-southeast. Winter gusts often reach 30 to 40 mph. During periods of strong wind, dust may affect air quality across the region.

An average of 15 air-stagnation events occur annually in the PRB and typically last two days each (BLM 1974). General information describing the area's resources was gathered from draft BLM Buffalo Field office planning documents (BLM 1996a, 1996b, 1996c, 1996d, 1996g) and a BLM coal leasing study (BLM 1996e).

3.5.2 TOPOGRAPHY AND PHYSIOGRAPHY

See Section 3.1.2

The area drains into Little Rawhide Creek located east of the exchange area. Little Rawhide Creek drains into Rawhide Creek which then flows northeast to its confluence with the Little Powder River.

Overall, the analysis area is similar in topography to the rest of the Rawhide Mine permit area. Slopes range from flat to about 22% and average about 7%.

3.5.3 GEOLOGY

Regional geology is discussed in Section 3.1.3.

Figure 3.5-1 shows two geologic cross-sections drawn through the South Sand Channel tract (one north-south and one east-west). These cross sections are representative of the geology near the tract, with the primary variables being the thickness of overburden, the parting thickness between the Roland and Smith coal seams, and the surface topography.

On the tract, the Roland coal seam averages 40 feet thick, and the underlying Smith seam averages 66 feet. The parting thickness between the Roland and Smith coal seams average about 15 feet in the tract.

3.5.3.1 Mineral Resources

See Section 3.1.3.1

There are no active conventional oil or gas wells within the tract. As shown on Figure 3.5-7, one pipeline owned by Phillips Petroleum crosses the tract.

Current WOGCC records indicated that there were one active CBNG well, three shut in CBNG wells, and five wells either abandoned or have expired permits within the tract.

CBNG wells were initially drilled on 40-acre spacing in the Wyoming PRB, but the WOGCC has now established 80-acre spacing patterns as the default spacing for CBNG wells in the Powder River Basin. Most CBNG drilling on and near the selected tract has occurred on a 40-acre pattern, either because the wells were drilled before the spacing was changed to 80 acres or under the authorization of spacing exceptions granted by WOGCC. Continental Industries, LC controls the drilling rights on the South Sand Channel tract.

The ownership of oil and gas resources in the selected tract is discussed in Section 3.5.11, Ownership and Use of Land.

No mineable bentonite reserves have been identified.

No known uranium reserves exist.

There are no scoria deposits..

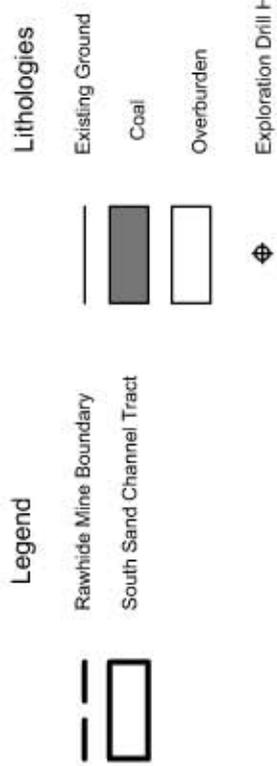
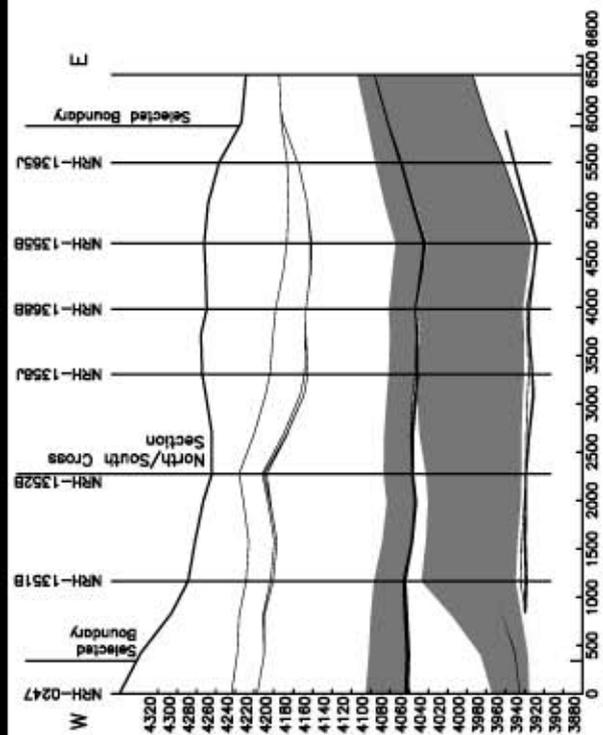
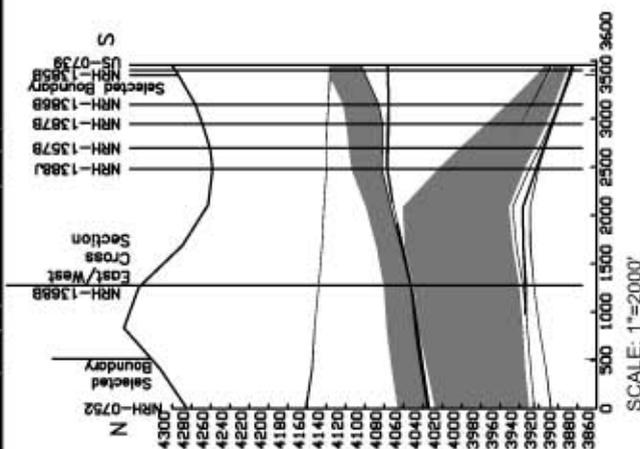
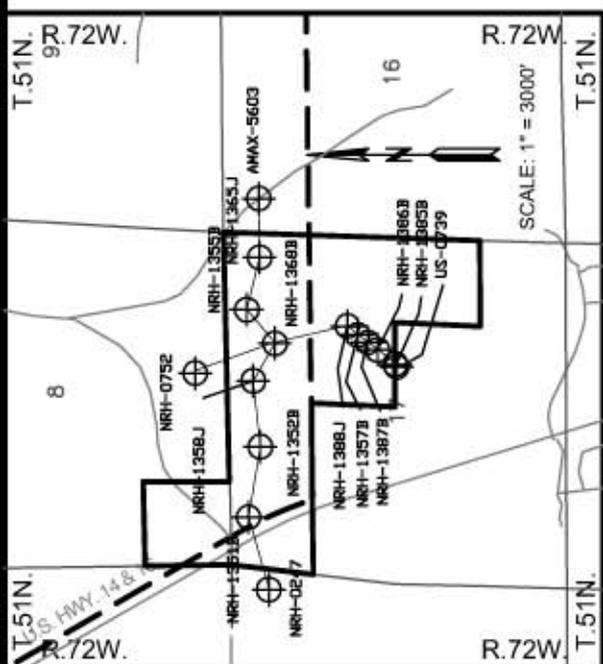


Figure 3.5-1 North-South and East-West Geologic Cross Sections, South Sand Channel Tract

3.5.4 SOILS

Approximately 55 per cent of the analysis area was included in order 1-2 surveys in 1978 and 1983 covering lands within the Rawhide Mine permit area. The results of that survey are presented in the Rawhide Mine permit document. The entire area has been surveyed by the NRCS.

The following is a list of the soil series that comprise the various map units delineated by the NRCS on the analysis area under the Proposed Action.

- Arwite fine sandy loam, 0 to 6% slopes
- Arwite-Elwop fine sandy loam, 0 to 6% slopes
- Deekay loam, 0 to 6% slopes
- Deekay-oldwolf loam, 0 to 6% slopes
- Jaywest-Spottedhorse loams, 0 to 6% slopes
- Moorhead-Leiter clay loams, 0 to 15% slopes
- Ucross-Fairburn loams, 15 to 45% slopes
- Vonalf-Xema-Mittenbutte fine sandy loam, 3 to 30% slopes
- Oldwolf-Fairburn loams, 3 to 15% slopes
- Jaywest loam, 0 to 6% slopes

According to the NRCS soil survey and the salvage depths utilized for the Rawhide Mine, much of the area has salvage depths ranging from 30 to 60 inches which exceeds the current Rawhide Mine WDEQ permit 19 inches replacement requirement. Topsoil replacement depths will be better defined once the detailed order 1-2 survey is completed on the lands not covered in previous Rawhide Mine baseline surveys.

The soil depths and types on the South Sand Channel tract are similar to soils currently being salvaged and used for reclamation at the adjacent Rawhide Mine and other mines in the PRB.

3.5.5 AIR QUALITY AND CLIMATE

See Section 3.1.5

Climate and meteorology information for the Rawhide Mine is presented in Section 3.5.1.

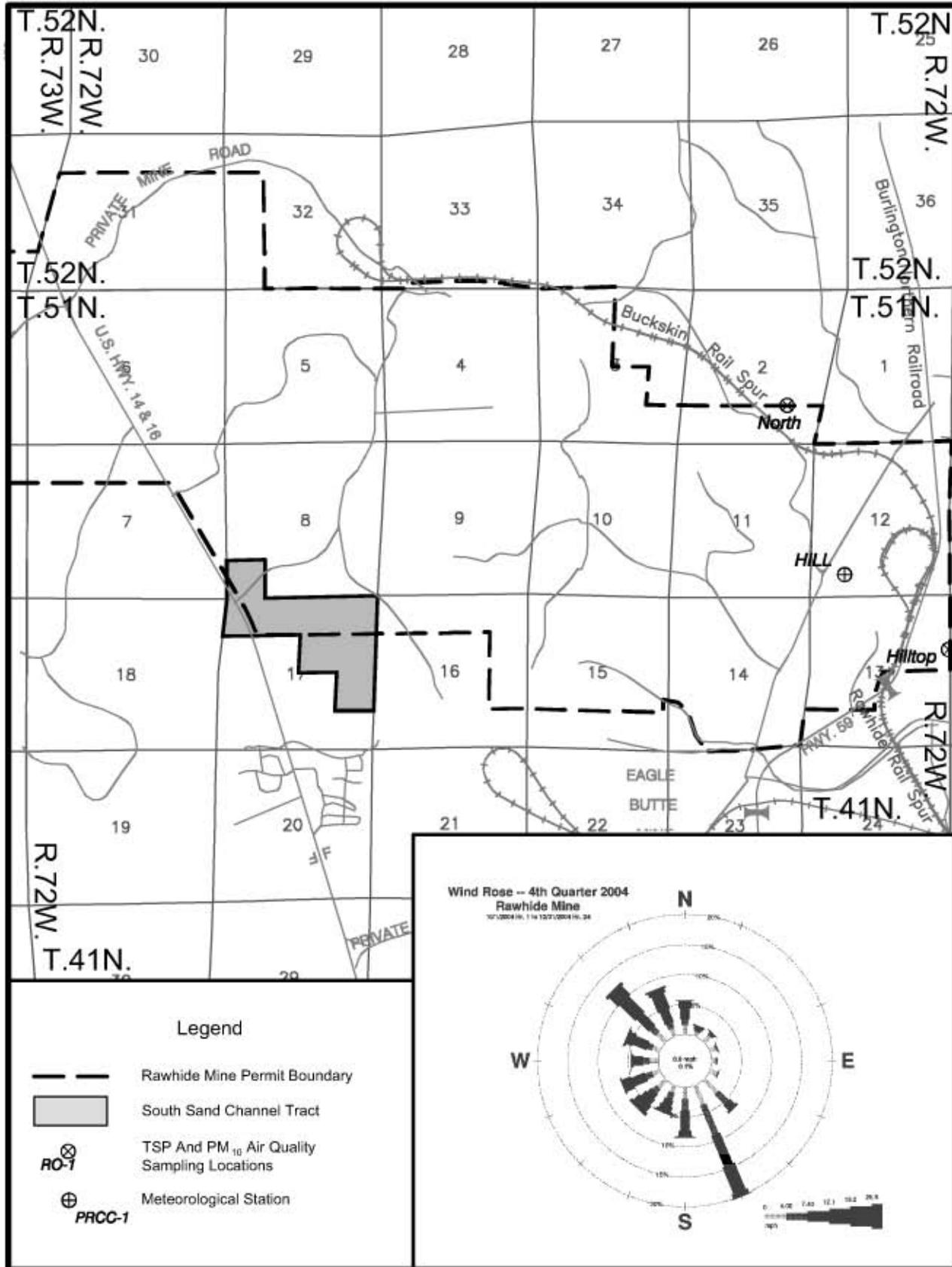


Figure 3.5-2 Wind Rose, Air Quality, and Meteorological Stations at the Rawhide Mine

3.5.6 WATER RESOURCES

3.5.6.1 Groundwater

See Section 3.1.6.1.

3.5.6.2 Surface Water

See Section 3.1.6.2

There are no drainages on the South Sand Channel tract, which slopes to the northeast. In general, surface water flow follows the surface topography, which slopes to the northwest toward Little Rawhide Creek. Flow events in Little Rawhide Creek are closely reflective of precipitation patterns

3.5.6.3 Water Rights

Records at the Wyoming State Engineer's Office(SEO) were searched for groundwater rights within a 3-mile radius of the Rawhide Mine selected tract. This information is required for WDEQ permitting. SEO data from a records search conducted August 2005 indicate there are 876 permitted water wells within three miles of the Rawhide Mine selected lands. Five of the water rights are located within the South Sand Channel tract, and are owned by coal mining or oil and gas companies. Of the remaining 871 water wells, 787 (90%) are owned by coal mining or oil and gas companies. Of these, 385 of the water wells are permitted as CBNG wells. Campbell County owns 31 monitoring wells within the three-mile radius. Table C-7 in Appendix C lists the 84 water wells that are not owned by coal mining companies or oil and gas companies.

SEO records were searched for surface water rights using the SEO's computer database. The search was conducted for surface-water rights within ½ mile of the offered lands and 3 miles downstream of the Rawhide Mine selected lands. Six water rights, all owned by coal mining companies, were identified within the search area.

3.5.7 ALLUVIAL VALLEY FLOORS (AVFS)

See Section 3.1.7

There are no named drainages within the selected tract therefore, no AVFs are expected. However, an AVF evaluation will be completed for the entire South Sand Channel tract as part of the WDEQ permitting process if the proposed Action is authorized. Investigations conducted by the Rawhide Mine for their current permit to

determine the presence of AVFs within and surrounding the Rawhide Mine determined there were no AVFs within those portions of the South Sand Channel tract covered by the investigations. WDEQ has concurred with that finding.

3.5.8 WETLANDS

See Section 3.1.8.

Jurisdictional wetland inventories were conducted over most of the selected tract in 1992 and again in 2001/2002. The wetlands delineation was completed in accordance with the procedures and criteria contained in the *Wetland Delineation Manual*. The consolidated delineation was subsequently approved by the COE in May 2002. No wetlands have been identified in the previously surveyed areas and there are no named drainages within the South Sand Channel tract. Areas not addressed in previous surveys will be investigated as part of the baseline studies conducted for the WDEQ permitting process.

3.5.9 VEGETATION

Approximately 55 percent (175 acres) of the analysis area had been previously mapped for vegetation community types as part of baseline surveys conducted for the current Rawhide Mine permit area. The vegetation communities in this area were delineated, mapped, and sampled in accordance with the current WDEQ/LQD requirements. The results of the baseline studies, including portions of the South Sand Channel tract, were reviewed and approved by WDEQ/LQD as part of an earlier permit submittal. Areas not covered by previous surveys will be surveyed as part of the WDEQ permitting process if the Proposed Action is authorized.

A total of three vegetation types were identified and mapped within the previously mapped portion of the analyses area.

3.5.9.1 Vegetation Types

The following discussion of vegetation types is based on data presented in the current Rawhide permit document collected in baseline studies conducted from 1974 through 1985. Approximately 174.51 acres of the analysis area were included in one or more of the previous studies. No data has been collected on the remaining area. However, field inspections of the analysis area indicate that upland grassland is the dominate community in the remaining area.

The Upland Grassland Type occurs on rolling upland terrain with some shrub cover. It commonly occurs on deeper fine sandy loams to clay loams (such as Arwite and Moorhead-Leiter series).

Vegetative cover in the upland grassland type averages 49.2%; absolute vegetation cover. Major perennial graminoids accounted for 38% and were dominated by western wheatgrass (*Agropyron smithii*), blue grama (*Bouteloua gracilis*), needle and thread (*Stipa comata*) and threadleaf sedge (*Carex filifolia*). Annual graminoids accounted for 3.1% absolute cover. Shrubs, primarily big sagebrush (*Artemisia tridentata wyogensis*), provided 3.1% absolute cover followed by halfshrubs, primarily fringed sagewort (*Artemisia frigida*), provided 3.8%. Three forbs provided only 0.6%.

Above-ground net productivity of the upland grassland averaged 28.9 grams per meter squared (g/m^2). Graminoids accounted for 25.2(g/m^2). Halfshrubs accounted for 3.1 (g/m^2).

Shrub density averaged 13,280 individuals/hectare. Fringed sagewort was the most frequently encountered shrub or halfshrub. Numerous other shrubs and halfshrubs were present in lesser numbers.

The Erosional Grassland Type occurs on rough broken topography generally adjacent to drainages within the Rawhide Mine permit area. Within the analysis area, small areas of erosional grasslands have been created by wind blowouts near sandstone outcrops. Steep slopes and heavy clay soils generally provide low vegetation cover. Major species include big sagebrush (*Artemisia tridentata wyogensis*), rubber rabbitbrush (*Chrysothamnus nauseosus*), broom snakeweed (*Gutierrezia sarothrae*), bluebunch wheatgrass (*Agropyron spicatum*), western wheatgrass, needle-and-thread and threadleaf sedge.

Absolute vegetative cover in the erosional grassland averages 51.3% and was dominated by perennial graminoids (30.5%). Major perennial species included bluebunch wheatgrass, blue grama, threadleaf sedge, and needle-and-thread. Annual graminoids accounted for 5.2% absolute cover and five shrub species provided 5.6% absolute cover. Halfshrubs provided 4.6% and thirty-six forbs provided 5.7% absolute cover.

Above-ground net productivity for erosional grasslands ranged from 15.5 g/m^2 squared to 155.6 and averaged 61.8 g/m^2 . Graminoids accounted for 43.5 g/m^2 (70%) with forbs contributing 11.9 g/m^2 and halfshrubs provided 6.6 g/m^2 .

Shrub density averaged 21,600 plants per hectare. A total of 15 shrub and halfshrub species were represented. Big sagebrush, fringed sagewort, rubber rabbitbrush, and silver sagebrush (*Artemisia cana*) were the most common species encountered.

Hayland Type. All agricultural haylands within the area are under either moderate or high management levels and are also utilized as pasturelands in some years. Cover studies were not conducted on hay lands.

Herbaceous productivity for the hay land community is based on countywide hay

production values for various soil series present in the analysis area as provided by the Natural Resources Conservation Service. Under average annual rainfall conditions, estimated forage production may range from 1,200 to 3,000 pounds per acre.

3.5.9.2 Threatened, Endangered, and Candidate Plant Species

No federally listed threatened, endangered, or candidate plant species are known to occur within the selected tract. The area was surveyed in 2005 for threatened, endangered and candidate species using the *Wyoming Rare Plant Field Guide* (Thorne 1994) as their reference. Ute ladies'-tresses surveys were conducted by BKS Environmental Associates, Inc. in 2005. The FWS memorandum published November 23, 1992 entitled "Interim Survey Requirements for *Spiranthes diluvialis*" was used as a guide in conducting the survey. All individuals who conducted the survey have received recognition from the FWS as being qualified to conduct Ute ladies'-tresses surveys. The 2005 survey indicated that there is no orchid habitat in the area due to the lack of an adequate water source. All lands within the area are privately owned by the Caballo Coal Company.

Appendix D contains a discussion of threatened, endangered and sensitive species.

3.5.10 WILDLIFE

Background information on wildlife near the South Sand Channel tract was gathered from several sources including: Rawhide Mine WDEQ/LQD permit and annual reports, Wyoming Game and Fish Department (WGFD) and FWS records.

Site-specific data for the entire proposed lease area were obtained from sources including the WDEQ/LQD permit and the 2004 annual report for the Rawhide Mine. Baseline and monitoring surveys cover large perimeters around the permit area. Consequently, the selected tract has been surveyed during annual wildlife monitoring for the Rawhide Mine and Eagle Butte Mine. Thunderbird Wildlife Consulting, Inc. (TWC), formerly Powder River Eagle Studies (PRES) have conducted annual wildlife monitoring surveys at Rawhide Mine from 1988 through 2004. Their current monitoring plan complies with Appendix B of the WDEQ/LQD Coal Rules and Regulations. The study area has included all of the selected tract throughout TWC's monitoring timeframe. Thus, extensive wildlife data are available for the selected tract. The data presented herein is from TWC's baseline and annual monitoring data.

The selected tract and adjacent area consists primarily of uplands. The topography is level to rolling, with some areas sloping. Upland grassland is the principal native habitat type in the area. Agricultural haylands are located in the northern portion of the area. Small areas of erosional grassland are also present. No designated critical, crucial, or unique habitats are present. There are no impoundments or streams in the selected tract. There are no trees in the area.

Big Game

Pronghorn (*Antilocapra Americana*) and mule deer (*Odocoileus hemionus*) are the only big game species that regularly occur on or near the selected tract. Rare sightings of white-tailed deer (*Odocoileus virginianus*) have been recorded at the Rawhide Mine.

The WGFD has classified the entire area as yearlong pronghorn range. The analysis area is located within the WGFD's Gillette antelope herd located north of Interstate 90 and is in hunt area 17. Historically, the major management problem with this herd has been the ability to achieve an adequate harvest. Most of the antelope are on private land. This is also the case in the selected tract. There are no public lands within the area, and public hunting access is limited.

The analysis area is located within the Powder River mule deer herd and deer hunt area 18. As with antelope, access to private land is limited.

WGFD has classified the majority of the analysis area as yearlong mule deer habitat with a portion of the southeast classified as winter/yearlong. The area is not considered whitetail deer habitat (Oedekoven 2002).

Crucial or critical mule deer habitat does not occur on or adjacent to the analysis area.

In response to the BLM scoping notice in an August 30, 2005 letter, the WGFD stated that making the selected tract available for leasing is unlikely to have large effects on the Powder River mule deer and Gillette pronghorn herds because these lands are adjacent to existing coal mines. Because the lands are private, WGFD also stated that few if any impacts to public recreation would occur if mineral rights were exchanged.

Other Mammals

A variety of small and medium-sized mammal species occur on or near the selected tract. These include predators and furbearers, such as coyote (*Canis latrans*), red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis*), and raccoon (*Procyon lotor*). Prey species include rodents such as mice, pocket gophers, voles, chipmunks, and lagomorphs (jackrabbits and cottontails). Surveys for prairie dog towns were conducted on the selected tract and adjacent lands. One small black-tailed prairie dog (*Cynomys ludovicianus*) town approximately 1 acre in size was identified within the selected tract. The town is located in the NW $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 17, T. 51 N., R. 72 W. The location of this town is shown on Figure 3.5-3. These mammal species are cyclically common and widespread throughout the region. These prey species are important for raptors and other predators.

Raptors

Numerous raptor species have been observed on or adjacent to the selected tract and within the area monitored for the Rawhide Mine. These species include the golden

eagle (*Aquila chrysaetos*), bald eagle (*Haliaeetus leucocephalus*), northern harrier (*Circus cyaneus*), Swainson's hawk (*Buteo swainsoni*), red-tailed hawk (*Buteo jamaicensis*), ferruginous hawk (*Buteo regalis*), rough-legged hawk (*Buteo lagopus*), prairie falcon (*Falco mexicanus*), merlin (*Falco columbarius*), turkey vulture (*Carthartes aura*), great horned owl (*Bubo virginianus*), short-eared owl (*Asio flammeus*) and burrowing owl (*Athene cunicularia*). As shown on Figure 3.5-3 there are four burrowing owl nests and one red-tailed hawk nesting platform within the selected tract. One former great horned owl nest is located on the eastern limits of the selected area in an area disturbed by Eagle Butte Mine.

Game Birds

Two species of upland game birds were observed during the 2004 Rawhide Mine annual monitoring: the sage grouse (*Centrocercus urophasianus*), and mourning dove (*Zenaida macroura*).

No sage grouse leks were identified within the selected tract.

Mourning doves (*Zenaida macroura*) were observed during spring and summer surveys conducted within the Rawhide Mine survey area which included the selected tract. This species is a relatively common breeding bird in Campbell County

Migratory Birds of Management Concern

Table 3.5-1 provides a list of the 40 migratory bird species of management concern in Wyoming that the FWS uses for reviews concerning existing and proposed coal mine leased land (FWS 2002). This listing was taken directly from the Wyoming Bird Conservation Plan (Cеровski et al. 2000). The regional status and expected occurrence, historical observations, and breeding records on and near the Rawhide Mine selected tract for each listed species are included in Table 3.5-1.

Historically, 22 of the 40 avian species of concern have been recorded at least once on or within one-half mile of the current Rawhide Mine permit area that includes the selected tract.

The following ten listed species were observed during the 2004 surveys; Brewer's sparrow (*Spizella breweri*), upland sandpiper (*Bartramia longicauda*) Swainson's hawk (*Buteo swainsoni*) short-eared owl (*Asio flammeus*), lark bunting (*Calamospiza melanocorys*), sage thrasher (*Oreoscoptes montanus*), grasshopper sparrow (*Ammodramus savannarum*), western screech owl (*Otus kennicottii*), loggerhead shrike (*Lanius ludovicianus*), and vesper sparrow (*Pooecetes gramineus*).

The Brewer's sparrow (*Spizella brewerii*) is a very common species and breeder in the Rawhide Mine area.

The Swainson's hawk (*Buteo swainsoni*) was classified as common but a rare breeder to the area.

Upland sandpipers have been observed infrequently.

Adult short-eared owls have been documented in the Rawhide Mine survey area for several years but no known nesting attempt has occurred since 1988.

Vesper sparrows and lark buntings are considered common and were observed in most habitat types on or near the Rawhide Mine permit area. Grasshopper sparrows have regularly been observed and presumably nest in the native, seeded, and reclaimed grasslands in the Rawhide Mine area.

The loggerhead shrike is not as common: only two adults were recorded in 2004.

Sage thrashers are rarely seen in the vicinity of the Rawhide Mine or elsewhere in Wyoming. Only one observation was recorded by TWC in 2004.

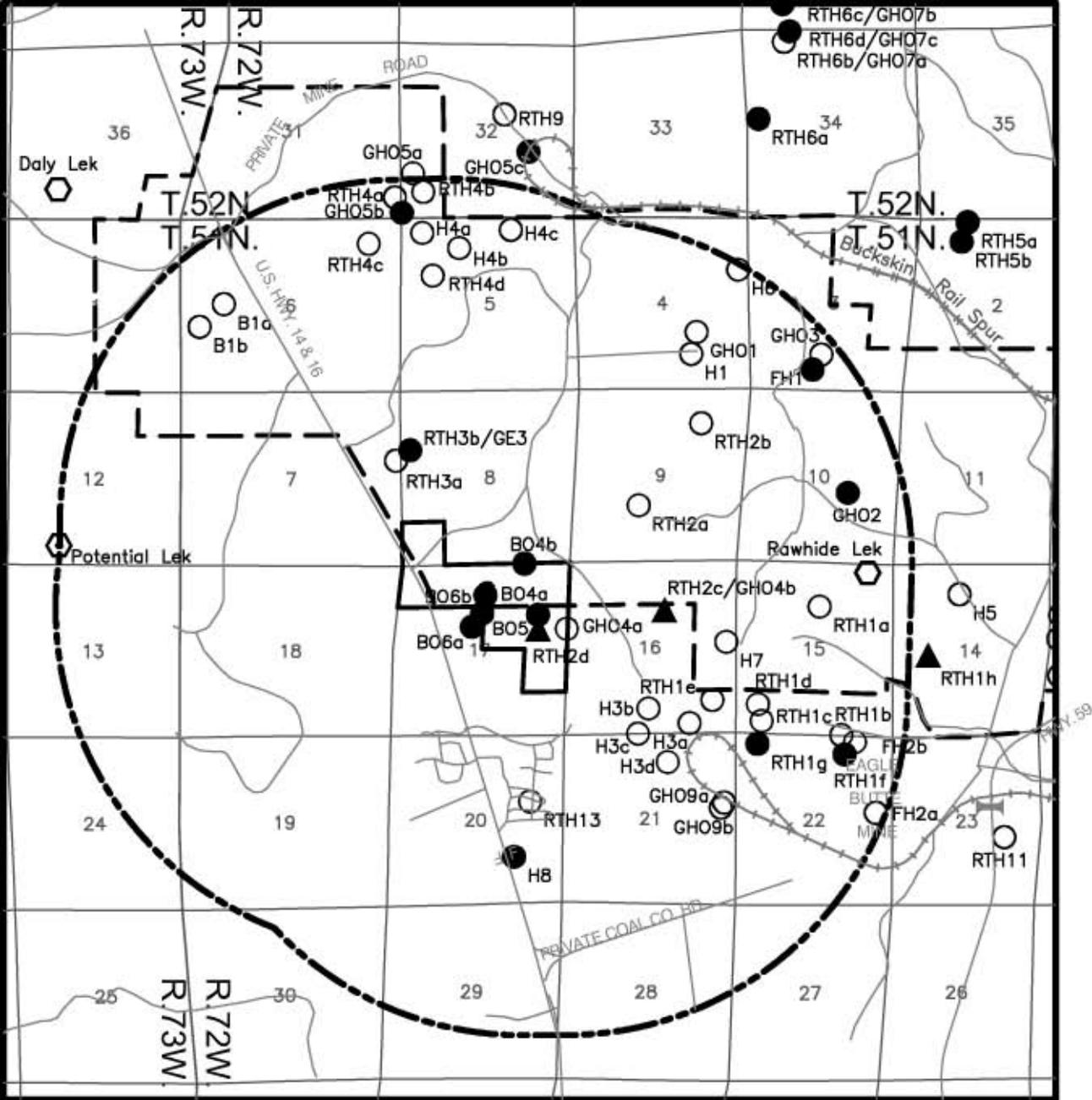
One young western screech owl was found near the Rawhide Mine entrance. This was the first screech owl documented in 17 years of monitoring at the mine (Caballo Coal Company 2005d).

Additional migratory bird species of management concern in Wyoming are not expected to occur on the analysis area, although marginal potential habitat for some species may be present within the Rawhide Mine survey area.

Other Species

Wildlife surveys completed specifically in the analyses area and surveys completed for the adjacent mines have documented numerous other wildlife species that inhabit the area. All of these species were generally common inhabitants of the area and none were of specific concern to state or federal agencies. Lists of species recorded at the Rawhide Mine and within the selected tract are in the mine's permit and annual report documents available at WDEQ/LQD.

Under current natural conditions, the selected tract doesn't provide any waterfowl and shorebird habitat because of the lack of surface water features.



Legend

- Rawhide Mine Permit Boundary
- South Sand Channel Tract
- Search Boundary - EPA (2 Mile Radius)
- Intact Raptor Nest
- Former Raptor Nest
- Raptor Nesting Platform

- Daly Lek
- Potential Lek
- Prairie Dog Colony

Species Codes

- GE** = Golden Eagle
- RTH** = Red-tailed Hawk
- GHO** = Great Horned Owl
- H** = Northern Harrier
- B** = Buteo Species
- BO** = Burrowing Owl



SCALE: 1" = 5000'

Figure 3.5-3 Raptor Nest Sites, Grouse Leks, and Prairie Dog Colonies Within and Adjacent to the South Sand Channel Tract

**TABLE 3.5-1
REGIONAL STATUS OF 40 MIGRATORY BIRDS OF MANAGEMENT CONCERN IN
WYOMING FOR COAL MINES AND EXPECTED AND ACTUAL OCCURRENCE
ON AND WITHIN ½ MILE OF THE RAWHIDE MINE**

Species	Seasonal Status/ Breeding Records in Northeastern WY ¹	Expected Occurrence in Vicinity of Rawhide Mine ²	Occurrence and Historical Breeding Status at Rawhide Mine ⁴
LEVEL I			
Mountain plover ³ <i>Charadrius montanus</i>	summer/observed	rare	never recorded
Sage grouse ^{*,3} <i>Centrocercus urophasianus</i>	resident/breeder	common	occasional breeder
Baird's sparrow ³ <i>Ammodramus bairdii</i>	never recorded	rare	never recorded
Ferruginous hawk ^{*,3} <i>Buteo regalis</i>	resident/breeder	common	historic breeder
Brewer's sparrow ^{*,3} <i>Spizella breweri</i>	summer/breeder	common	regular breeder
Sage sparrow ³ <i>Amphispiza belli</i>	summer/observed	uncommon	never recorded
McCown's longspur ^{*,3} <i>Calcarius mccownii</i>	summer/breeder	uncommon	rarely observed
Swainson's hawk* <i>Buteo swainsoni</i>	summer/breeder	common	occasional breeder
Long-billed curlew ^{*,3} <i>Numenius americanus</i>	summer/breeder	uncommon	rare spring migrant
Short-eared owl* <i>Asio flammeus</i>	resident/breeder	uncommon	historic observed
Peregrine falcon ³ <i>Falco peregrinus</i>	resident/observed	rare	never recorded
Burrowing owl ^{*,3} <i>Athene cunicularia</i>	summer/breeder	uncommon	recent breeder
Bald eagle* <i>Haliaeetus leucocephalus</i>	resident/observed	seasonally common	frequent in winter
Upland sandpiper* <i>Bartramia longicauda</i>	summer/breeder	uncommon	infrequently observed
LEVEL II			
Cassins's Kingbird <i>Tyrannus vociferans</i>	summer/breeder	uncommon	never recorded
Lark bunting* <i>Calamospiza melanocorys</i>	summer/breeder	common	common breeder
Dickcissel <i>Spiza americana</i>	summer/observed	rare	observed once
Chestnut-collared longspur ^{*,3} <i>Calcarius ornatus</i>	summer/breeder	uncommon	never recorded
Black-chinned Hummingbird <i>Archilochus alexandri</i>	never recorded	not expected	never recorded

TABLE 3.5-1 (cont.)

Species	Seasonal Status/ Breeding Records in Northeastern WY ¹	Expected Occurrence in Vicinity of Rawhide Mine ²	Occurrence and Historical Breeding Status at Rawhide Mine ⁴
Pygmy nuthatch <i>Sitta pygmaea</i>	resident/observed	not expected	never recorded
Marsh wren <i>Cistothorus palustris</i>	summer/observed	uncommon	never recorded
Western bluebird <i>Sialia mexicana</i>	summer/observed	uncommon	never recorded
Sage thrasher* ³ <i>Oreoscoptes montanus</i>	summer/breeder	common	rarely observed
Grasshopper sparrow* <i>Ammodramus savannarum</i>	summer/breeder	common	recent breeder
Bobolink <i>Dolichonyx oryzivorus</i>	summer/observed	uncommon	never recorded
Common loon <i>Gavia immer</i>	summer/observed	not expected	observed once
Black-billed cuckoo <i>Coccyzus erythrophthalmus</i>	summer/breeder	uncommon	never recorded
Red-headed woodpecker <i>Melanerpes erythrocephalus</i>	summer/observed	uncommon	observed once
Yellow-billed cuckoo ³ <i>Coccyzus americanus</i>	never recorded	uncommon	never recorded
Eastern screech-owl <i>Otus asio</i>	never recorded	uncommon	never recorded
Western screech-owl <i>Otus kennicottii</i>	never recorded	uncommon	observed once
Western scrub-jay <i>Apheloma californica</i>	never recorded	uncommon	never recorded
Loggerhead shrike* ³ <i>Lanius ludovicianus</i>	summer/breeder	uncommon	occasional breeder
Vesper sparrow* <i>Pooecetes gramineus</i>	summer/breeder	common	common breeder
Lark sparrow* <i>Chondestes grammacus</i>	summer/breeder	common	occasional breeder
Ash-throated flycatcher <i>Myiarchus cinerascens</i>	never recorded	abundance unknown	uncommon breeder
Bushtit <i>Psaltiriparus minimus</i>	never recorded	uncommon	never recorded
Merlin* <i>Falco columbarius</i>	resident/breeder	uncommon	rarely observed
Sprague's pipit <i>Anthus spragueii</i>	migrant/observed	uncommon	never recorded
Barn owl <i>Tyto alba</i>	summer/breeder	abundance unknown	never recorded

¹Compiled from Luce et al. (1999), for lat-long block that encompasses northern Campbell County.

²Expected occurrence on or within ½ mile of Rawhide Mine was based on range, history of occurrence, and habitat availability.

³BLM Sensitive Species (discussed in Appendix D).

⁴Historical occurrence is based on records from baseline and monitoring studies conducted at the mine from 1980 to 2005.

*Species highlighted with asterisks were recorded on or within ½ mile of Rawhide Mine during baseline or monitoring studies at least once before or during May 2002.

Source: Luce, B., A. Cerovski, B. Oakleaf, J. Friday, and L. Van Fleet. 1999. Atlas of Birds, Mammals, Reptiles, and Amphibians in Wyoming. Wyoming Game and Fish Department, Cheyenne, Wyoming.

3.5.11 OWNERSHIP AND LAND USE

As shown on Figure 3.5-4, Caballo Coal Company owns the surface on the South Sand Channel tract. The principal land use within the tract is domestic grazing and wildlife habitat. A secondary land use is agricultural hay land. Areas of disturbance within the tract include plugged and abandoned oil, gas or CBNG well sites, and active CBNG wells and associated utilities/easement corridors, ranch access roads, and mine monitoring access roads.

All of the coal estate included in the South Sand Channel tract is federally owned. Figure 3.5-5 shows that the oil and gas estate within the analyses area is both federally and privately owned. All of the federally owned oil and gas estate is leased. Continental Industries, LC control the drilling rights on the Rawhide Mine selected tract and have one active CBNG well in the South Sand Channel tract.

The Supreme Court has ruled that CBNG rights belong to the owner of the oil and gas rights (98-830). Therefore, the oil and gas lessees have the right to develop the CBNG in the coal as well as the right to develop conventional oil and gas on the tract.

There are no conventional oil or gas wells in the analyses area. According to the WOGCC database, there is only one CBNG well located on the selected tract that was producing

CBNG wells were initially drilled on 40-acre spacing patterns in the Wyoming PRB, but the WOGCC has established 80-acre spacing patterns as the default spacing for CBNG wells in the Powder River Basin. Most CBNG drilling near the Rawhide Mine selected tract has occurred on a 40-acre pattern, either because the wells were drilled before the spacing was changed to 80 acres or under the authorization of spacing exceptions granted by WOGCC.

Certain ancillary facilities are needed to support oil and gas production. These support facilities may include well access roads, well pads, production equipment at the wellhead (which may be located on the surface and/or underground), well production casing (which extends from the surface to the zone of production), underground pipelines (which gather the oil, gas and/or water produced by the individual wells and carry it to a larger transmission pipeline or collection facility), facilities for treating, discharging, disposing of, containing, or injecting produced water, central metering facilities, electrical power utilities, gas compressor stations, and high-pressure transmission pipelines for delivering the gas to market.

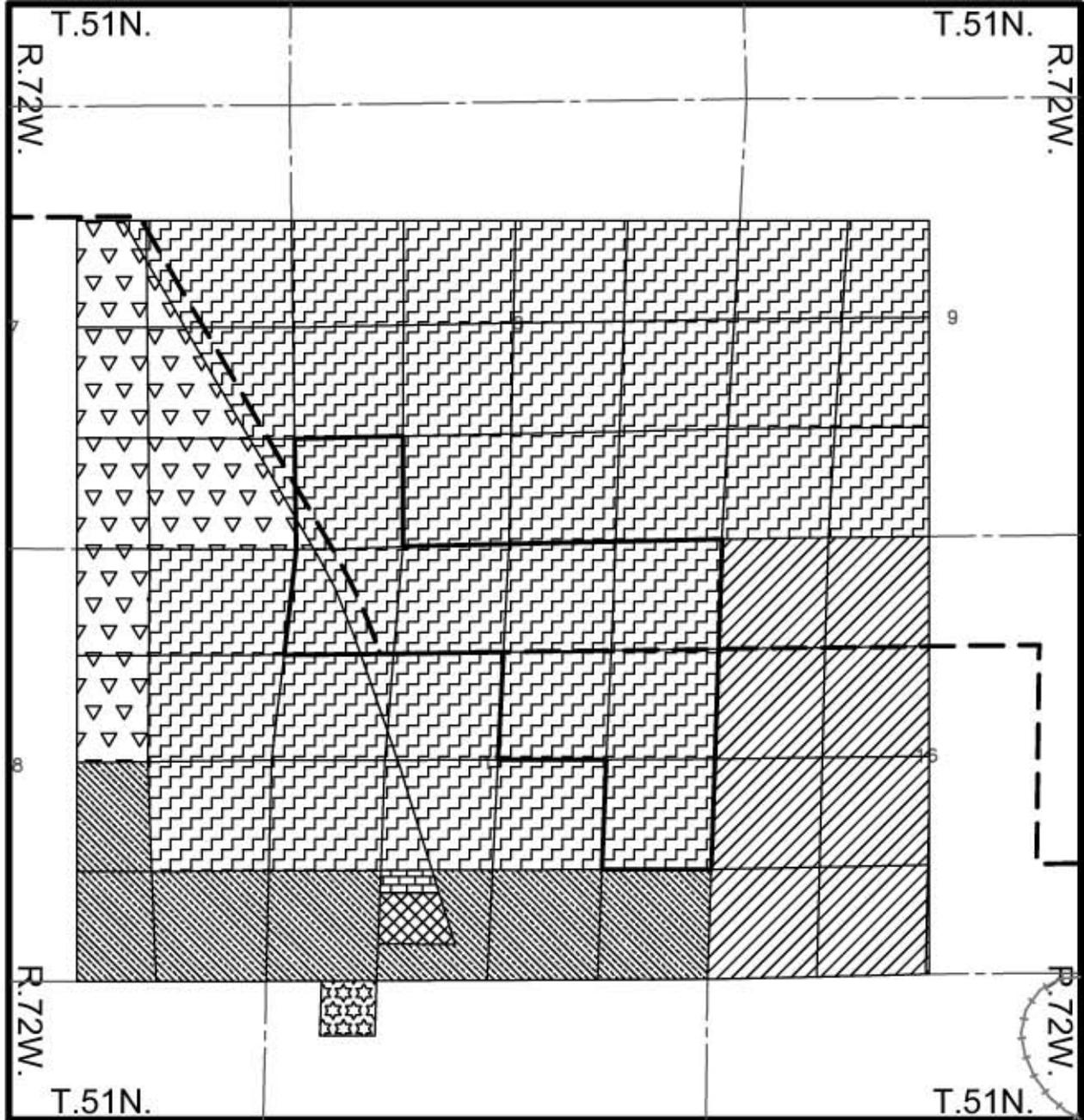
Coal mining is a dominant land use in the area surrounding the selected tract. The Rawhide Mine is within a group of five operating surface coal mines located in northern Campbell County (Figure 1-1).

Campbell County has no applicable countywide land use plans, and the selected tract has no designated zoning classification. The *City of Gillette/Campbell County*

Comprehensive Planning Program (City of Gillette 1978) provides general land use goals and policies for state and federal coal leases in the county.

Big game hunting is the principal recreational use in the analysis area. Land ownership within the PRB is 80% private, but some private landowners permit sportsmen to cross and/or hunt on their land. Others charge an access fee, and some do not allow any access. There has been a trend over the past two decades towards a substantial reduction in lands open and reasonably available for hunting. Access fees continue to rise, and many resident hunters feel these access fees are unreasonable. This trend has created problems for the WGFD in their attempt to distribute and control harvest at optimal levels, as well as to sportsmen who desire access to these animals (WGFD 1996). Due to safety concerns, public lands contained within an active mining area are often closed to the public, further limiting recreational use. In the PRB, the publicly owned Thunder Basin National Grasslands, BLM-administered public lands, and state school sections (normally Sections 16 and 36) are generally open to hunting if legal access is available. As shown in Figure 3.5-4, there are no public surface lands included in the selected tract.

The surface estate of all of the lands within the exchange tract under the Proposed Action is privately owned, and recreational use is allowed only with landowner permission. Sport hunting in varying degrees occurs on the tract. Pronghorn and mule deer occur on and adjacent to the tract. Sage grouse, mourning dove, waterfowl, rabbit, and coyote are hunted in the vicinity, and some coyote and red fox trapping may occur.



Legend

— Rawhide Mine Permit Boundary

■ South Sand Channel Tract

Surface Ownership

▨ Foundation Coal West, Inc.

▤ Terry L. Jones

★ Campbell County School District

▽ Twenty Mile Land Co., LLC.

▧ State of Wyoming

▩ Dorothy B. Hardy

▦ Caballo Coal Company



SCALE: 1" = 2000'

Figure 3.5-4 Surface Ownership on the South Sand Channel Tract

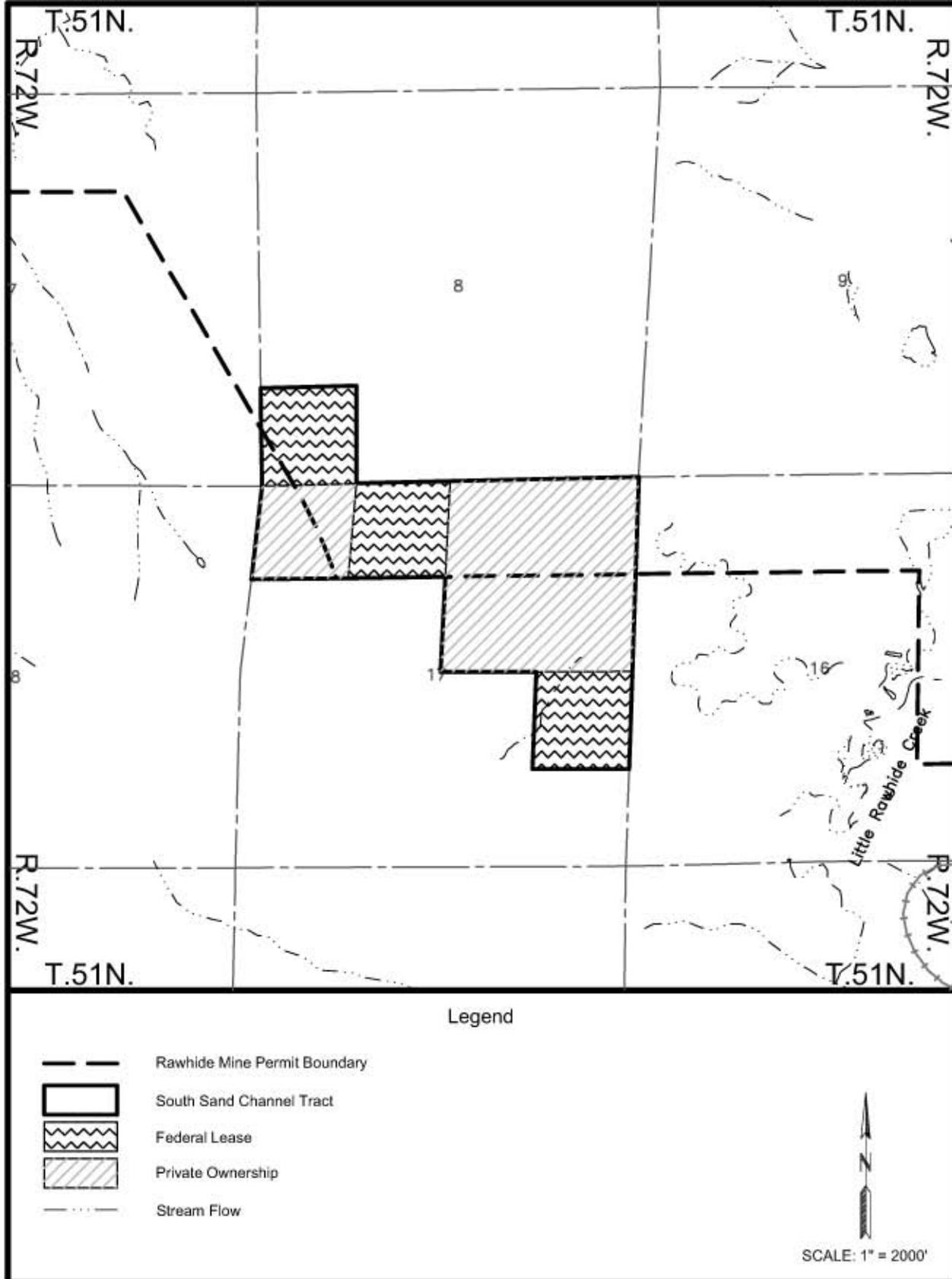


Figure 3.5-5 Oil and Gas Ownership on the South Sand Channel Tract

3.5.12 CULTURAL RESOURCES

See Section 3.1.9

Approximately 200 acres of the selected tract were surveyed in 1980 and 1983 as part of previous mine baseline studies. A total of 11 previous survey projects intersected portions of the selected tract. In 2005, GCM Services, Inc. completed a survey on approximately 120 acres that had not been surveyed and re-surveyed the NE $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 17, T. 51 N., R 72 W. The re-survey was done to check the status of two previously recorded sites, 48CA468 and 48CA569, that had raised questions during the background search. Site 48CA468 was recommended as being eligible for the NRHP by a previous recorder. The site was mitigated by Powers Elevation in 1981, however, SHPO records were not complete on the history of the site. Site 48CA569 was previously recorded as ineligible. SHPO records were also incomplete on the status of 48CA569. The 2005 survey found that both sites have been highly disturbed since the work on them in the 1980's by both mining and ranching activities. Testing conducted on site 48CA468 did not yield any cultural items or any evidence of a subsurface component. Site 48CA569 lies underneath a topsoil stockpile. The site consisted of only a few flakes when originally recorded and recommended as ineligible and nothing was found during the 2005 survey. The consultant recommended that the SHPO should review both sites and update their database.

No sites were identified on the 120 acres of newly surveyed lands. One secondary flake found in the NE $\frac{1}{4}$ SE $\frac{1}{4}$ of Section 17 was the only isolate found during the 2005 survey (Meyer 2005).

3.5.13 NATIVE AMERICAN CONCERNS

See Section 3.1.10

Native American tribes were consulted at a general level in 1995-1996 as part of an effort to update the BLM Buffalo RMP. Tribes that have been potentially identified as having concerns about actions in the PRB include: the Crow, Northern Cheyenne, Shoshone, Arapaho, Oglala Lakota, Rosebud Sioux, Flandreau Santee Sioux, Santee Sioux, Crow Creek Sioux, Lower Brule Sioux, Standing Rock Sioux, and Cheyenne River Sioux.

The Native American consultation on the selected lands will be completed as necessary upon submittal of the survey reports to OSM.

3.5.14 PALEONTOLOGICAL RESOURCES

See Section 3.1.11

A paleontological survey was conducted within and adjacent to the selected tract during previous Rawhide Mine baseline studies to determine the potential for recovery of significant fossils prior to disturbance. Areas not previously surveyed in 2005. There are no outcrops in the project area and the discovery of significant vertebrate remains is considered highly unlikely (Meyer 2005).

3.5.15 VISUAL RESOURCES

See Section 3.1.12

The Rawhide Mine and Eagle Butte Mine facilities and some mining activities are visible from US 14-16 and Wyoming 59. This is also true for the selected tract.

The lands in the selected tract are generally classified as VRM Class IV. The existing mining activities are visible from the selected tract.

3.5.16 NOISE

See Section 3.1.13

Existing noise sources in the area include adjacent coal mining activities, traffic on US 14-16, and the unnamed private access roads, rail traffic, ranching activities, and wind. No site-specific noise level data are available for the area. Because the Eagle Butte Mine and Rawhide Mine are adjacent to the selected tract, a median noise level is estimated to be 40 to 60 dBA for day, evening, and nighttime, with the noise level increasing with proximity to active mining at the Rawhide Mine. Mining activities are characterized by noise levels of 85 to 95 dBA at 50 feet from actual mining operations and activities (BLM 1992b). Figure 3.1-4 presents noise levels associated with some commonly heard sounds.

The nearest occupied dwelling to the South Sand Channel tract is located approximately ½ mile south of the tract. Occupied dwellings and publicly accessible roads near the selected tract are shown in Figure 3.5-6.

3.5.17 TRANSPORTATION FACILITIES

Transportation resources near the South Sand Channel tract include US 14-16, and Wyoming 59, US 14-16 crosses the western portion of the tract area, and Wyoming 59 lies approximately 3 miles south. Both highways are paved two-lane roads that run

generally north-south. Several unnamed two-track roads either cross the area or are adjacent to it. Access to the selected tract is on unnamed two-track road off of US 14-16.

The nearest railroad facilities are the Burlington Northern/Santa Fe Railroad spurs accessing the Eagle Butte Mine two miles east of the selected tract area, and the Rawhide Mine approximately 3.5 miles east of the proposed tract area. The Buckskin Mine railroad loop, located approximately 2.5 miles north of the tract is the northern terminus of a series of spur lines that serve the surface coal mines north of Gillette. Oil and gas pipelines, power lines, and associated rights of way (ROWs) are found in the analysis area. However, no telephone lines are located within the selected tract.

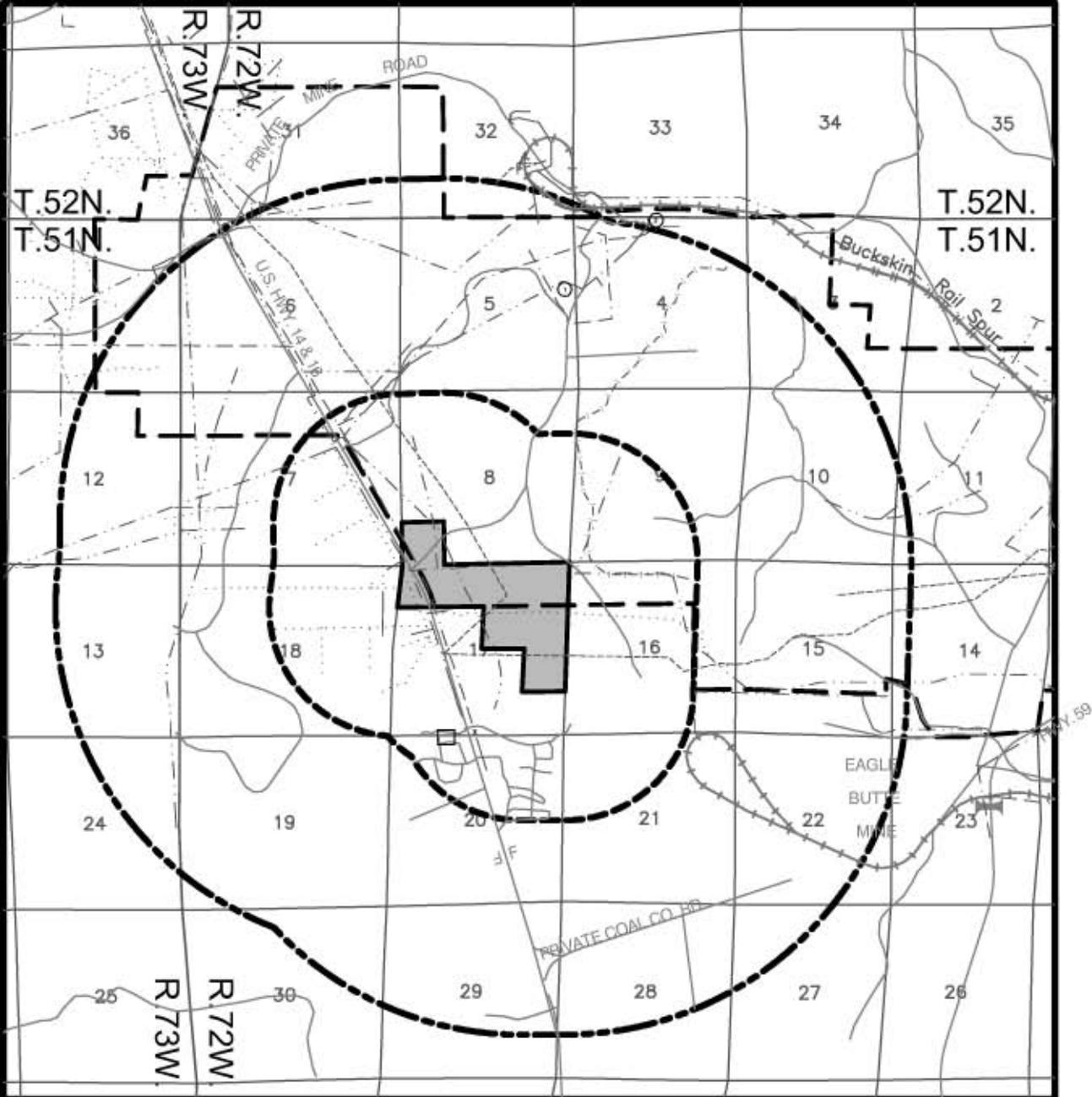
Figure 3.5-6 shows the location of transportation facilities within and adjacent to the selected tract. Since the selected tract as applied for would be an extension of the existing Rawhide Mine operations, the existing coal transportation facilities and infrastructure would be used during mining of the selected tract.

3.5.18 SOCIOECONOMICS

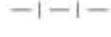
See Section 3.1.13.

3.5.19 HAZARDOUS AND SOLID WASTE

Potential sources of hazardous or solid waste on the South Sand Channel tract would include spilling, leaking, or dumping hazardous substances, petroleum products, and/or solid waste associated with mineral, coal, oil and/or gas exploration and development, or agricultural or livestock activities. No such hazardous or solid wastes are known to be present on the selected tract. Wastes produced by current mining activities at the Rawhide Mine are handled according to the procedures described in Chapter 2.



Legend

- | | | | |
|--|---------------------------------------|---|-----------------------------|
|  | Rawhide Mine Permit Boundary |  | Power Transmission Lines |
|  | South Sand Channel Tract |  | CBM Pipelines |
|  | Search Boundary (3/4 Mile Radius) |  | CBM Utility Or CBM Easement |
|  | Search Boundary - EPA (2 Mile Radius) |  | Residence (4) |
|  | Utility Pipelines |  | Bus Stop (1) |
|  | Telephone Lines |  | School (1) |



SCALE: 1" = 5000'

Figure 3.5-6 Transportation Facilities Within and Adjacent to the South Sand Channel Tract

3.6 SELECTED TRACT #8 – CABALLO WEST

3.6.1 GENERAL SETTING

The Caballo West tract is one of the eight tracts selected for exchange and is located adjacent to the Caballo Mine (Figure 2-5). A portion of the lands are within the current Caballo Mine permit area. The Caballo Mine is the northernmost of the centrally located mines within the PRB and is a part of the Northern Great Plains which includes most of northeastern Wyoming (Figure 1-1). Vegetation is primarily croplands with small areas of big sagebrush, silver sagebrush, pastureland and lowland grassland. Snowfall at the Gillette 9ESE Station averaged 65 inches per year from 1961 through 2002, with most occurring in December and January. Evaporation exceeds annual precipitation, with relatively short warm summers and longer cold winters. The average daily mean temperature is around 45°F. The highest recorded hourly temperature at the mine was 104°F and the lowest was -34°F. July is the warmest month with a mean temperature of 70.6° F; January is the coldest (20°F). The frost-free period averages 129 days (Caballo Coal Company 2005a).

The average annual wind speed for the Caballo Mine was about 12 mph. Wind speeds are highest in the winter and spring and are predominantly from the northwest and south-southeast. Winter gusts often reach 30 mph and can exceed 40 mph. During periods of strong wind, dust may affect air quality across the region.

An average of 15 air-stagnation events occur annually in the PRB and typically last two days each (BLM 1974). General information describing the area's resources was gathered from draft BLM Buffalo Field office planning documents (BLM 1996a, 1996b, 1996c, 1996d, 1996g) and a BLM coal leasing study (BLM 1996e).

3.6.2 TOPOGRAPHY AND PHYSIOGRAPHY

See Section 3.1.2

3.6.3 GEOLOGY

See Section 3.1.3.

On the selected tract, the Roland and the underlying Smith seams form one coal seam that averages 80 feet in thickness with thin parting in some areas. There is no clinker on the selected tract.

Figure 3.6-1 shows two geologic cross-sections of the Caballo West tract.

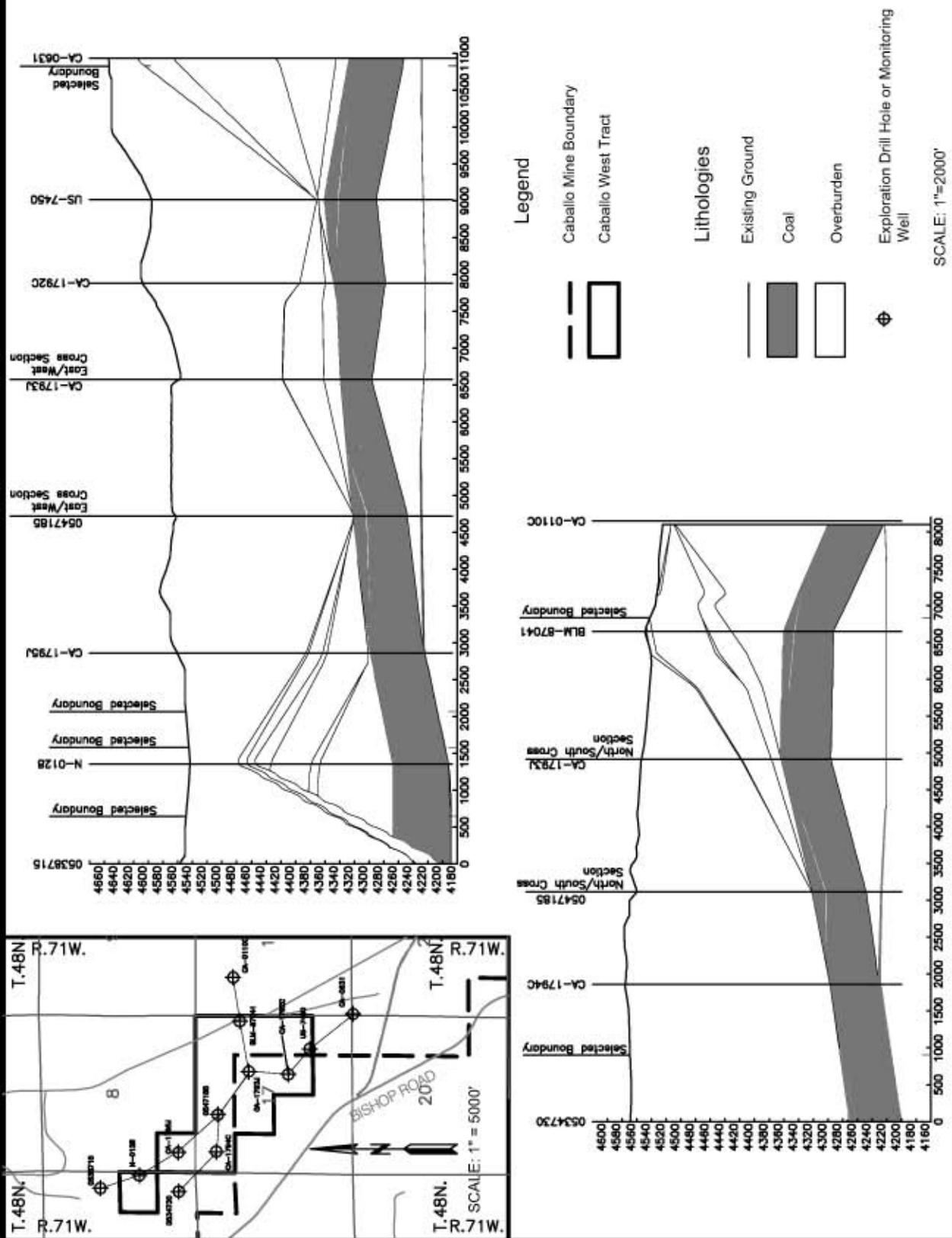


Figure 3.6-1. North-South and East-West Geologic Cross Sections, Caballo West Tract.

3.6.3.1 Mineral Resources

See Section 3.1.3

There are no active conventional oil or gas wells or pipelines within the selected tract. There are four plugged and abandoned oil wells in that portion of the selected tract located in Section 17, Township 48 North, Range 71 West.

Based on Wyoming Oil and Gas Conservation Commission records as of December 1, 2005, there is a producing CBNG well in the NE $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 17 and a shut in CBNG well in the NE $\frac{1}{4}$ SE $\frac{1}{4}$ of Section 17, Township 48 North, Range 71 West and both are operated by Blackstone Operating, Inc.

The ownership of oil and gas resources in the selected tract is discussed in "Ownership and Use of Land" Section 3.6.11.

No mineable bentonite reserves have been identified.

No known uranium reserves exist.

There is no scoria.

3.6.4 SOILS

Approximately 75% of the selected tract is located within the Caballo Mine permit area and was subjected to an order 1-2 soils survey during the WDEQ permitting process. The soil survey was completed to an order 1-2 resolution in accordance with WDEQ/LQD Guideline No. 1, which outlines required soils information necessary for a coal mining operation. The inventories included field sampling and observations at the requisite number of individual sites, and laboratory analysis of representative collected samples.

Because the entire area was not covered in earlier baseline surveys, NRCS soils data have been selected to represent the soils that comprise the various map units delineated on the selected tract. The soils in the area include;

- Jaywest-Moorhead loams, 0 to 6% slopes
- Arwite fine sandy loam, 0 to 6% slopes
- Moorhead clay loam, 0 to 6% slopes
- Leiter-Cromack clay loams, 3 to 15% slopes
- Deekay-Oldwolf loams 0 to 6% slopes
- Arwite-Elwop fine sandy loams, 0 to 6% slopes
- Heldt-Bidman complex, saline, 0 to 3% slopes
- Deekay loam, 0 to 6% slopes
- Aridic Ustorthents, saline, 0 to 4% slopes

- Moorhead-Leiter clay loams, 6 to 15% slopes
- Arwite-Elwop fine sandy loam, 6 to 15% slopes

According to the baseline soils studies conducted on 75% percent of the area, enough suitable soil exists for salvaging within the selected area to redistribute suitable soils to the 18 inch depth required by the Caballo Mine WDEQ permit. Over one-half of the area has topsoil salvage depths ranging from 30 to 90 inches.

The soil depths and types on the selected tract are similar to the deeper soils currently being salvaged and used for reclamation at the Caballo Mine and other mines in the PRB. The site-specific soil surveys have located hydric soils and/or inclusions of hydric soils, which are one component used in identifying wetlands. Please see Section 3.6.8 for a discussion of wetland surveys.

3.6.5 AIR QUALITY AND CLIMATE

See Section 3.2.5.

3.6.6 WATER RESOURCES

3.6.6.1 Groundwater

See Sections 3.1.6.1 and 3.2.6.1.

3.6.6.2 Surface Water

See Sections 3.1.6.2.

The topography of the Caballo West tract slopes toward the northeast. Surface water flows toward two tributaries of Tisdale Creek, which flows northwest to southeast just east of the offered lands. The two tributaries are typical for the region, and their flow events are closely reflective of precipitation patterns

3.6.6.3 Water Rights

Records at the Wyoming State Engineer's Office (SEO) were searched for groundwater rights within a 3-mile radius of the Caballo West tract. This information is required for WDEQ permitting. SEO data from a records search conducted August 2005 indicate there are 1,214 permitted water wells within 3 miles of the offered lands, of which six

permitted wells are within the offered lands. Water rights which have been abandoned or cancelled have been excluded from the search.

Of the total number of wells within the search area, coal mining companies own 542 wells (45%). Of the remaining 672 wells within the search area, 557 are permitted for CBNG development related uses. Table C-3 in Appendix C contains a listing of the 672 non-coal mine wells and associated water rights information.

SEO records were searched for surface water rights using the SEO's computer database. The search was conducted for surface-water rights within ½ mile of the offered lands and 3 miles downstream.

SEO records indicate 60 permitted surface water rights within the search area. Thirty-three of the surface water rights are held by coal mining companies. The remaining 27 water rights are permitted for irrigation or stock watering. Table C-4 of Appendix C shows a listing of the 27 non-coal mine surface water rights.

3.6.7 ALLUVIAL VALLEY FLOORS (AVFS)

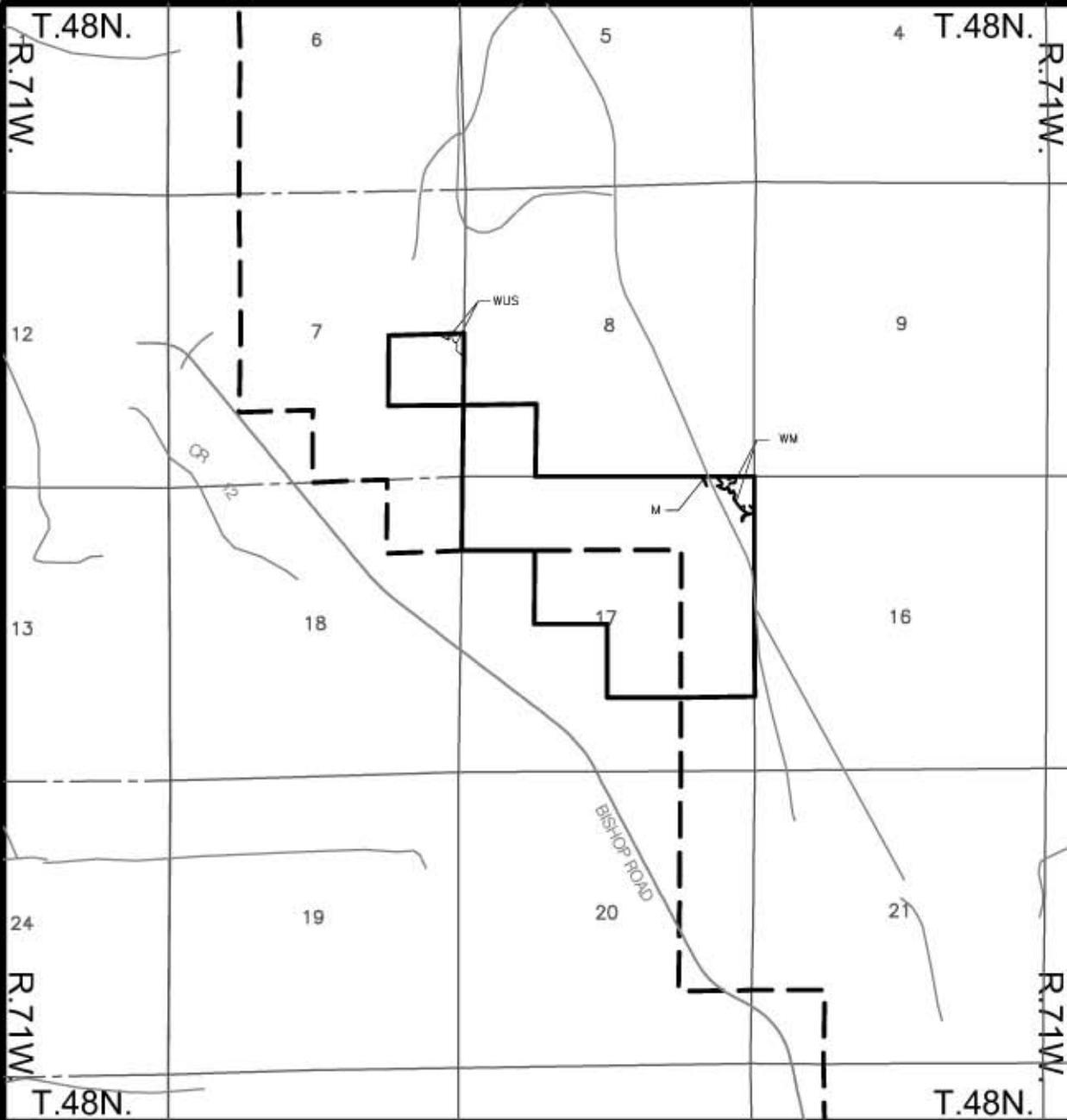
See Section 3.1.3.7

Investigations conducted on and surrounding the Caballo Mine, including the selected tract, determined there is no AVF within the selected tract. The WDEQ has concurred with that finding. A detailed discussion of the AVF investigations is available in Section D-11 of the Caballo Mine WDEQ/LQD permit document.

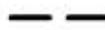
3.6.8 WETLANDS

See Section 3.1.3.8

Jurisdictional wetland inventories were conducted within the Caballo Mine permit area in 1990, 1992, 1996 and 1998. The wetlands delineations were completed in accordance with the procedures and criteria contained in the *Wetland Delineation Manual*. The consolidated delineations were subsequently approved by the COE in January, 1998. Caballo Mine then submitted an application for reauthorization and on April 4, 2002 received approval for an additional five years through April 4, 2007. A mitigation plan covering mining activities through the current permit term, which expires in 2008 has been submitted for WDEQ-LQD and COE. Approximately 0.60 acre of wet meadow type wetlands are located in the NE¼NE¼ of Section 17, Township 48 North, Range 71 West. Under current mine plans, these wetlands would be impacted during overburden removal to mine the current Caballo Mine coal lease. These wetlands are shown on Figure 3.6-2.



Legend

 Caballo Mine Permit Boundary

 Caballo West Tract

Caballo Mine 1992 Wetland Delineations

M - Marsh

WM - Wet Meadow

North Caballo Wetland Delineations

wus- Waters Of The U.s.



SCALE: 1" = 3000'

Figure 3.6-2 Wetlands Within the Caballo West Tract

3.6.9 VEGETATION

The selected tract is represented by two vegetation baseline studies. The original Caballo Mine study covered the eastern portion of the tract and an additional study conducted on the North Amendment Area covered the western portion. Both studies were completed by the Caballo Mine on the lands contained within the selected tract as a part of the WDEQ permitting process. Most of the baseline study areas are located within the current Caballo Mine permit area. The vegetation communities in this area were delineated, mapped, and sampled in accordance with the current WDEQ/LQD requirements. The results of the baseline studies, including the Proposed Action lands, were reviewed and approved by WDEQ/LQD as part of an earlier permit amendment. Sampling was conducted on a large enough area to include sufficient room for overburden layback and other mining needs to recover the coal under the Caballo Mine's current leases located adjacent to the selected tract.

A total of five native and two agricultural vegetation types have been identified and mapped within the offered area. Agricultural cropland and pastureland account for over 70% of the selected tract. Big sagebrush and silver sagebrush communities make up approximately 20% and lowland grassland, upland grassland and meadow represent approximately 8% and disturbed areas over 2% of the remaining area. There are no trees on the selected tract.

3.6.9.1 Vegetation Types

The vegetation type summaries for the Caballo West tract presented in this section are from the same baseline study summarized in Section 3.2.9. Therefore, the reader is referenced back to the offered tract discussion for community types common to both tracts.

The Upland Grassland Type is discussed in Section 3.2.9.

The Meadow Type is discussed in Section 3.2.9.

The Agricultural - Pastureland Type is discussed in Section 3.2.9.

The Big Sagebrush Type is discussed in Section 3.2.9.

The Silver Sagebrush Type was combined with big sagebrush for sampling purposes, therefore, the big sagebrush discussion presented in Section 3.2.9 is representative of this community type. The silver sagebrush community occurs on coarse sandy soils dominated by silver sagebrush. Some big sagebrush is also present. Various cool and warm season grasses are scattered throughout the understory. The silver sagebrush community represented only 1% of the 12,000 acre survey area.

The *Lowland Grassland Type* was mapped in the baseline study completed for the North Caballo Amendment area and was not mapped in the original Caballo Mine baseline vegetation study. Representing less than 0.5% of the permit area, the lowland grassland type occurs in the bottoms of ephemeral channels and at the margins of riparian areas and is comparable to the meadow community type mapped in the original survey as discussed in Section 3.2.9.

Agricultural - Cropland Type. The productivity of cropland is not presented in the permit document and will be based on Campbell County averages provided in “Agricultural Statistics” compiled by the Wyoming Crop and Livestock Reporting Service for reclamation commitments. Historically, grain crops have included wheat, barley and millet (Caballo Coal Company 2005a).

3.6.9.2 Threatened, Endangered, and Candidate Plant Species

No federally listed threatened, endangered, or candidate plant species are known to occur within the selected tract. The offered area was surveyed during baseline studies for threatened, endangered and candidate species using the *Wyoming Rare Plant Field Guide* (Thorne 1994) as their reference. Ute ladies'-tresses surveys were conducted by BKS Environmental Associates, Inc. in 2005. Currently acceptable Ute ladies'-tresses survey methods and practices were utilized in the survey. All individuals who conducted the survey have received written recognition as being qualified to conduct Ute ladies'-tresses surveys and are on the FWS's list of qualified consultants. That survey indicated that there is no orchid habitat within the selected tract due to lack of an adequate water source. All surface lands within the selected tract are privately owned.

Appendix D contains a discussion of threatened, endangered and sensitive species.

3.6.10 WILDLIFE

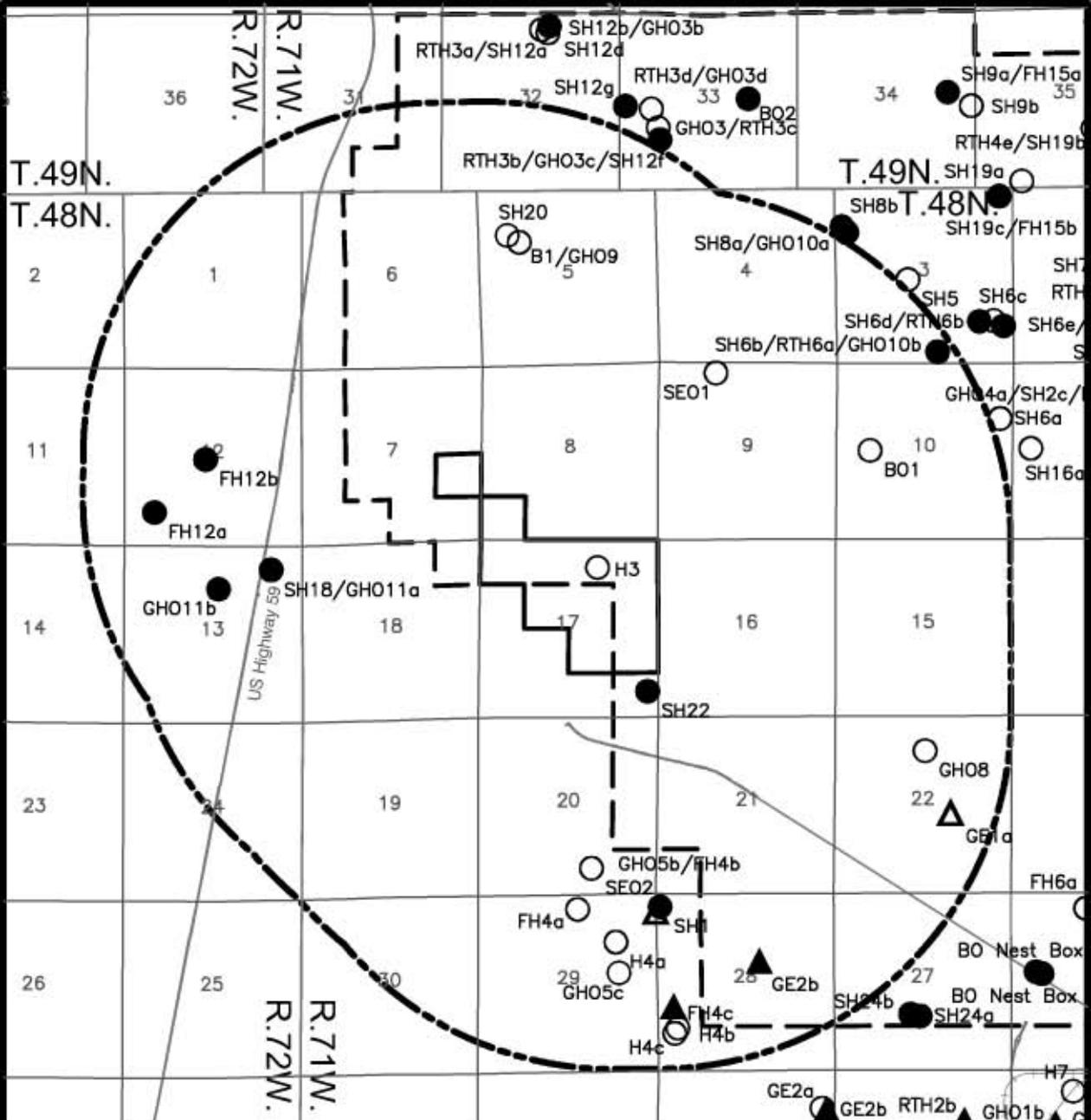
Background information on wildlife near the selected tract was gathered from several sources including: Caballo Mine WDEQ/LQD permit and annual reports, Wyoming Game and Fish Department (WGFD) and FWS records.

Site-specific data for the selected tract were obtained from sources including the WDEQ/LQD permit and annual reports for the Caballo Mine. The selected tract has been surveyed during annual wildlife monitoring for the Caballo Mine. Thunderbird Wildlife Consulting, Inc. (TWC), formerly Powder River Eagle Studies (PRES) have conducted annual wildlife monitoring surveys at Caballo Mine from 1993 through 2005. Their current monitoring plan complies with Appendix B of the WDEQ/LQD Coal Rules and Regulations. The study area has included the selected tract throughout TWC's monitoring timeframe. Thus, extensive wildlife data are available for the selected tract. The data presented herein is from TWC's baseline and annual monitoring data.

The selected tract and adjacent area consists primarily of uplands. The topography is

level to rolling, with some small areas sloping to steeply sloping. Croplands are the primary vegetation type (over 70% of the area) with some big sagebrush, silver sagebrush, upland grassland, scoria grassland, and lowland grassland are the principal habitat types in the selected tract. No designated critical, crucial, or unique habitats are present. Tisdale Creek, an ephemeral stream, crosses the extreme northeast corner of Section 17.

The wildlife discussions presented in Section 3.2.10 are also representative of this portion of the Caballo Mine area and the selected tract. Figure 3.6-3 shows the location of any raptor nests, grouse leks and prairie dog colonies, if present, in the selected tract and on adjacent lands. Monitoring data presented in the Caballo Mine permit and annual report documents show that nest H3 was destroyed by natural causes in 1995 with portions of the nest still intact. No prairie dog colonies or grouse leks exist within the selected tract.



Legend

- Caballo Mine Permit Boundary
- Caballo West Tract
- Search Boundary - EPA (2 Mile Radius)
- Former Raptor Nest
- Former Nesting Platform
- Raptor Nesting Platform

H3 Intact Raptor Nest

- Species Codes
- | | |
|-------------------------------|------------------------------|
| GE = Golden Eagle | SH = Swainson's Hawk |
| RTH = Red-tailed Hawk | H = Northern Harrier |
| GHO = Great Horned Owl | BO = Burrowing Owl |
| B = Buteo Species | SEO = Short-eared Owl |

Note: No Leks or Prairie Dog Colonies

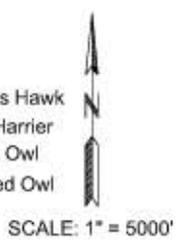


Figure 3.6-3 Raptor Nest Sites, Grouse Leks, and Prairie Dog Colonies Within and Adjacent to the Caballo West Tract

3.6.11 OWNERSHIP AND LAND USE

All of the surface is privately owned and all but one quarter-quarter of the surface on the selected tract is owned by Foundation Wyoming Land Company (Figure 3.6-4). The principal land uses within the tract are cropland, livestock grazing and wildlife habitat.

Areas of disturbance within the selected tract include plugged and abandoned oil and gas well sites, ranch access roads, and mine monitoring access roads.

All of the coal estate in the selected tract is federally owned. Figure 3.6-5 shows that all but two quarter-quarters of the other minerals within the selected tract are privately owned. All of the federally owned oil and gas estate is leased.

The Supreme Court has ruled that CBNG rights belong to the owner of the oil and gas rights (98-830). Therefore, the oil and gas lessees have the right to develop the CBNG in the coal as well as the right to develop conventional oil and gas on the tract.

Oil and gas development have been an historical land use on the selected tract. According to the WOGCC database, there are no producing conventional oil or gas wells in the selected tract and there is only one producing CBNG well

Coal mining is a dominant land use in the area surrounding the selected tract.

Campbell County has no applicable countywide land use plans, and the selected tract has no designated zoning classification. The *City of Gillette/Campbell County Comprehensive Planning Program* (City of Gillette 1978) provides general land use goals and policies for state and federal coal leases in the county.

Only one federal oil and gas lease is located within the selected tract. Federal lease W-138121 is located in Section 17, lots 1 and 8 (E $\frac{1}{2}$ NE $\frac{1}{4}$), Township 48 North, Range 71 West. This lease is owned by Petroleum Corporation, Newport Exploration, Inc., Pendragon Resources, L.P., and Pennaco Energy, Inc.

Big game hunting is the principal recreational use in the general area. Land ownership within the PRB is 80% private, but some private landowners permit sportsmen to cross and/or hunt on their land. Others charge an access fee, and some do not allow any access. There has been a trend over the past two decades towards a substantial reduction in lands open and reasonably available for hunting. Access fees continue to rise, and many resident hunters feel these access fees are unreasonable. This trend has created problems for the WGFD in their attempt to distribute and control harvest at optimal levels, as well as to sportsmen who desire access to these animals (WGFD 1996). Due to safety concerns, public lands contained within an active mining area are often closed to the public, further limiting recreational use. In the PRB, the publicly owned Thunder Basin National Grasslands, BLM-administered public lands, and state school sections (normally Sections 16 and 36) are generally open to hunting if legal

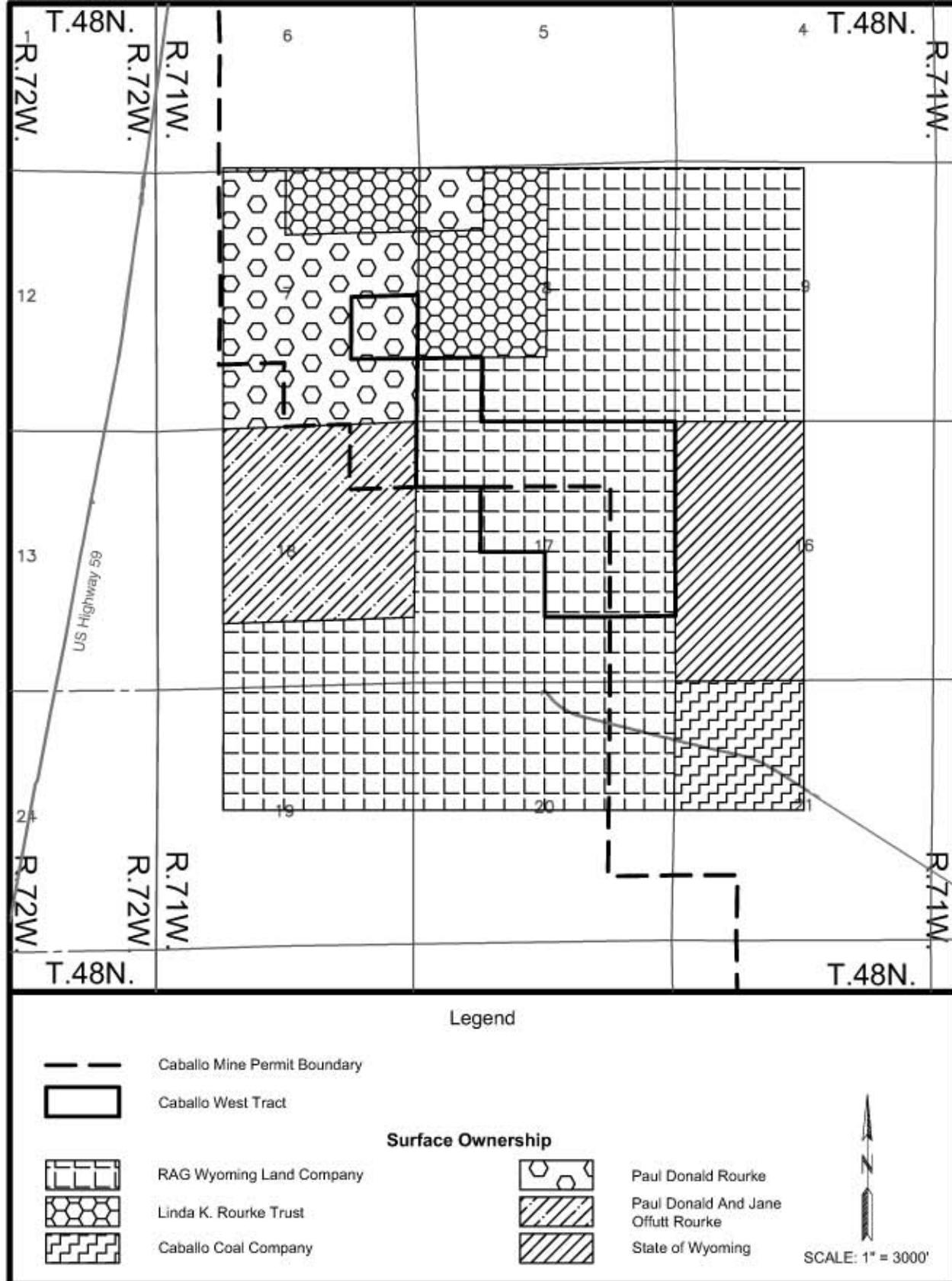


Figure 3.6-4 Surface Ownership on the Caballo West Tract

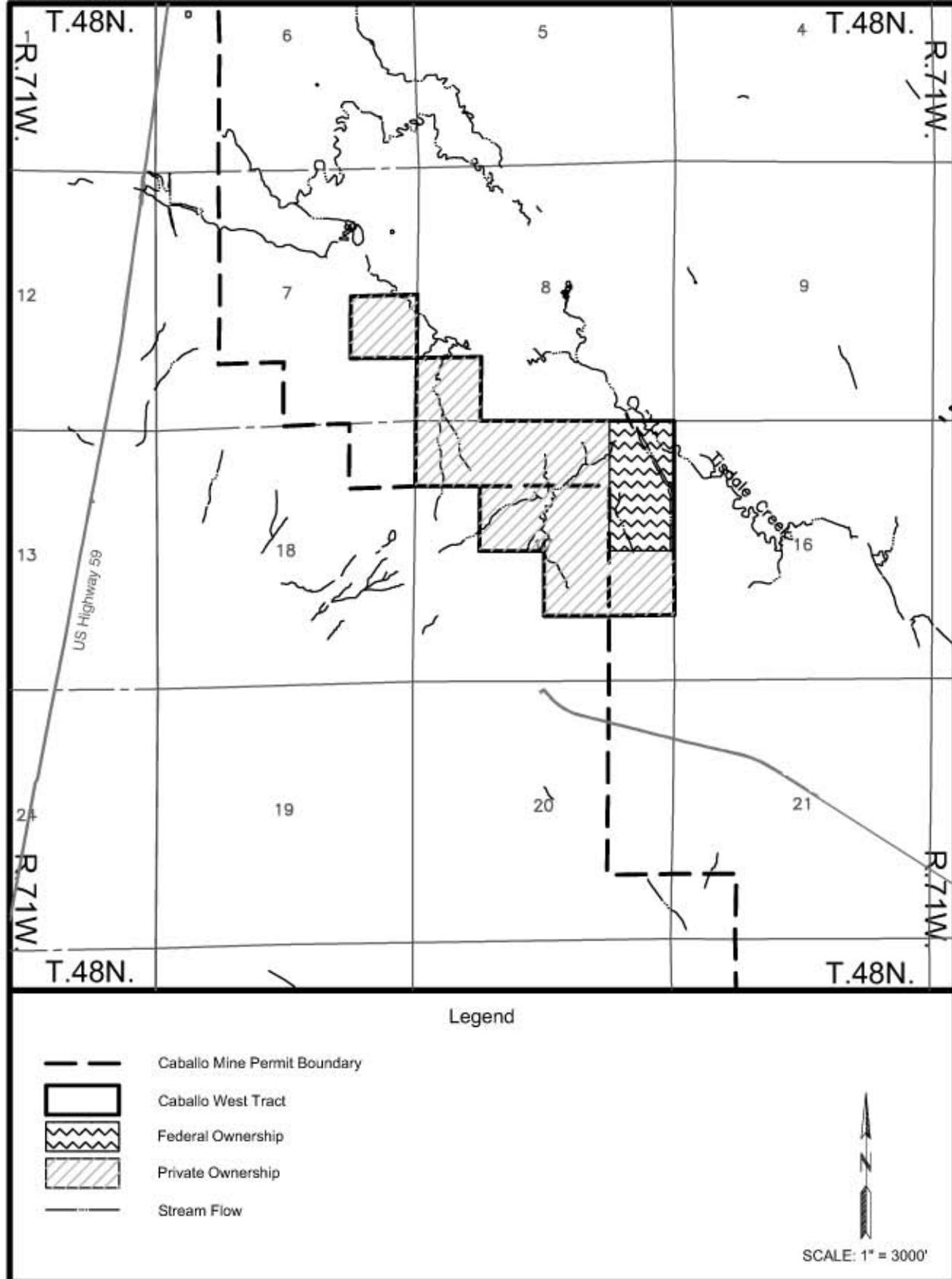


Figure 3.6-5 Oil and Gas Ownership on the Caballo West Tract

access is available. As shown in Figure 3.6-4, there are no public surface lands included in the Caballo West tract and. Due to the area's close proximity to active mining areas, hunting is generally limited.

The surface lands within the selected tract are privately owned, and recreational use is allowed only with landowner permission. Sport hunting in varying degrees occurs on adjacent lands. Pronghorn and mule deer occur on and adjacent to the tract. Sage grouse, mourning dove, waterfowl, rabbit, and coyote are hunted in the vicinity, and some coyote and red fox trapping may occur.

3.6.12 CULTURAL RESOURCES

See Section 3.1.9

A portion of the selected tract was covered by multiple Class III cultural resource inventories and assessments conducted for the Caballo Mine permit area. The remaining areas were surveyed as part of the exploration permitting process conducted in 2004. The goal of the inventories was to locate and evaluate for the NRHP all cultural resources 50 years and older within the study area. WDEQ, OSM, and the Wyoming SHPO reviewed and approved the survey results on the permitted lands which included two sites that were determined to be not eligible for the NRHP. Two additional sites were identified during the 2004 survey which were also determined to be not eligible by the cultural resource consultant. The report from the 2004 survey will be submitted as part of the WDEQ permitting process if the Caballo Mine acquires the selected tract.

3.6.13 NATIVE AMERICAN CONCERNS

See Section 3.1.10

3.6.14 PALEONTOLOGICAL RESOURCES

See Section 3.1.11

A paleontological survey was conducted within and adjacent to the selected tract as part of the cultural resource surveys for the Caballo Mine mining permit and exploration permitting process to determine the potential for recovery of significant fossils prior to disturbance. No vertebrate or invertebrate fossils or plant material was identified or collected within the selected tract as all of it was fragmentary and considered to be of limited scientific importance.

3.6.15 VISUAL RESOURCES

See Section 3.2.15 for a discussion of visual resources for the Caballo Mine area.

3.6.16 NOISE

See Section 3.2.16 for a discussion of existing noise sources in the area

The nearest occupied dwelling to the Caballo West tract is located approximately 0.2 mile south in the SE $\frac{1}{4}$ SE $\frac{1}{4}$ of Section 17, T48N, R71W. Occupied dwellings and publicly accessible roads near the offered tract are shown in Figure 3.6-6.

3.6.17 TRANSPORTATION FACILITIES

Transportation resources near the selected tract include Wyoming 59, and Bishop county road. Wyoming 59 lies approximately 0.5 mile west of the tract and is a paved two-lane road. Bishop county road is also a paved two-lane road in the area of the Caballo Mine. Bishop Road is located approximately 0.25 mile south of the selected tract. The only roads within the selected tract are gas field access, two-track ranch or environmental monitoring roads.

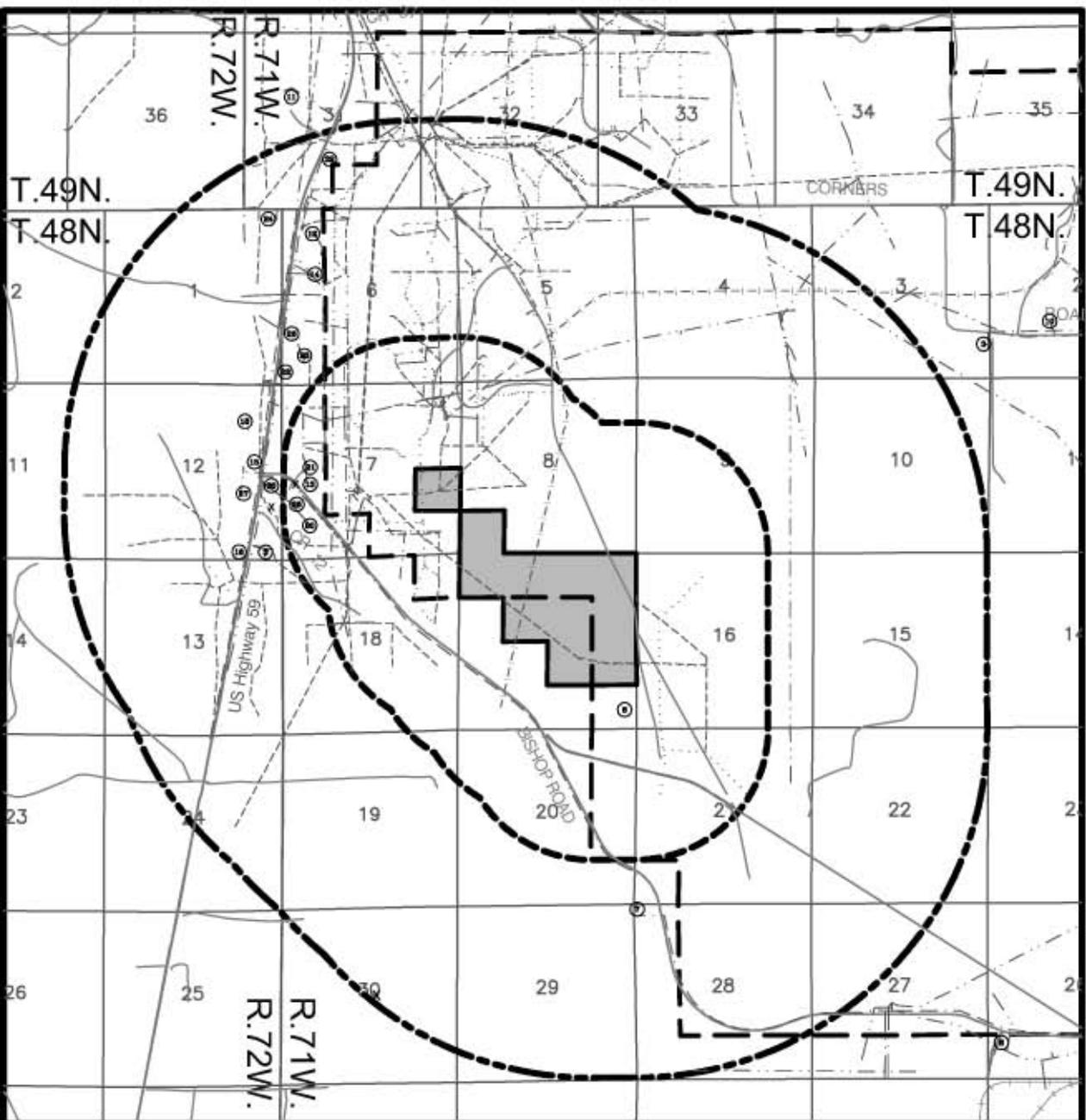
The nearest railroad facilities are the Burlington Northern/Santa Fe Railroad spurs accessing the Caballo Mine. The railroad spur is located approximately 4.0 miles east of the selected tract in Section 24, T48N, R71W. CBNG easements, pipelines and other facilities within and adjacent to the selected tract are shown on Figure 3.6-6.

3.6.18 SOCIOECONOMICS

See Section 3.1.13.

3.6.19 HAZARDOUS AND SOLID WASTE

Potential sources of hazardous or solid waste on the selected tract would include spilling, leaking, or dumping hazardous substances, petroleum products, and/or solid waste associated with mineral, coal, oil and/or gas exploration and development, or agricultural or livestock activities. No such hazardous or solid wastes are known to be present on the tract. Wastes produced by current mining activities at the Caballo Mine are handled according to the procedures described in Chapter 2.



Legend

- | | | | |
|--|---------------------------------------|---|--------------------------|
|  | Caballo Mine Permit Boundary |  | Power Transmission Lines |
|  | Caballo West Tract |  | CBM Pipelines |
|  | Search Boundary (3/4 Mile Radius) |  | CBM Roads |
|  | Search Boundary - EPA (2 Mile Radius) |  | Residence (23) |
|  | Utility Pipelines |  | Bus Stop (2) |
|  | Telephone Lines | | |



SCALE: 1" = 5000'

Figure 3.6-6 Transportation Facilities Within and Adjacent to the Caballo West Tract