

**SECTION 3**

CABALLO WEST LBA TRACT

### **S3-1 TOPOGRAPHY AND PHYSIOGRAPHY**

The Caballo West LBA Tract is in an area of gently rolling terrain of moderate relief influenced by Tisdale Creek and its tributaries. Elevations range from 4,532 to 4,704 ft within the LBA tract and from 4,532 to 4,572 ft within the area added under Alternative 2. Within the LBA tract and the area added under Alternative 2, slopes range from flat to over 26 percent in the central portion of the tract. The slopes of the gently rolling uplands, which comprise most (about 60 percent) of the LBA tract, seldom exceed 4.5 percent. A slope analysis would be done for the LBA tract if a lease sale is held and it is proposed for mining.

### **S3-2 GEOLOGY**

Surficial deposits in the general analysis area include alluvial and eolian deposits, clinker, and weathered Wasatch and Fort Union Formations. Although clinker is present throughout the eastern portion of the general analysis area and the Caballo Mine's existing permit area, the LBA tract analyzed in this EIS contains no appreciable clinker deposits. There are thin alluvial deposits along some of the ephemeral stream channels. These alluvial deposits typically consist primarily of poorly to well-sorted, irregularly bedded to laminated sequences of unconsolidated sand, silt, and clay. The valley floor of Tisdale Creek contains a limited amount of alluvium, both in width and depth, and exhibits a developed terrace and floodplain system. The Tisdale Creek alluvial deposits contain much more coarse-grained material (sands and gravels) than any of the other ephemeral tributaries that drain the general analysis area.

The Eocene Wasatch Formation directly overlies the recoverable coal seam and thus forms most of the overburden in the general analysis area. It consists of interbedded lenticular sandstones, siltstones, shales, and thin discontinuous coals. Typically, units are gradational mixtures of these sediments. There is no distinct boundary between the Wasatch Formation and the underlying Paleocene Fort Union Formation. Typically, the top of the mineable coal zone is considered to be the contact between the two formations. The average overburden thickness in the LBA tract as applied for is about 270 feet and about 286 feet in the Alternative 2 tract configuration. Regionally, overburden thickness generally increases to the west due to the westerly dip (one to three degrees) of the beds. In general, overburden thickness decreases in stream valleys where it has been removed by erosion.

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 seam), Lebo Shale, and Tullock, in descending order.

The Tongue River Member of the Fort Union Formation consists of interbedded claystone, silty shale, carbonaceous shale, and coal, with lesser amounts of fine-grained sandstone and siltstone.

In the western portion of the Caballo Mine and within the Caballo West LBA Tract, there is one mineable coal seam. The nomenclature of this seam varies according to mine operator. The U.S. 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. Locally, this coal zone is referred to as either the Wyodak or the Wyodak-Anderson. On the Caballo West LBA Tract as proposed and the Alternative 2 tract configuration, the Wyodak coal seam thickness averages about 74 feet. Up to five noncoal splits or partings occur within the seam and they are locally discontinuous lenses of carbonaceous clay or shale that are each less than one foot thick.

Within the general analysis area, the coal strikes essentially north-south and dips from zero to five degrees to the west.

The Fort Union coal seams are sub-bituminous and are generally low-sulfur, low-ash coals. Typically, the coal being mined has a higher heating value and lower sulfur content south of Gillette than north of Gillette. According to the analyses (which were done on an as-received basis) of exploration drilling samples collected in the LBA tract as proposed, the heating value of the coal is approximately 8,518 Btu/lb and contains an average of 4.8 percent ash, 0.3 percent sulfur, 1.5 percent sodium, and 29.6 percent moisture. This is not expected to be significantly different in the Alternative 2 tract configuration area.

The Lebo Shale and Tullock Members of the Fort Union Formation consist primarily of sandstone, siltstone, mudstone, shale, and coal. In general, the Tullock Member contains more sand than the Lebo Shale Member.

Table S3-1 presents the average thicknesses of the overburden and the coal seam for the Caballo West LBA Tract. Figures S3-1 and S3-2 depict geologic cross sections drawn through the Caballo West LBA Tract. These cross sections are representative of the geology in the vicinity of the Caballo West LBA Tract.

---

Table S3-1. Average Overburden and Coal Thicknesses in the Caballo West LBA Tract.

---

<b>Mining Unit</b>	<b>Proposed Action (ft)</b>	<b>Alternative 2 (ft)</b>
Overburden	270	286
Coal	74	74

---

Figure S3-1. Geologic Cross Sections A-A' and B-B' for the Caballo West LBA Tract.

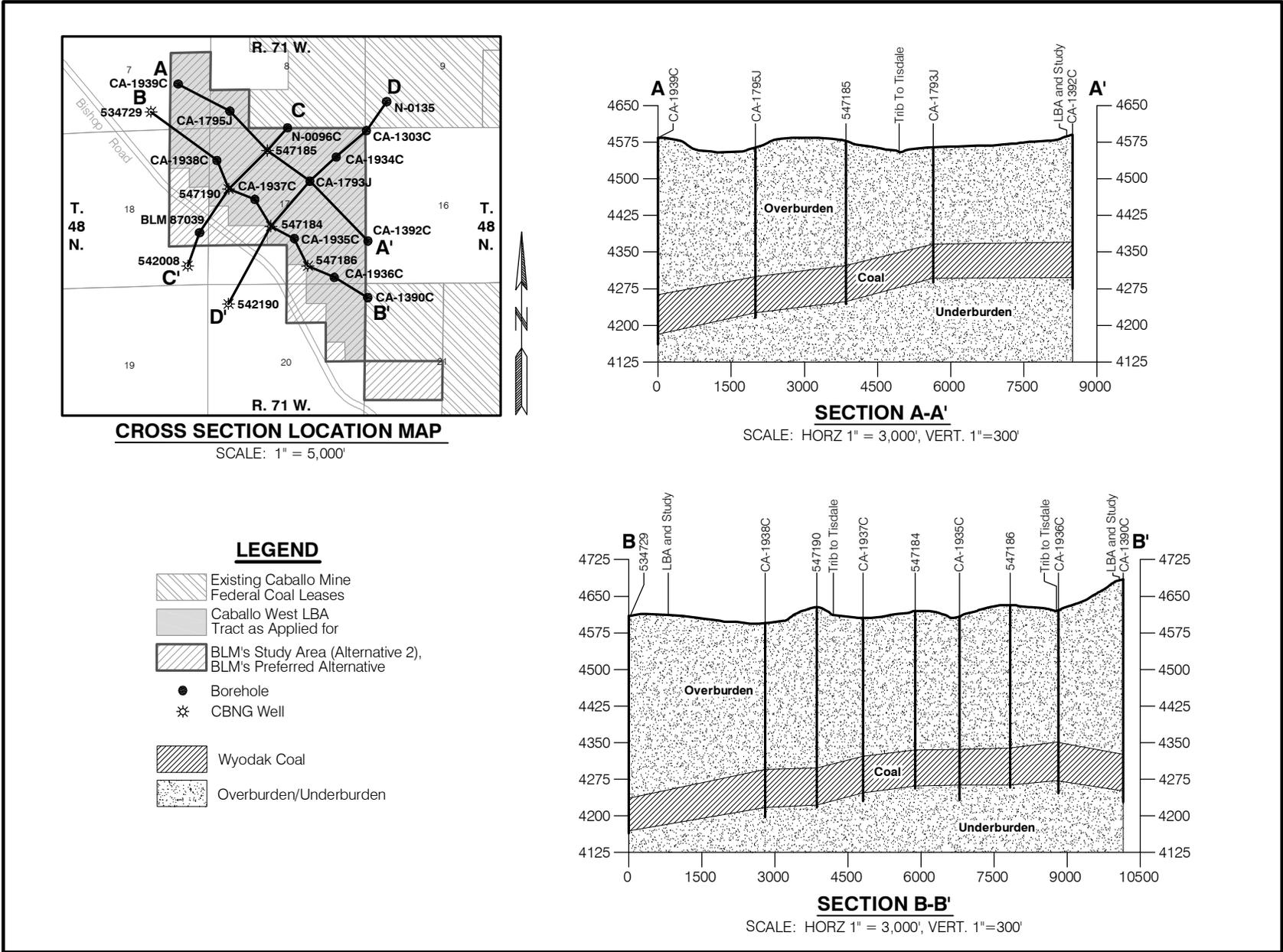
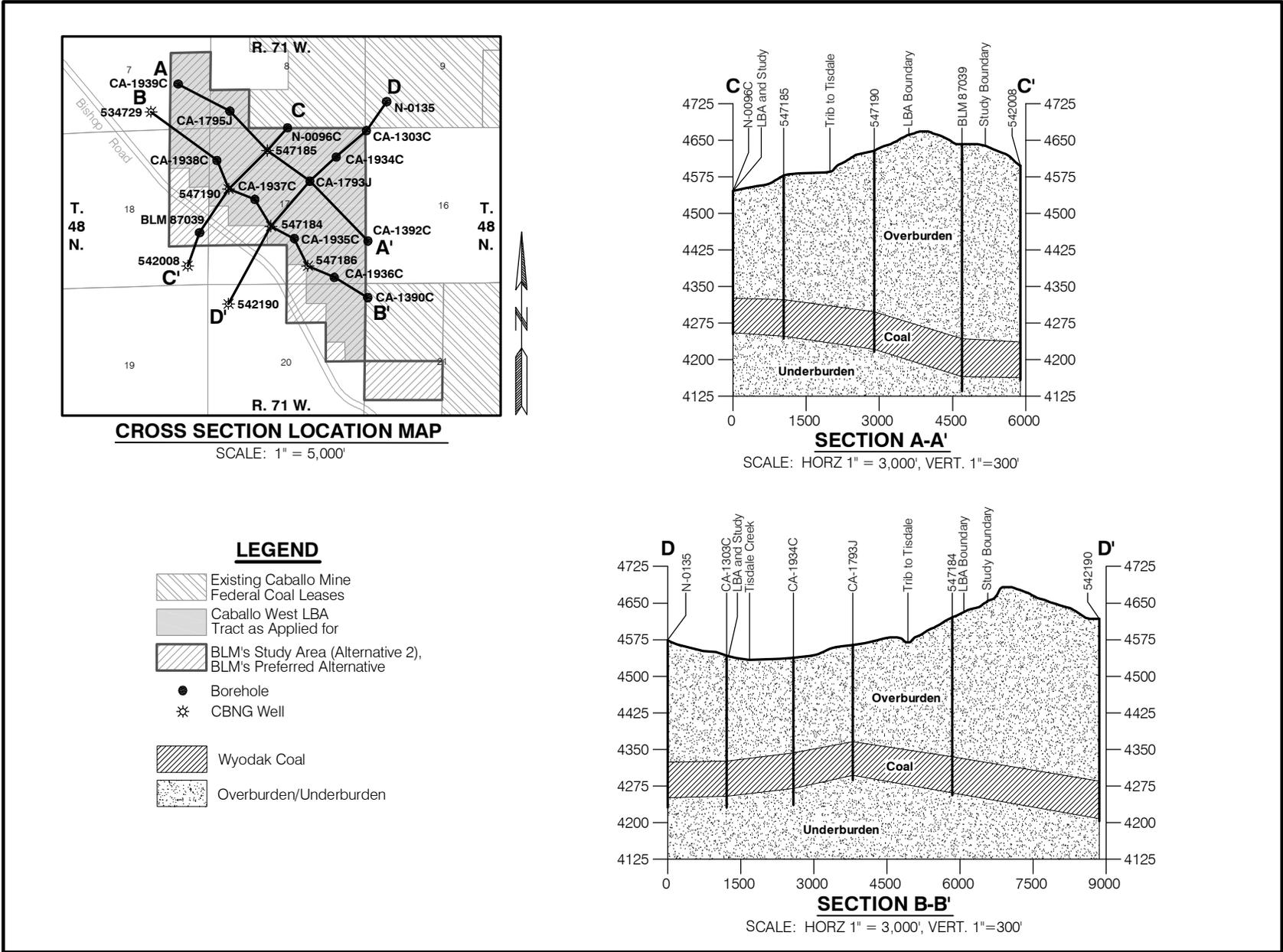


Figure S3-2: Geologic Cross Sections C-C' and D-D' for the Caballo West LBA Tract.



### **S3-3 PALEONTOLOGY**

The formation exposed on the surface of the resource report area is the sedimentary Eocene Wasatch Formation, which is known to produce fossil vertebrates of scientific significance throughout Wyoming, including the PRB (Delson 1971, Winterfeld 1978, EVG 2001).

Although the Wasatch Formation is known to produce fossil vertebrates of scientific significance in Wyoming, outcrops of the Wasatch Formation in the PRB are not generally well exposed and the conditions of deposition of the formation have contributed to a low preservation potential for fossils. 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; and fish. Non-marine invertebrates such as mollusks and ostracods have also been described from the Wasatch.

Fossil plant material is common in the Wasatch Formation. The fossil plants inventoried are primarily leaves and fossilized wood. The leaves usually occur as lignitic impressions in sandstone and siltstone and as compact masses in shale. Leaves are the most abundant fossils found during paleontological surveys and are frequently encountered during mining operations. Fossilized wood often occurs near the top of a coal seam, in carbonaceous shale or within channel sandstone. Exposures of fossil logs are common, but usually very fragmentary. Like fossil leaves, fossil logs can be readily collected in the PRB.

No comprehensive inventory for paleontological resources has been conducted within the resource report area, however, several cultural resource inventories have been conducted within this area and no paleontological finds have been reported in the resource report area.

The landscape of the resource report area is not particularly suited to paleontological exposure. The resource report area is generally rolling grassland, some of which has been cultivated. No substantial areas of bedrock exposures are found in this vicinity.

No significant or unique paleontological resource localities have been recorded on federal lands in the resource report area and no specific mitigation has been recommended for paleontology.

### **S3-4 AIR QUALITY**

#### **S3-4.1 Existing Emission Sources**

In the vicinity of the Caballo West LBA Tract, the main sources of air pollution are surface coal mining activities, vehicular traffic, railroad traffic, and various sources associated with oil and gas production and farming and ranching

activities. The closest existing coal-fired power plants to the LBA tract are the Dave Johnston plant (approximately 91 miles south-southwest) and the Wyodak Complex (approximately 9 miles north-northeast), which consists of the 90-Mw WyGen No. 1, the 335-Mw Wyodak No. 1, the 21.8-Mw Neil Simpson No. 1, the 80-Mw Neil Simpson No. 2, and two 40-Mw natural gas-fired power plants.

### **S3-4.2 Proposed Emission Sources**

All of the currently proposed emission sources in the eastern PRB are discussed in Chapter 4 of the SGAC EIS document. There are currently 13 pending LBA applications, including the Caballo West tract. Table S3-2 provides the approximate distances from the Caballo West LBA Tract to each of the other 12 pending LBAs.

---

Table S3-2. Distances to Pending LBAs.

---

<b>LBA Tract Name</b>	<b>Adjacent Mine</b>	<b>Distance from Caballo West LBA</b>
North Maysdorf	Cordero Rojo	4 miles south
Eagle Butte West	Eagle Butte	15 miles north
Maysdorf II	Cordero Rojo	4 miles south
Belle Ayr North	Belle Ayr	Proximate
West Coal Creek	Coal Creek	12 miles southeast
West Antelope II	Antelope	40 miles south
North Hilight Field	Black Thunder	24 miles south
South Hilight Field	Black Thunder	30 miles south
West Hilight Field	Black Thunder	28 miles south
West Jacobs Ranch	Jacobs Ranch	24 miles south
Hay Creek II	Buckskin	22 miles north
North Porcupine	North Antelope Rochelle	36 miles south
North Porcupine	North Antelope Rochelle	41 miles south

---

### **S3-4.3 Historical Ambient Air Quality: Particulate Emissions**

#### Emission Producing Activities

Fugitive particulate (dust) emissions are produced within the mine areas by activities such as coal and overburden blasting, excavating, loading and hauling, and large areas of disturbed land. Stationary or point sources of particulate emissions produced within the mine areas include coal crushing, handling/conveying, and storage facilities.

## Monitoring Results

WDEQ/AQD requires the collection of information documenting the quality of the air resource at each of the PRB surface coal mines. Each mine was required to monitor air quality for a 24-hour period every six days at multiple monitoring sites through the end of 2001. All PM<sub>10</sub> monitors located at the active mines are now required by WDEQ/AQD to sample air quality for a 24-hour period every three days beginning in 2002.

In accordance with the Ambient Air Quality Assurance Project Plan, Caballo Mine operates a particulate and meteorological monitoring network. Figure 3-5 in the SGAC EIS document shows the locations of the particulate (PM<sub>10</sub> and TSP) air quality sampling sites and the meteorological stations at the Caballo Mine. Ambient particulate data are currently collected at two sites: C-8 and C-9. Sites C-8 and C-9 were originally established as high-volume TSP samplers, but CCC began reporting particulate emissions using low-volume PM<sub>10</sub> samplers at sites C-8 and C-9 2002. The State of Wyoming added PM<sub>10</sub>-based standards in 1989 and retained the TSP standards until March 2000; therefore, the TSP standard is no longer being enforced. Caballo Mine discontinued reporting TSP at sites C-8 and C-9 in 2002.

There were no exceedances of the 24-hour TSP standard at the Caballo Mine when TSP was the federally regulated pollutant, and there have been no exceedances of the 24-hour and annual average PM<sub>10</sub>-based standards at the Caballo Mine since PM<sub>10</sub> became the federally regulated pollutant. Table S3-3 presents the average annual particulate emissions measured at the mine's two currently active air quality monitoring sites from 1997 through 2006. In effort to relate measured particulate emissions to mine activity, Caballo Mine's annual coal and overburden production are included in Table S3-3.

## Control Measures

The WDEQ/AQD requires the use of BACT on all sources of emissions in the State of Wyoming. CCC practices control measures that are applicable to surface mining operations, which are outlined in Section 14 of the WAQSR.

Fugitive emissions are controlled with a variety of methods that the agency considers BACT. Water trucks are used to apply water and chemical dust suppressants on the mine access road and all haul roads used by trucks and/or scrapers. Haul truck speed limits are imposed to further help reduce fugitive emissions from roads. Emissions are further reduced by the assumption of 100 days of precipitation per year. Limiting the drop height between the shovel bucket and truck bed controls emissions from overburden and coal loading. Best mining practices are used to limit the number and areal extent of overburden blasts. Soil is revegetated, either temporarily or permanently, in a timely manner to help minimize emissions from wind erosion. Fugitive emissions from the coal truck dump are controlled with a

Table S3-3. Summary of Caballo Mine Annual Coal and Overburden Production and Particulate Emissions Monitoring Data, 1997 - 2006.

Year	Coal Produced (mmtpy)	Overburden Yards Moved (mmbcy)	Average Annual Particulate Emissions*	
			C-8	C-9
1997	20.0	54.3	28	28
1998	26.0	65.9	34	31
1999	26.5	75.5	40	34
2000	25.6	58.8	42	37
2001	27.1	65.5	42	42
2002	26.0	77.7	(21)	(19)
2003	22.7	56.2	(20)	(18)
2004	26.5	80.2	(19)	(17)
2005	30.5	75.5	(21)	(17)
2006	32.7	81.2	(26)	(22)

Source: PM<sub>10</sub> (2002-2006) EPA AirData (2009a), TSP (1997-2001) WDEQ/AQD District III

\* TSP  $\mu\text{g}/\text{m}^3$   
(PM<sub>10</sub>)  $\mu\text{g}/\text{m}^3$

PEC dust control system (stilling shed). Mine-wide emissions are further reduced by the use of pavement where possible.

Emissions at point sources (i.e., coal crushing, storage, and handling facilities) are controlled with baghouse dust collection systems, PECs, or water sprayers/atomizers/foggers. These are all considered BACT controls by WDEQ/AQD. When the Caballo Mine's air quality permit was first issued, the BACT on emissions from the mine's point sources included covered conveyors, telescoping loadout chutes, enclosed storage devices (silos), and water spray dust controls at all coal transfer points. In 2006, WDEQ/AQD issued air quality permit MD-1477 to modify operations at the Caballo Mine with the addition of a PEC dust control system (stilling shed) at the coal truck dump that replaced the existing water spray dust controls.

#### S3-4.4 Historical Ambient Air Quality: NO<sub>2</sub> Emissions

##### Emission Producing Activities

Vehicular traffic, both inside and outside the areas of mining, is responsible for tailpipe emissions. Exhaust emissions from large-scale mining equipment, emissions from compressor engines used in the production of natural gas, emissions from railroad locomotives, and coal-fired power plant emissions all contain oxides of nitrogen (NO<sub>x</sub>). Tailpipe emissions consist primarily of NO<sub>2</sub>, CO, and VOCs, but may also include SO<sub>2</sub> and other trace constituents. Overburden blasting also sometimes produces gaseous orange-colored clouds

that contain NO<sub>2</sub>. NO<sub>2</sub> is one of several products resulting from the incomplete combustion of the explosives used in the blast.

### Monitoring Results

NO<sub>2</sub> monitoring results are available from several currently-active air quality monitoring stations in the eastern PRB, including the Thunder Basin National Grasslands Site, located approximately 37 miles north-northeast of the LBA tract; the Campbell County Site, located approximately 5 miles west of the LBA tract; and the Tracy Ranch Site, located approximately 35 miles south-southeast of the LBA tract. WDEQ/AQD and the Black Thunder Mine (Tracy Ranch site) maintain these air quality monitoring stations. The monitoring data that have been gathered from these sites, as well as other sites that no longer monitor NO<sub>2</sub> concentration, are included in Section 3.4.3 of the SGAC EIS document.

### Control Measures

To date, there have been no reported events of public exposure to NO<sub>2</sub> from blasting activities at the Caballo Mine. Control measures to limit both emissions and public exposure to NO<sub>x</sub> from blasting are presently being instituted at the Caballo Mine. These control measures that are defined, in part, by conditions in the WDEQ/LQD Mine Permit No. 433-T5 and the provisions of the Wyoming EQC ruling of June 26, 2003 include such procedures as limiting blast size, using low-NO<sub>x</sub> blasting techniques, consideration of wind conditions, and establishment of safe setback distances as effective methods for mitigating exposure to NO<sub>2</sub>.

## **S3-5 WATER RESOURCES**

### **S3-5.1 Groundwater**

The Caballo West LBA Tract overlies three geologic water-bearing strata that have been or would be directly affected by mining. In descending order, these units are the recent alluvial deposits, the Wasatch Formation overburden, and the Fort Union Formation Wyodak coal seam that will be mined. The underlying, subcoal Fort Union Formation and the Fox Hills Sandstone are utilized for industrial water supply at the Caballo Mine and other nearby coal mines, but these units are not physically disturbed by mining activities. Baseline hydrogeologic conditions within and around the Caballo Mine are characterized in the Wyoming Department of Environmental Quality (WDEQ) mining and reclamation permit (CCC 2003), and groundwater monitoring data (depth to water and water quality) are included in the WDEQ Mine Permit and Annual Reports. Caballo Mine's current groundwater monitoring program is addressed in their 2007 WDEQ Annual Report (CCC 2007), and Figure S3-3 depicts the locations of the currently active monitoring wells.

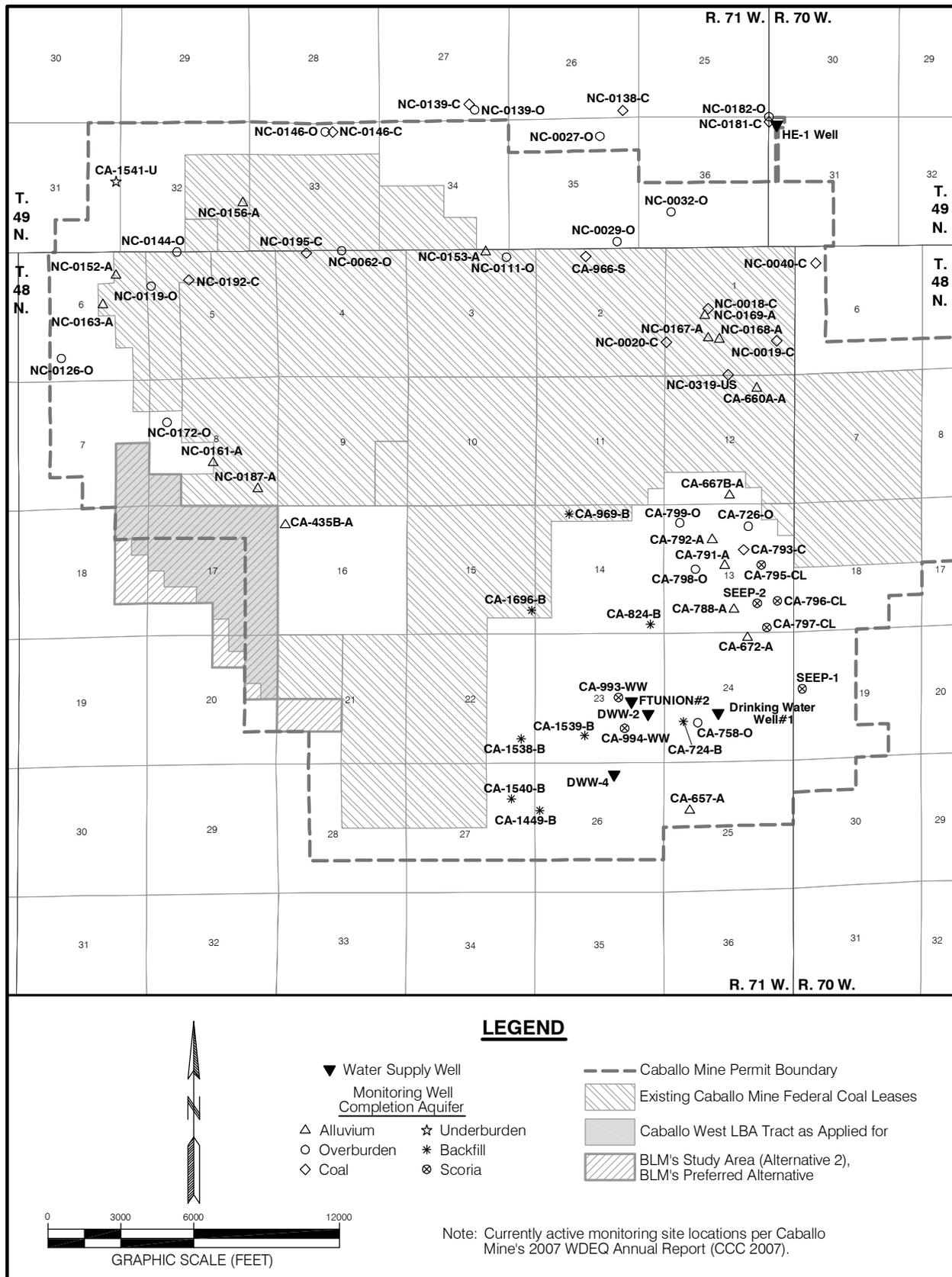


Figure S3-3. Locations of Currently Active Groundwater Monitoring and Water Supply Wells at the Caballo Mine.

### Recent Alluvium

Within the Caballo West LBA Tract, alluvial (unconsolidated, stream-laid) deposits are associated with Tisdale Creek, an ephemeral tributary of Caballo Creek. The Tisdale Creek alluvium consists of recent stream channel deposits and terrace deposits. Recent channel deposits and terraces that are present in the stream valley are typified by both lateral and vertical heterogeneity and are generally comprised of gravels, coarse- to fine-grained sands, and local lenses of silty, commonly organic-rich clays. The upper-most terrace is comprised of relatively homogeneous sandy silt and clay deposits. The alluvial materials presently being deposited by fluvial processes along Tisdale Creek are clayey and heavy-textured.

The thickness of the Tisdale Creek alluvial deposits varies from zero feet where bedrock is exposed in the stream channel to more than 30 feet. Within the Caballo West LBA Tract, the thickness of alluvial deposits averages approximately 12 feet, and the saturated thickness varies from almost zero (dry from land surface to the top of the underlying overburden) to more than 10 feet thick, and is greatest near the stream channel.

Tisdale Creek alluvial monitor well water levels indicate that alluvial groundwater progresses down-valley under a hydraulic gradient similar to that of the valley profile. Recharge to the alluvium is from direct precipitation, streamflow infiltration, and groundwater contributions from adjacent upland areas. The water table geometry near the stream suggests that the stream generally loses water to the alluvium, but may gain water depending on the season and extent of saturation in the alluvium. The heavy-textured nature of the alluvial aquifer material severely limits groundwater flow downgradient.

In general, the groundwater quality in the saturated Tisdale Creek alluvium adjacent to the LBA tract is poor. Alluvial groundwater is characterized as a calcium-sulfate type with a mean total dissolved solids (TDS) concentration ranging from approximately 4,900 to 36,000 milligrams per liter (mg/L). Due to the high salinity, Tisdale Creek alluvial groundwater is considered unsuitable for domestic consumption and irrigation, and is marginal only in some areas for livestock and wildlife use, based on WDEQ Water Quality Division (WQD) standards. The low hydraulic conductivities and limited areal extent of saturation indicate that the alluvium does not exhibit aquifer characteristics adequate for producing groundwater in sufficient quantities for agricultural or domestic uses. There is currently no known use of alluvial groundwater in or near the Caballo West general analysis area.

### Wasatch Formation

Within the Powder River Basin (PRB), the Wasatch Formation (strata lying above the Wyodak Coal) consists of interbedded sands, silts, and clays with occasional discontinuous deposits of carbonaceous material. This description basically holds true for the Caballo West LBA Tract. The Wasatch strata range

in cohesion from unconsolidated (i.e., loose sands and siltstones) to lithified (sandstones, siltstones, shales, and coal stringers). Any of the deposits may be water bearing, although the sands and sandstones possess a greater, but laterally limited, potential for groundwater yield. These sands are generally discontinuous and separated laterally and vertically by fine-grained deposits. The discontinuous nature of the deposits causes considerable variability in groundwater elevations both laterally and vertically. The hydraulic connection between sandstone lenses is tenuous due to intervening shale aquitards; thus, groundwater movement through the Wasatch Formation overburden is limited. Because the water-bearing units within the Wasatch Formation are not continuous, the Wasatch is not considered to be a regional aquifer.

Water production from the overburden within and around the Caballo West LBA area is generally low, although in some locations, the Wasatch Formation can produce water reliably for domestic and stock use. Isopach maps and geologic cross sections indicate that the sandstone lenses contained in the Wasatch Formation cannot be reliably correlated over the Caballo Mine's permit area. The formation is also composed of interbedded clays, which are similar to shales, and tend to isolate water production units.

Another geologic unit that is often considered a part of the Wasatch Formation is scoria, also called clinker or burn. It consists of sediments that were baked, fused, and melted in place when the underlying coal burned spontaneously. These burned sediments collapsed into the void left by the burned coal. Scoria deposits can feature high permeabilities and well yields, and can extend laterally for miles in the eastern PRB. Scoria typically occurs in areas where coal seams outcrop at the surface. The hydrologic function of scoria is to provide infiltration of precipitation and recharge to laterally contiguous overburden and Wyodak coal beds. Clinker outcrop areas occur along the Caballo Mine's eastern permit boundary. No scoria deposits are present within the Caballo West LBA Tract.

Recharge to the Wasatch Formation is from the infiltration of precipitation and lateral movement of water from adjacent scoria bodies. Regionally, groundwater is discharged from the Wasatch Formation by evaporation and transpiration, by pumping wells, by drainage into mine excavations, and by seepage into the alluvium along stream courses. Overburden in the vicinity of the LBA tract is recharged naturally by precipitation infiltration and infiltration of surface water runoff stored in playa areas. Additionally, artificial recharge occurs where reservoirs have been constructed for ranching operations, and where coal bed natural gas (CBNG) groundwater is discharged to the surface. CBNG-produced groundwater has been discharged to Tisdale Creek along the northern edge of the LBA tract, and has enhanced recharge to the overburden in that area. Overburden groundwater is not generally connected to the underlying Wyodak coal seam due to a low-permeability stratum at the base of the overburden which is fairly widespread in the general south Gillette analysis area. However, leakage through this lower unit may provide some additional recharge component to the coal aquifer.

Regionally, the discontinuous nature of the sediments in the Wasatch Formation results in considerable variability in the occurrence of groundwater, both laterally and vertically, in the overburden. Due to the varied nature of the geologic units within the Wasatch, hydraulic properties are variable as well. Martin et al. (1988) reported that hydraulic conductivities within the Wasatch ranged from  $10^{-4}$  feet per day (ft/day) to  $10^2$  ft/day, and 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 using wells completed in siltstone and claystone in the Wasatch overburden was 0.007 ft/day (Rehm et al. 1980). Field aquifer tests conducted within and adjacent to the Caballo Mine indicate that the water-bearing Wasatch strata in this area typically exhibit low hydraulic conductivities, ranging over three orders of magnitude (0.02 to 78 ft/day); with locally higher values being associated with higher sand fractions relative to the low-permeability silts and clays that make up the majority of the overburden. Aquifer testing also verified that the overburden sands are usually hydraulically isolated.

Premine saturated thicknesses in the overburden ranged from near zero in the eastern part of the Caballo Mine permit area to more than 200 feet in the western portions of the Caballo West Tract as applied for. Due to the discontinuous nature of the deposits, premine overburden groundwater movement generally followed the topography. Before mining, overburden groundwater flow in the vicinity of the Caballo Mine was generally toward the Tisdale Creek and Caballo Creek valleys. Groundwater flow has since been affected within and adjacent to the mine area by the removal of overburden.

Pre-mine dewatering of overburden at the Caballo and Belle Ayr Mines affects groundwater flow by accelerating the effects of overburden removal by approximately one to two years. Monitor well data indicate that overburden groundwater in the Caballo West general analysis area now flows toward the Caballo Mine's and neighboring mines' open pits; however, water levels in overburden monitoring wells located more than 500 feet from the pit have shown no significant decline and any changes are generally only in response to seasonal fluctuations. Currently, Caballo Mine overburden groundwater levels in the vicinity of the Caballo West general analysis area vary from approximately 25 feet to over 180 feet below the land surface (Hydro-Engineering 2007). Mining operations have depressed water levels in the overburden, although the historical monitoring data do not indicate a correlation between water level drawdown in the overburden to distance and direction from the open pits.

Water quality in the Wasatch Formation near the Caballo West LBA Tract is extremely variable, but generally poor. The shallow sand zones are found to have higher concentrations of TDS and the water quality tends to improve with depth. TDS concentrations range from approximately 2,100 mg/L to 13,000 mg/L and the water type is characterized as a calcium-magnesium-sulfate.

The water is considered unsuitable for domestic consumption and irrigation, but suitable for livestock and wildlife use in some cases. According to the Wyoming State Engineer's Office (SEO) records, there are 63 wells within 3 miles of the Caballo West general analysis area that are completed in the overburden (based on depth of completion): 11 for domestic use only, 8 for domestic and/or stock use, and 36 for stock use only. This excludes wells for industrial and mining use.

### Wyodak Coal

The Tongue River Member of the Fort Union Formation contains the Wyodak coal seam, referred to as the Smith Coal in some Caballo Mine baseline studies. The Wyodak is often divided by partings that separate it into two or more units. The separate units are given local names that vary from mine to mine (e.g., Upper and Lower Wyodak or Anderson and Canyon seams). Only local, discontinuous carbonaceous shale partings, typically less than one foot thick, occur in the Caballo West general analysis area; therefore, the Wyodak coal seam is considered a single aquifer. A general discussion of the coal seam aquifer is presented below.

Due to its continuity, the Wyodak coal seam is considered a regional aquifer because it is water bearing and is laterally continuous throughout the area. Hydraulic conductivity within the Wyodak coal seam is highly variable and reflective of the amount of fracturing the coal has undergone, as unfractured coal is virtually impermeable. Field tests indicate that the coal has a low to moderate transmissivity with a range of roughly three orders of magnitude, with localized zones of moderately high transmissivity due to increased fracturing. The yield of groundwater to wells and mine pits is smallest where the permeability of the coal is derived primarily from localized unloading fractures. These fractures, which are the most common, are created by the expansion of the coal as the weight of overlying sediments is slowly removed by erosion. The highest permeability is imparted to the coal by tectonic fractures. These are through-going fractures of areal importance created during deformation of the Powder River structural basin. The presence of these fractures can be recognized by their linear expression at the ground surface, controlling the orientation of stream drainages and topographic depressions. Due to their pronounced surface expression, these tectonic fractures are often referred to as "lineaments". Coal permeability along lineaments can be orders of magnitude greater than coal fractured by unloading only. Such increased aquifer transmissivity occurs west of the Caballo Mine area, and is attributed to structural development that has produced additional fracturing.

Field aquifer tests conducted by Caballo Mine in the vicinity of the Caballo West LBA Tract indicate that the coal aquifer is non-homogeneous and generally low in transmissivity with some local areas of high transmissivity. Hydraulic conductivity values reported for the Wyodak coal seam within and near the existing Caballo Mine permit boundary range from 0.04 ft/day to 66.7 ft/day, with a mean of approximately 8.9 ft/day, and storage coefficients

measured around the Caballo Mine area range from  $10^{-3}$  to  $10^{-4}$ , which indicates confined groundwater conditions (CCC 2003).

Recharge occurs principally by infiltration of precipitation in the clinker outcrop areas along Caballo Mine's eastern permit boundary. Secondary vertical recharge from the overburden also occurs. Prior to mining, the direction of groundwater flow within the coal aquifer was generally from recharge areas westward into the basin, following the dip of the coal. Groundwater conditions varied from unconfined to confined, depending on the coal elevation and proximity to outcrop, and the coal was not fully saturated in some portions of the Caballo Mine permit area.

Site-specific water-level data collected from monitoring wells by Caballo Mine and other PRB coal mining companies that were presented in the Gillette Area Groundwater Monitoring Organization (GAGMO) 25-year report (Hydro-Engineering 2007) indicate that the groundwater flow directions in the Wyodak coal have been greatly influenced by surface mine dewatering and groundwater discharge associated with CBNG development. Near active mining areas, groundwater flow within the coal aquifer is typically toward the mine pits. Caballo Mine development began in 1977 and Belle Ayr Mine development began in 1973, and gradual water level declines recorded prior to 1997 were likely due to mine dewatering alone. By the year 2000, groundwater level decline rates had dramatically increased because drawdown caused by widespread CBNG development west of the mines was overlapping with drawdown caused by mining operations. A continuous cone of depression existed around the Caballo, Belle Ayr, and Cordero Rojo Mines due to their proximity to each other and the cumulative drawdown effects from pit dewatering and nearby CBNG discharges. The extent of drawdown west of the mines that is specifically attributable to mine dewatering can no longer be defined due to much greater drawdown in both magnitude and areal extent caused by CBNG development (Hydro-Engineering 2007).

Monitoring wells located within one mile west of the Caballo Mine pits in 2005 had recorded less than 80 feet of historical drawdown. Due to safety, environmental, and economic reasons, many of the coal monitoring wells have been plugged to prevent methane gas from escaping. However, monitoring wells located at least 3 miles west of the mine pits had recorded total drawdowns of 180 feet or more (Hydro-Engineering 2007). By May 2005, dewatering by mining and CBNG development had lowered the Wyodak coal aquifer's groundwater level to approximately the top of the seam near the Caballo West LBA Tract. The direction of groundwater flow within the LBA tract is now predominantly to the west rather than east. After CBM wells near some monitoring wells were shut in, water levels rose slightly, probably due to recharge from the east as CBNG development continues to the west.

Within the general south Gillette analysis area, Wyodak coal groundwater quality is generally poor, but exhibits lower TDS concentrations than alluvial or overburden groundwater. The composition of groundwater in the coal is

generally characterized as a calcium/magnesium-sulfate type near the scoria outcrop recharge areas and transitions to a sodium-bicarbonate type as the groundwater moves downgradient. TDS concentrations range from around 522 mg/L to 3,620 mg/L, and average approximately 1,450 mg/L. Coal groundwater commonly exceeds many suitability criteria for domestic uses and has a high salinity and sodium hazard, which makes it unsuitable for agricultural uses. Therefore, coal groundwater is typically suitable for only livestock and wildlife watering purposes.

#### Subcoal Fort Union Formation

The Fort Union Formation is divided into three members, which are, in descending order: The Tongue River Member, the Lebo Member, and the Tullock Member. The mineable coal seams occur within the Tongue River Member. The subcoal Fort Union Formation consists primarily of lithified sands and shales, and is divided into three hydrogeologic units: the upper Tongue River aquifer, the Lebo confining layer, and the Tullock aquifer (Law 1976). Of the three units, the Tullock is the most prolific in terms of groundwater yield.

Mining does not directly disturb the hydrogeologic units below the Wyodak coal, but many PRB mines use them for industrial 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 (BLM 2001b). The upper Tongue River aquifer consists of lenticular, fine-grained sandstone interbedded with mudstone. 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 Lebo confining layer typically separates the Tongue River and Tullock aquifers hydraulically. The Tullock aquifer consists of discontinuous lenses of sandstone separated by interbedded shale and siltstone.

Transmissivity is equal to an aquifer's hydraulic conductivity, or permeability, times its saturated thickness, and is commonly used when discussing the hydraulic properties of the subcoal 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 upper Tongue River aquifer, and many mines in the PRB have water supply wells completed in this interval (Martin et al. 1988). The City of Gillette also utilizes the Tullock aquifer to meet part of its municipal water requirements. The average transmissivity for the Tullock, as reported by OSM (1984), is 290 ft<sup>2</sup>/day.

The water quality of the subcoal Fort Union Formation is generally good. TDS concentrations measured in various subcoal Fort Union Formation water supply wells in the eastern PRB range from 230 mg/L to 520 mg/L. Water from the subcoal Fort Union Formation is of the sodium- bicarbonate type. This water is generally suitable for domestic use and livestock and wildlife

watering. Depending upon TDS concentrations and site-specific SAR values, groundwater from Fort Union supply wells may also be suitable for irrigation.

According to SEO records, excluding wells for industrial and mining use, and based on depth of completion, there are 22 wells within three miles of the Caballo West LBA Tract that are completed in the sub-coal Fort Union Formation: four for domestic and stock use, one for livestock-only use, and 17 for domestic use only. The Caballo Mine uses two wells completed in this formation, DW-1 (Drinking Water Well #1) and FTUNION#2, to supply water for human consumption and mining operations. The depths of these industrial water supply wells range from 1,415 to 1,605 feet. The locations of these mine supply wells are shown on Figure S3-3.

#### Lance Formation-Fox Hills Sandstone

The Lance Formation of Cretaceous age underlies the Fort Union Formation. The Lance Formation is comprised of an upper confining layer and a lower aquifer. In Wyoming, the lower Lance Formation is also called the Fox Hills Sandstone. The Fox Hills Sandstone is described as a well-developed, fine- to medium-grained, marine sandstone that contains thin beds of sandy shale and averages around 670 feet thick.

Caballo has an industrial water supply well HE-1 (Figure S3-3), which is completed in the Fox Hills Sandstone. This well is 3,754 feet deep and permitted to pump 250 gallons per minute (gpm). Water from this well is suitable for domestic use, although it is primarily used for dust suppression and other mining-related uses. The City of Gillette also utilizes the Lance/Fox Hills aquifer to meet part of its municipal water requirements, as do the Wyodak Power Plant and various eastern PRB surface coal mines.

#### **S3-5.2 Surface Water**

The Caballo Mine site is situated near the center of the PRB, which is a broad structural trough that lies between the Big Horn Mountains and the Black Hills. The PRB is drained by three separate drainage systems: the Powder/Little Powder, the Cheyenne, and the Belle Fourche Rivers. The Belle Fourche River drainage system lies between the Powder River and Cheyenne River drainage basins, and is a narrow, linear-shaped basin extending from the Pumpkin Buttes northeast to the Black Hills. The topography of the Belle Fourche drainage basin is typified by broad, flat, inter-stream uplands and a wide, level expanse of eastward-sloping plains broken by a few isolated buttes. Caballo Creek, a major tributary of the Belle Fourche River, drains the existing Caballo Mine permit area and Caballo West general analysis area. The total drainage area for Caballo Creek is approximately 260 square miles, and the stream's main stem is about 51 miles long. The Caballo Creek watershed has a dendritic drainage pattern with an approximate width (north-south) of 12.8 miles and an approximate length (east-west) of 25.0 miles. The relief of Caballo Creek's basin is 740 feet from its headwaters to its confluence with the Belle

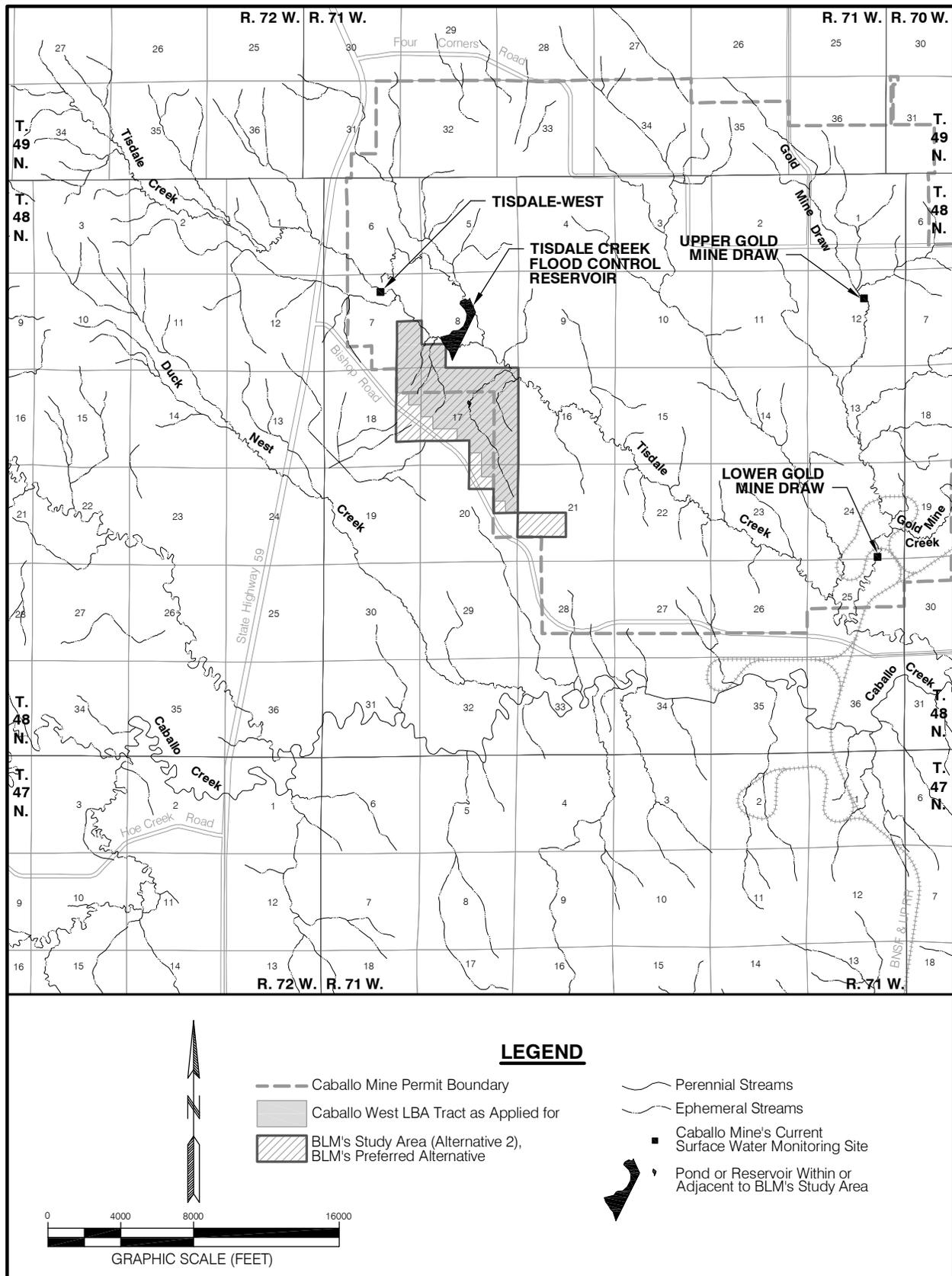


Figure S3-4. Surface Water Features Within and Adjacent to the Caballo West LBA Tract.

Fourche River. The Caballo Mine is currently permitted to disturb approximately 12 percent of the Caballo Creek watershed.

Caballo Mine's existing permit area is located primarily within the Tisdale Creek drainage, a tributary of Caballo Creek (Figure S3-4). There are also approximately 2,220 acres of area within the mine's permit area that drain internally toward natural topographic depressions to form playas. A large portion of the Caballo West general analysis area is within the mine's existing permit area. Tisdale Creek, a southeasterly-flowing tributary of Caballo Creek, drains the northern and eastern portions of the Caballo West general analysis area, and a large playa drains the southern and western portions of the tract. Approximately 1,000 linear feet of Tisdale Creek's main stem overlies the LBA tract. Tisdale Creek is currently interrupted to the north of the Caballo West LBA Tract by Caballo Mine's T7 Reservoir (a total containment reservoir). Water from the reservoir is pumped around the mine operations to Gold Mine Draw, which is another tributary to Caballo Creek.

All streams, including Tisdale Creek, within and adjacent to the LBA tract are typical for the region, in that flow events are ephemeral. Stream runoff is typically of short duration and exhibits temporal patterns similar to precipitation events. All streams in the region show the characteristic extreme low-flow period from October through January. Flow events frequently result from snowmelt during the late winter and early spring. Although peak discharges from such events are generally small, the duration and corresponding percentage of annual runoff volume can be considerable. During the spring, general storms (both rain and snow) increase soil moisture, which decreases infiltration capacity, and subsequent rainstorms can result in both large runoff volumes and high peak discharges. Portions of Tisdale Creek downstream of the Caballo Mine receive recharge from bank storage (groundwater stored in the alluvium and bedrock along the stream channel) creating intermittent reaches.

Streamflow was measured on Tisdale Creek at the Lower Tisdale gaging station between 1978 and 1989. Gaging stations at Caballo Mine are outfitted with continuous recorders between the months of April and November. During 1978 and 1979, the mean daily flow was as high as 225 cubic feet per second (cfs), but the average mean daily flow was much less and the stream was usually dry. Flow was measured upstream of the Caballo Mine at the Upper Tisdale gaging station between 1979 and 1995, and the mean daily flow records show that during most days no flow was recorded. Monitoring of both the Lower and Upper Tisdale gaging stations was discontinued. Since 2004, Caballo Mine has been measuring flows upstream of the mine at the Tisdale-West station (Figure S3-4), and flow has been recorded on only two days over the period of record.

Tisdale Creek is listed in the WDEQ/WQD Surface Water Classification List as a Class 3B stream, which is an intermittent or ephemeral stream with sufficient hydrology to normally support and sustain communities of aquatic

life, including invertebrates, amphibians, or other flora and fauna that inhabit waters at some stage of their life cycles. All other ephemeral streams draining the existing permit area and Caballo West general analysis area are categorized as Class 3 or 4 streams.

Surface water quality typically varies with flow and by season. In general, as streamflow increases so does total suspended solids (TSS), while TDS concentration decreases. Conversely, TSS decreases with reduced streamflow, and TDS concentration rises. Due to the relatively sparse vegetative cover and the infrequent occurrence of surface runoff in this semi-arid environment, high TSS concentrations can occur frequently in larger streamflows, especially from floods caused by thunderstorms. Water quality was measured at the Upper Tisdale gaging station, which was located northwest and upstream of the Caballo West LBA Tract from 1978 to 1995. TDS concentrations ranged from 115 to 3,090 mg/L with a mean concentration of 830 mg/L.

Springs do not occur in the Caballo West general analysis area and only exist at the Caballo Mine along the Gold Mine Draw drainage.

There is one stock reservoir located on the Caballo West general analysis area. This in-channel reservoir is located on an unnamed tributary of Tisdale Creek, in Section 17, T.48N., R.71W., and it is not permitted with the Wyoming SEO.

### **S3-5.3 Water Rights**

The Wyoming SEO administers water rights in Wyoming. Water rights are granted for both groundwater and surface water appropriations. Prior to development of water resources associated with energy development, water appropriations (either groundwater or surface water) in the PRB were typically for livestock use. Currently, mining companies and CBNG development companies hold the majority of the water rights in the general south Gillette analysis area.

Records of the SEO have been searched for groundwater rights within a 3-mile radius of the BLM study area for the Caballo West LBA Tract. This information is required for WDEQ permitting. SEO data indicate that, as of July 25, 2007, there were 1,382 permitted water wells within 3 miles of the tract, of which, 677 are owned by coal mining companies. The other 705 non-coal mine related, permitted water wells, which include 587 wells permitted for uses related to CBNG development, are permitted for the following uses:

- 282 CBNG
- 260 CBNG and livestock
- 37 livestock
- 36 domestic
- 26 CBNG and miscellaneous
- 19 CBNG, livestock, and miscellaneous
- 18 domestic and livestock

- 8 monitoring
- 7 industrial
- 5 miscellaneous
- 1 domestic, livestock, and miscellaneous
- 1 irrigation
- 1 municipal and miscellaneous
- 1 reservoir supply, industrial, and miscellaneous
- 1 livestock and industrial
- 1 livestock and irrigation
- 1 livestock and miscellaneous

SEO records have been searched for surface water rights within a 3-mile radius of the BLM study area for the Caballo West LBA Tract. Like the groundwater rights, this information is also required for WDEQ permitting. SEO records indicate that as of July 2, 2007, there are 9 non-coal mine related, permitted surface water rights within the search area. These surface water rights are permitted for the following uses:

- 3 irrigation
- 2 livestock
- 1 temporary and industrial
- 1 reservoir supply
- 1 reservoir supply and irrigation
- 1 reservoir supply, irrigation, and domestic

A listing of the non-coal mine related groundwater and surface water rights as of July 25, 2007 is presented in Table S3-4.

### **S3-6 ALLUVIAL VALLEY FLOORS**

Caballo Mine's existing permit area is located primarily within the Tisdale Creek watershed, a tributary of Caballo Creek. A large portion of the Caballo West general analysis area is within the mine's existing permit area. Tisdale Creek drains the northern and eastern portions of the Caballo West general analysis area, and a large playa drains the southern and western portions of the tract. Figure S3-5 depicts the extent of the stream laid alluvial deposits associated with Tisdale Creek and its tributaries within and adjacent to the Caballo West LBA Tract. The thickness of the Tisdale Creek alluvial deposits varies from zero feet where bedrock is exposed in the stream channel to more than 30 feet. Within the Caballo West LBA Tract, the thickness of alluvial deposits averages approximately 12 feet, and the saturated thickness varies from almost zero (dry from land surface to the top of the underlying overburden) to more than 10 feet thick, and is greatest near the stream channel. The locations of Caballo Mine's existing alluvial groundwater monitoring wells are also shown on Figure S3-5.

Tisdale Creek and its associated ephemeral tributaries within the existing Caballo Mine permit area, including a portion of the BLM study area for the

Supplementary Information on the Affected Environment

Table S3-4. Groundwater Rights for Caballo West LBA Tract.												
Permit No.	Priority	TNS	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD	
P66523W	2/16/1984	47	71	2	SWSW	WY BOARD OF LAND COMMISSIONERS** CABALLO ROJO INC.	ENL MOBILE ROJO #2A	ADJ	RES, IND, MIS	75	2034	
P79080W	2/13/1989	47	71	4	NWSW	COMDISCO EXPLORATION	ROYAL DRAW UNIT #1		MIS	15	###	
P5514P	5/8/1958	47	71	4	SWSW	LESLIE CLABAUGH	CLABAUGH #3	GST	STO	4	210	
P131776W	12/29/2000	47	71	6	NESW	HI-PRO PRODUCTION L.L.C.	DUNLAP 6 - 23 - 47 - 71 - A	GST	CBM	100	321	
P130325W	10/16/2000	47	71	6	SESW	RMG I, LLC	DUNLAP 6-24-47-71-A	GST	CBM	25	401	
P130326W	10/16/2000	47	71	6	SWSE	RMG I, LLC	DUNLAP 6-34-47-71-A	GST	CBM	25	330	
P130327W	10/16/2000	47	71	6	NESE	RMG I, LLC	DUNLAP 6-43-47-71-A	GST	CBM	25	326	
P130328W	10/16/2000	47	71	6	SESE	RMG I, LLC	DUNLAP 6-44-47-71-A	GST	CBM	25	341	
P130437W	10/25/2000	47	71	6	SWNW	RMG I, LLC	DUNLAP 6-12-47-71-A	GST	CBM	25	330	
P130438W	10/25/2000	47	71	6	NWSE	RMG I, LLC	DUNLAP 6-33-47-71-A	GST	CBM	25	301	
P130691W	11/3/2000	47	71	6	SESW	RMG I, LLC	RAG 6- 22 - 47 - 71 - A	GST	CBM	25	293	
P131775W	12/29/2000	47	71	6	NWNE	RMG I, LLC	DUNLAP 6 - 31 - 47 - 71 - A	GST	CBM	100	326	
P131777W	12/29/2000	47	71	6	NWSW	RMG I, LLC	DUNLAP 6 - 13 - 47 - 71 - A	GST	CBM	100	333	
P131781W	12/29/2000	47	71	6	NENW	RMG I, LLC	RAG 6-21-47-71-A	GST	CBM	100	324	
P133817W	4/6/2001	47	71	6	SWNE	RMG I, LLC	DUNLAP 6-32-47-71-A	GST	CBM	100	313	
P133818W	4/6/2001	47	71	6	SENE	RMG I, LLC	DUNLAP 6-42-47-71-A	GST	CBM	100	351	
P132111W	12/29/2000	47	71	6	SWNW	RMG I, LLC	ENL DUNLAP 6-12-47-71--A	UNA	CBM			
P132112W	12/29/2000	47	71	6	SESW	RMG I, LLC	ENL R.A.G. 6-22-47-71--A	UNA	CBM			
P132113W	12/29/2000	47	71	6	SESW	RMG I, LLC	ENL DUNLAP 6-24-47-71--A	UNA	CBM			
P132114W	12/29/2000	47	71	6	NWSE	RMG I, LLC	ENL DUNLAP 6-33-47-71--A	UNA	CBM			
P132115W	12/29/2000	47	71	6	SWSE	RMG I, LLC	ENL DUNLAP 6-34-47-71--A	UNA	CBM			
P132116W	12/29/2000	47	71	6	NESE	RMG I, LLC	ENL DUNLAP 6-43-47-71--A	UNA	CBM			
P132117W	12/29/2000	47	71	6	SESE	RMG I, LLC	ENL DUNLAP 6-44-47-71--A	UNA	CBM			
P18774P	12/31/1951	48	71	2	NESE	MORRIS A. CLARK	CLARK #2	GST	DOM, STO	10	110	
P32695W	4/12/1976	48	71	2	NESW	OLEN C. GREER	GREER #6	GST	DOM, STO	17	304	
P18143P	12/31/1953	48	71	2	SWSE	MELVIN D. & ETHEL L. CLARK	HUGHES #5	GST	STO	4	225	
P50992W	5/22/1979	48	71	2	SESW	TRUE OIL COMPANY** ARTHUR CUNDY	CLARK STATE WS 1	UNA	STO, IND	18	1100	
P88920W	7/27/1992	48	71	3	NWNW	BALLARD PETROLEUM HOLDINGS LLC	W.D. WATER WELL #1	UNA	IND	60	2070	
P57957W	8/27/1981	48	71	3	NWNW	ELMORE LIVESTOCK COMPANY	EL-SOUTH #1	GST	STO	25	20	
P57958W	8/27/1981	48	71	3	NESW	ELMORE LIVESTOCK COMPANY	EL-SOUTH #2	GST	STO	15	260	
P142206W	5/7/2001	48	71	4	SWNE	BLACKSTONE OPERATING, INC	SC 4-32	GSI	CBM			
P69168W	12/27/1984	48	71	4	NESW	ELMORE LIVESTOCK COMPANY	EL SOUTH #5	GST	STO	25	160	
P131233W	11/30/2000	48	71	5	NESW	PENNACO ENERGY, INC.	ROURKE FEDERAL #11-5-48-71A	GST	CBM	60	312	
P113928W	2/8/1999	48	71	5	NENW	PENNACO ENERGY, INC.	ROURKE #3-5-48-71	GST	CBM, STO	50	380	
P113929W	2/8/1999	48	71	5	NWNE	PENNACO ENERGY, INC.	ROURKE #2-5-48-71	GST	CBM, STO	50	384	
P121313W	11/22/1999	48	71	5	SWSW	PENNACO ENERGY, INC.	ROURKE GAP 13-5-48-71	GST	CBM, STO	50	312	
P121315W	11/22/1999	48	71	5	SWNW	PENNACO ENERGY, INC.	ROURKE GAP 5-5-48-71	GST	CBM, STO	50	315	
P16961P	12/31/1939	48	71	5	NESW	JAMES H. CASSIDY	CASSIDY #5	GST	STO	10	300	
P113216W	12/2/1998	48	71	6	NENW	PENNACO ENERGY, INC.	ROURKE 3-6-48-71	GST	CBM, STO	30	423	
P115888W	5/14/1999	48	71	6	SWSW	PENNACO ENERGY, INC.	ROBBINS #13-6-48-71B	GST	CBM, STO	50	419	

Table S3-4. Groundwater Rights for Caballo West LBA Tract (Continued).

Permit No.	Priority	TNS	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
P115894W	5/14/1999	48	71	6	SWNW	PENNACO ENERGY, INC.	ROBBINS #5-6-48-71	GST	CBM, STO	50	415
P121299W	11/22/1999	48	71	6	SWSE	PENNACO ENERGY, INC.	ROURKE GAP 15-6-48-71	GST	CBM, STO	50	382
P121300W	11/22/1999	48	71	6	SESE	PENNACO ENERGY, INC.	ROURKE GAP 16-6-48-71	GST	CBM, STO	50	340
P121301W	11/22/1999	48	71	6	NWNE	PENNACO ENERGY, INC.	ROURKE GAP 2-6-48-71	GST	CBM, STO	50	331
P121302W	11/22/1999	48	71	6	SWNE	PENNACO ENERGY, INC.	ROURKE GAP 7-6-48-71	GST	CBM, STO	50	370
P121316W	11/22/1999	48	71	6	SENE	PENNACO ENERGY, INC.	ROURKE GAP 8-6-48-71	GST	CBM, STO	50	337
P121317W	11/22/1999	48	71	6	NESE	PENNACO ENERGY, INC.	ROURKE GAP 9-6-48-71	GST	CBM, STO	50	336
P121318W	11/22/1999	48	71	6	NWSW	PENNACO ENERGY, INC.	ROBBINS 12-6-48-71	GST	CBM, STO	50	434
P121319W	11/22/1999	48	71	6	NWNW	PENNACO ENERGY, INC.	ROBBINS 4-6-48-71	GST	CBM, STO	50	437
P121322W	11/22/1999	48	71	6	NENE	PENNACO ENERGY, INC.	ROURKE GAP 1-6-48-71	GST	CBM, STO	50	330
P121323W	11/22/1999	48	71	6	NWSE	PENNACO ENERGY, INC.	ROURKE GAP 10-6-48-71	GST	CBM, STO	50	392
P113217W	12/2/1998	48	71	6	SENE	PENNACO ENERGY, INC.	ROURKE 6-6-48-71	UNA	CBM, STO	25	433
P113218W	12/2/1998	48	71	6	NESW	PENNACO ENERGY, INC.	ROURKE 11-6-48-71	UNA	CBM, STO	30	421
P113219W	12/2/1998	48	71	6	SESW	PENNACO ENERGY, INC.	ROURKE 14-6-48-71	UNA	CBM, STO	30	427
P70703W	7/24/1985	48	71	6	NWNW	GENE & DELORES ALBERY** LEE & LORI EDWARDS	EDWARDS #1 (DEEPENED)	GST	DOM	20	932
P102848W	6/28/1996	48	71	6	SWNW	KIRK & TERESA BLACKFORD	BLACKFORD #1	GST	DOM	18	###
P169042W	7/15/2005	48	71	6	NWSW	GARY D. & PATTY MILLER	ROBBINS 12-6-48-71A	GSI	DOM, STO		
40/5/171W	5/24/2007	48	71	6	NWSW	GARY D. & PATTY MILLER	ROBBINS 12-6-48-71	UNA	DOM, STO		
P65807W	10/26/1983	48	71	6	SWNW	KIRK & TERESA BLACKFORD	DOM,STO		DOM, STO	5	780
P65899W	7/29/1983	48	71	6	SWSW	WAYNE KRUSE	MANOUS #1	GST	DOM, STO	20	790
P28296W	10/3/1974	48	71	6	NWSE	W. A. MONCRIEF	ROURKE #9		IND	100	4480
P10600P	12/31/1950	48	71	6	NWSW	PLACIDE ROBBINS	GUMBO FLAT #2	GST	STO	17	180
P113210W	12/2/1998	48	71	7	NWNW	PENNACO ENERGY, INC.	SMITH 4-7-48-71	GST	CBM, STO	25	428
P115297W	4/12/1999	48	71	7	SESW	PENNACO ENERGY, INC.	ROURKE #14-7-48-71	GST	CBM, STO	50	482
P115299W	4/12/1999	48	71	7	NESE	PENNACO ENERGY, INC.	ROURKE #9-7-48-71	GST	CBM, STO	30	381
P115303W	4/12/1999	48	71	7	SESE	PENNACO ENERGY, INC.	ROURKE #16-7-48-71	GST	CBM, STO	50	373
P115304W	4/12/1999	48	71	7	SWSE	PENNACO ENERGY, INC.	ROURKE #15-7-48-71	GST	CBM, STO	50	433
P118222W	8/25/1999	48	71	7	SWSW	PENNACO ENERGY, INC.	ROURKE #13-7-48-71	GST	CBM, STO	30	562
P118932W	9/7/1999	48	71	7	NWSW	PENNACO ENERGY, INC.	ROURKE #12-7-48-71	GST	CBM, STO	30	475
P120581W	11/4/1999	48	71	7	NENW	PENNACO ENERGY, INC.	ROURKE #3-7-48-71	GST	CBM,	50	412

Supplementary Information on the Affected Environment

Table S3-4. Groundwater Rights for Caballo West LBA Tract (Continued).												
Permit No.	Priority	TNS	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD	
P121303W	11/22/1999	48	71	7	NENE	PENNACO ENERGY, INC.	ROURKE GAP 1-7-48-71	GST	STO CBM, STO	50	356	
P121304W	11/22/1999	48	71	7	NWNE	PENNACO ENERGY, INC.	ROURKE GAP 2-7-48-71	GST	CBM, STO	50	382	
P121305W	11/22/1999	48	71	7	SENE	PENNACO ENERGY, INC.	ROURKE 8-7-48-71	GST	CBM, STO	50	372	
P113211W	12/2/1998	48	71	7	SWNW	PENNACO ENERGY, INC.	SMITH 5-7-48-71	UNA	CBM, STO	30	431	
P113212W	12/2/1998	48	71	7	SENW	PENNACO ENERGY, INC.	SMITH 6-7-48-71	UNA	CBM, STO	30	426	
P113213W	12/2/1998	48	71	7	SWNE	PENNACO ENERGY, INC.	SMITH 7-7-48-71	UNA	CBM, STO	30	387	
P113214W	12/2/1998	48	71	7	NWSE	PENNACO ENERGY, INC.	SMITH 10-7-48-71	UNA	CBM, STO	30	394	
P113215W	12/2/1998	48	71	7	NESW	PENNACO ENERGY, INC.	SMITH 11-7-48-71	UNA	CBM, STO	30	453	
P162715W	9/24/2004	48	71	7	SWSW	BOB AND CRYSTAL JOHNSON	SINCLAIR #1	GST	DOM	20	1022	
P92050W	6/17/1993	48	71	7	NWSW	DAVID THOMPSON	DT #1	GST	DOM	4	320	
P106998W	8/6/1997	48	71	7	SWSW	KEN HALL	HALL #1	GST	DOM	22	756	
P169457W	8/15/2005	48	71	7	SWNW	KENNETH & ANGELA BERTALOT	BERTALOT #2	GSI	DOM			
P67809W	6/27/1984	48	71	7	NWSW	KENNETH K. & ANGELA M. BERTALOT	BERTALOT #1	GST	DOM	10	200	
P66663W	3/20/1984	48	71	7	SWNW	STEVEN E. & DEBORA R. JOHNSON	JOHNSON #1	GST	DOM	15	310	
P139416W	10/3/2001	48	71	7	SWSW	WALTER AND BRENDA SINCLAIR	SINCLAIR # 1	GSI	DOM			
40/3/46W	3/28/2007	48	71	7	NWSW	BRADLEY & CHERYL O'BRIEN	ROURKE 12-7-48-71	UNA	DOM, STO			
40/2/46W	3/28/2007	48	71	7	NWNW	KENNETH & ANGELA BERTALOT	SMITH 4-7-48-71A	UNA	DOM, STO			
P130089W	10/19/2000	48	71	7	NWNE	PAUL D. ROURKE	TISDALE #1	GST	STO	5	240	
P142205W	5/7/2001	48	71	8	SWNE	BLACKSTONE OPERATING, INC	SC 8-32	GSI	CBM			
39/5/258W	8/28/2006	48	71	8	SWSE	PRB OIL & GAS INC	CABALLO 34-8-48-71 M	UNA	CBM			
39/9/404W	11/7/2006	48	71	8	SWSE	PRB OIL & GAS INC	CABALLO 34-8-48-71 M	UNA	CBM			
P142176W	1/22/2002	48	71	8	SWSW	PENNACO ENERGY, INC.	BURNS 13-8-48-71 A	GSI	CBM, STO			
P121308W	11/22/1999	48	71	8	NENW	PENNACO ENERGY, INC.	ROURKE 3-8-48-71	GST	CBM, STO	50	307	
P121310W	11/22/1999	48	71	8	SWNW	PENNACO ENERGY, INC.	ROURKE 5-8-48-71	GST	CBM, STO	50	343	
P18140P	12/31/1956	48	71	11	NWSW	MELVIN D. & ETHEL L. CLARK	HOUSE #2	GST	DOM	10	170	
P18139P	12/31/1957	48	71	11	NWSW	MELVIN D. & ETHEL L. CLARK	HOUSE #1	GST	STO	5	170	
P18141P	12/31/1920	48	71	11	SWSW	MELVIN D. & ETHEL L. CLARK	ORIGINAL #3	GST	STO	5	30	
P115889W	5/14/1999	48	71	12	NESE	PENNACO ENERGY, INC.	ROURKE #9-12-48-72	GST	CBM, STO	50	534	
P102222W	5/2/1996	48	71	12	SWNW	PEABODY DEVELOPEMENT CO	CA-1357WW	GST	DOM	18	703	
P1815W	1/27/1967	48	71	12	SWNW	T. W. & HERMA L. CZAPLA	CZAPLA #1 (DEEPENED)	GST	DOM	5	560	
P1816W	1/27/1967	48	71	12	SWNW	T. W. & HERMA L. CZAPLA	CZAPLA #2	GST	DOM, STO	4	270	
P14368P	12/21/1919	48	71	13	SWSE	T. W. & HERMA L. CZAPLA	HOMESTEAD SPRING #1	GST	DOM, STO	5	6	
P72993W	8/4/1986	48	71	13	NENE	U.S. GEOLOGICAL SURVEY	CA 2	UNA	MON			
P18773P	12/31/1945	48	71	15	NENE	MORRIS A. CLARK	CLARK #1	GST	STO	10	165	
P152715W	6/30/2003	48	71	16	NESW	BLACKSTONE OPERATING	ENL. CABALLO 16-23	GST	CBM	9	294	
P152716W	6/30/2003	48	71	16	SWNW	BLACKSTONE OPERATING	ENL. CABALLO 16-12	GST	CBM	3	294	
P152717W	6/30/2003	48	71	16	NENW	BLACKSTONE OPERATING	ENL. CABALLO 16-21	GST	CBM	5	289	
P142604W	1/31/2002	48	71	16	NESW	BLACKSTONE OPERATING, INC	CABALLO 16-23	GST	CBM	10	294	
P142605W	1/31/2002	48	71	16	SWSW	BLACKSTONE OPERATING, INC** WY STATE	CABALLO 16-14	GST	CBM	10	334	

Table S3-4. Groundwater Rights for Caballo West LBA Tract (Continued).

Permit No.	Priority	TNS	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
P142606W	1/31/2002	48	71	16	NENW	BOARD OF LAND COMMISSIONERS BLACKSTONE OPERATING, INC** WY STATE BOARD OF LAND COMMISSIONERS	CABALLO 16-21	GST	CBM	10	289
P142607W	1/31/2002	48	71	16	SWNW	WY STATE BOARD OF LAND COMMISSIONERS** BLACKSTONE OPERATING, INC	CABALLO 16-12	GST	CBM	10	294
P142587W	1/31/2002	48	71	17	NESW	BLACKSTONE OPERATING, INC	CABALLO 23-17	GST	CBM	0	368
P142588W	1/31/2002	48	71	17	NESE	BLACKSTONE OPERATING, INC	CABALLO 43-17	GST	CBM	10	275
P142589W	1/31/2002	48	71	17	SWSE	BLACKSTONE OPERATING, INC	CABALLO 34-17	GST	CBM	1	374
P142591W	1/31/2002	48	71	17	NENW	CONTINENTAL INDUSTRIES	CABALLO 21-17	GST	CBM	1	316
P142592W	1/31/2002	48	71	17	SWNW	CONTINENTAL INDUSTRIES	CABALLO 12-17	GST	CBM	1	422
39/1/258W	8/28/2006	48	71	17	NESW	PRB OIL & GAS INC	CABALLO 23-17-48-71 M	UNA	CBM		
39/10/257W	8/28/2006	48	71	17	NENW	PRB OIL & GAS INC	CABALLO 21-17-48-71 M	UNA	CBM		
39/3/258W	8/28/2006	48	71	17	SWNE	PRB OIL & GAS INC	CABALLO 32-17-48-71 M	UNA	CBM		
39/4/258W	8/28/2006	48	71	17	NESE	PRB OIL & GAS INC	CABALLO 43-17-48-71 M	UNA	CBM		
39/7/338W	10/12/2006	48	71	17	NESE	PRB OIL & GAS INC	CABALLO 43-17-48-71 M	UNA	CBM		
39/7/404W	11/7/2006	48	71	17	NENW	PRB OIL & GAS INC	CABALLO 21-17-48-71 M	UNA	CBM		
39/8/338W	10/12/2006	48	71	17	SWNE	PRB OIL & GAS INC	CABALLO 32-17-48-71 M	UNA	CBM		
39/8/404W	11/7/2006	48	71	17	NESW	PRB OIL & GAS INC	CABALLO 23-17-48-71 M	UNA	CBM		
P133819W	4/6/2001	48	71	17	SWSW	RMG I, LLC	DUNLAP 17-14-48-71-A	GST	CBM	100	432
P132129W	12/29/2000	48	71	18	SWSW	HI-PRO PRODUCTION L.L.C.	ENL DUNLAP 18-14-48-71-A	UNA	CBM		
P124267W	3/23/2000	48	71	18	NWNE	QUANTUM ENERGY** FOUNDATION COAL WEST, INC.AMAX LAND COMPANY** CABALLO COAL COMPANY	ROURKE FEDERAL #31-18	GST	CBM	0	552
P130453W	10/25/2000	48	71	18	SESE	RMG I, LLC	DUNLAP 18-44-48-71-A	GST	CBM	25	459
P130454W	10/25/2000	48	71	18	SWSE	RMG I, LLC	DUNLAP 18-34-48-71-A	GST	CBM	25	402
P130455W	10/25/2000	48	71	18	SESW	RMG I, LLC	DUNLAP 18-24-48-71-A	GST	CBM	25	397
P132130W	12/29/2000	48	71	18	SESW	RMG I, LLC	ENL DUNLAP 18-24-48-71-A	UNA	CBM		
P132131W	12/29/2000	48	71	18	SWSE	RMG I, LLC	ENL DUNLAP 18-34-48-71-A (ENL. U.W.PERMIT NO.130454 FOR ADDITIONAL YIELD ONLY)	UNA	CBM		
P132132W	12/29/2000	48	71	18	SESE	RMG I, LLC	ENL DUNLAP 18-44-48-71-A	UNA	CBM		
P115298W	4/12/1999	48	71	18	NWSW	PENNACO ENERGY, INC.	ROURKE #12-18-48-71	GST	CBM, STO	50	370
P115300W	4/12/1999	48	71	18	NENE	PENNACO ENERGY, INC.	ROURKE #1-18-48-71	GST	CBM, STO	50	390
P115301W	4/12/1999	48	71	18	SWNW	PENNACO ENERGY, INC.	ROURKE #5-18-48-71	GST	CBM, STO	50	441
P115302W	4/12/1999	48	71	18	SENW	PENNACO ENERGY, INC.	ROURKE #6-18-48-71	GST	CBM, STO	50	446
P115305W	4/12/1999	48	71	18	SWNE	PENNACO ENERGY, INC.	ROURKE #7-18-48-71	GST	CBM, STO	30	470
P115306W	4/12/1999	48	71	18	SENE	PENNACO ENERGY, INC.	ROURKE #8-18-48-71	GST	CBM, STO	50	488
P115307W	4/12/1999	48	71	18	NESE	PENNACO ENERGY, INC.	ROURKE #9-18-48-71	GST	CBM, STO	50	462
P115308W	4/12/1999	48	71	18	NWSE	PENNACO ENERGY, INC.	ROURKE #10-18-48-71	GST	CBM, STO	30	432
P115309W	4/12/1999	48	71	18	NESW	PENNACO ENERGY, INC.	ROURKE #11-18-48-71	GST	CBM, STO	50	406
P132138W	12/29/2000	48	71	19	SESE	HI-PRO PRODUCTION L.L.C.	ENL DUNLAP 19-44-48-71-A	UNA	CBM		
P119780W	10/7/1999	48	71	19	SWNW	RMG I, LLC	R.A.G. 19-12	GST	CBM	25	404
P119781W	10/7/1999	48	71	19	NWSW	RMG I, LLC	R.A.G. 19-13	GST	CBM	25	404
P119782W	10/7/1999	48	71	19	SWSW	RMG I, LLC	R.A.G. 19-14	GST	CBM	25	420
P119783W	10/7/1999	48	71	19	SENW	RMG I, LLC	R.A.G. 19-22	GST	CBM	25	391
P119784W	10/7/1999	48	71	19	NESW	RMG I, LLC	R.A.G. 19-23	GST	CBM	25	384
P119785W	10/7/1999	48	71	19	SESW	RMG I, LLC	R.A.G. 19-24	GST	CBM	25	364

Supplementary Information on the Affected Environment

Table S3-4. Groundwater Rights for Caballo West LBA Tract (Continued).												
Permit No.	Priority	TNS	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD	
P119786W	10/7/1999	48	71	19	SWNE	RMG I, LLC	R.A.G. 19-32	GST	CBM	25	364	
P119787W	10/7/1999	48	71	19	NWSE	RMG I, LLC	R.A.G. 19-33	GST	CBM	25	394	
P130448W	10/25/2000	48	71	19	SENE	RMG I, LLC	DUNLAP 19-42-48-71-A	GST	CBM	25	390	
P130449W	10/25/2000	48	71	19	NENE	RMG I, LLC	DUNLAP 19-41-48-71-A	GST	CBM	25	414	
P130450W	10/25/2000	48	71	19	NWNE	RMG I, LLC	DUNLAP 19-31-48-71-A	GST	CBM	25	391	
P130451W	10/25/2000	48	71	19	NENW	RMG I, LLC	DUNLAP 19-21-48-71-A	GST	CBM	25	379	
P130452W	10/25/2000	48	71	19	NWNW	RMG I, LLC	DUNLAP 19-11-48-71-A	GST	CBM	25	369	
P131534W	12/13/2000	48	71	19	SWNW	RMG I, LLC	ENL. R.A.G. 19-12	GST	CBM	70	404	
P131535W	12/13/2000	48	71	19	NWSW	RMG I, LLC	ENL. R.A.G. 19-13	GST	CBM	70	404	
P131536W	12/13/2000	48	71	19	SWSW	RMG I, LLC	ENL. R.A.G. 19-14	GST	CBM	70	420	
P131537W	12/13/2000	48	71	19	SENE	RMG I, LLC	ENL. R.A.G. 19-22	GST	CBM	70	391	
P131538W	12/13/2000	48	71	19	NESW	RMG I, LLC	ENL. R.A.G. 19-23	GST	CBM	70	384	
P131539W	12/13/2000	48	71	19	SESW	RMG I, LLC	ENL. R.A.G. 19-24	GST	CBM	70	364	
P131540W	12/13/2000	48	71	19	SWNE	RMG I, LLC	ENL. R.A.G. 19-32	GST	CBM	70	364	
P131541W	12/13/2000	48	71	19	NWSE	RMG I, LLC	ENL. R.A.G. 19-33	GST	CBM	70	394	
P132133W	12/29/2000	48	71	19	NWNW	RMG I, LLC	ENL DUNLAP 19-11-48-71-A	UNA	CBM			
P132134W	12/29/2000	48	71	19	NENW	RMG I, LLC	ENL DUNLAP 19-21-48-71-A (ENL. U.W. PERMIT NO.130451 FOR ADDT'L YIELD ONLY)	UNA	CBM			
P132135W	12/29/2000	48	71	19	NWNE	RMG I, LLC	ENL DUNLAP 19-31-48-71-A	UNA	CBM			
P132136W	12/29/2000	48	71	19	NENE	RMG I, LLC	ENL DUNLAP 19-41-48-71-A	UNA	CBM			
P132137W	12/29/2000	48	71	19	SENE	RMG I, LLC	ENL DUNLAP 19-42-48-71-A	UNA	CBM			
P171996W	12/9/2005	48	71	19	NWSE	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-33-48-71	GSI	CBM			
P171997W	12/9/2005	48	71	19	SWNE	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-32-48-71	GSI	CBM			
P171998W	12/9/2005	48	71	19	NESW	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-23-48-71	GSI	CBM			
P171999W	12/9/2005	48	71	19	SENE	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-22-48-71	GSI	CBM			
P172001W	12/9/2005	48	71	19	SWNW	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-12-48-71	GSI	CBM			
P172434W	12/9/2005	48	71	19	SWSE	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-34NW-48-71	GSI	CBM			
P172435W	12/9/2005	48	71	19	NWSE	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-33SW-48-71	GSI	CBM			
P172436W	12/9/2005	48	71	19	NWSE	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-33NW-48-71	GSI	CBM			
P172437W	12/9/2005	48	71	19	SWNE	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-32SW-48-71	GSI	CBM			
P172438W	12/9/2005	48	71	19	SWNE	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-32NW-48-71	GSI	CBM			
P172439W	12/9/2005	48	71	19	NWNE	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-31SW-48-71	GSI	CBM			
P172440W	12/9/2005	48	71	19	SESW	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-24N-48-71	GSI	CBM			
P172441W	12/9/2005	48	71	19	NESW	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-23S-48-71	GSI	CBM			
P172442W	12/9/2005	48	71	19	NESW	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-23N-48-71	GSI	CBM			
P172443W	12/9/2005	48	71	19	SENE	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-22S-48-71	GSI	CBM			
P172444W	12/9/2005	48	71	19	SENE	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-22N-48-71	GSI	CBM			
P172445W	12/9/2005	48	71	19	NENW	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-21S-48-71	GSI	CBM			
P172446W	12/9/2005	48	71	19	SWSW	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-14NE-48-71	GSI	CBM			
P172447W	12/9/2005	48	71	19	NWSW	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-13SW-48-71	GSI	CBM			
P172448W	12/9/2005	48	71	19	NWSW	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-13NE-48-71	GSI	CBM			
P172449W	12/9/2005	48	71	19	SWNW	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-12SE-48-71	GSI	CBM			
P172450W	12/9/2005	48	71	19	SWNW	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-12NE-48-71	GSI	CBM			
P172451W	12/9/2005	48	71	19	NWNW	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-11SE-48-71	GSI	CBM			
P173694W	3/24/2006	48	71	19	NWNW	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-11SE-48-71	GSI	MISC			
P142593W	1/31/2002	48	71	20	NENW	CONTINENTAL INDUSTRIES	CABALLO 21-20	GST	CBM	1	412	
P142594W	1/31/2002	48	71	20	SWNE	CONTINENTAL INDUSTRIES	CABALLO 32-20	GST	CBM	1	394	
P142595W	1/31/2002	48	71	20	NENE	CONTINENTAL INDUSTRIES	CABALLO 41-20	GST	CBM	1	388	
P130445W	10/25/2000	48	71	20	SENE	RMG I, LLC	DUNLAP 20-22-48-71-A	GST	CBM	25	385	
P130446W	10/25/2000	48	71	20	SWNW	RMG I, LLC	DUNLAP 20-12-48-71-A	GST	CBM	25	390	
P131770W	12/29/2000	48	71	20	NWNW	RMG I, LLC	DUNLAP 20 - 11 - 48 - 71 - A	GST	CBM	100	418	
P132139W	12/29/2000	48	71	20	SWNW	RMG I, LLC	ENL DUNLAP 20-12-48-71-A	UNA	CBM			
P132140W	12/29/2000	48	71	20	SENE	RMG I, LLC	ENL DUNLAP 20-22-48-71-A	UNA	CBM			
P142600W	1/31/2002	48	71	21	SWNE	BLACKSTONE OPERATING	CABALLO 21-32	GST	CBM	10	308	
P152718W	6/30/2003	48	71	21	SWNE	BLACKSTONE OPERATING	ENL. CABALLO 21-32	GST	CBM	1	308	

Supplementary Information on the Affected Environment

Table S3-4. Groundwater Rights for Caballo West LBA Tract (Continued).

Permit No.	Priority	TNS	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
P152768W	6/30/2003	48	71	21	NENW	BLACKSTONE OPERATING	ENL. CABALLO 21-21	GST	CBM	6	323
P142602W	1/31/2002	48	71	21	NENW	BLACKSTONE OPERATING, INC	CABALLO 21-21	GST	CBM	10	323
P142603W	1/31/2002	48	71	21	SWNW	BLACKSTONE OPERATING, INC	CABALLO 21-12	GST	CBM	10	362
P78550W	11/23/1988	48	71	21	NWNE	CHUCK ROURKE	ROURKE STOCK WELL (NWNE SECTION 21)	GST	STO	5	325
P18096P	12/31/1916	48	71	21	NWNE	EILEEN MITCHUM** JOE FOLEY	FOLEY #1	GST	STO	2	60
P18097P	12/31/1946	48	71	21	SWNE	EILEEN MITCHUM** JOE FOLEY	FOLEY #2	GST	STO	2	130
P132141W	12/29/2000	48	71	23	NESW	RMG I, LLC	ENL R.A.G. 23-23-A	UNA	CBM		
P72994W	8/4/1986	48	71	24	SWSW	U.S. GEOLOGICAL SURVEY	CA 3	UNA	MON		
P16957P	12/31/1946	48	71	25	NWNW	JAMES H. CASSIDY	CASSIDY #1	GST	DOM, STO	15	75
P424G	1/18/1956	48	71	25	NWNW	JAMES H. CASSIDY	CASSIDY #1	UNA	IRR	350	47
P16958P	3/31/1962	48	71	25	NWNW	JAMES H. CASSIDY	CASSIDY #2	GST	STO	7	105
P119805W	10/7/1999	48	71	30	NWNW	RMG I, LLC	R.A.G. 30-11	GST	CBM	25	384
P119806W	10/7/1999	48	71	30	SWNW	RMG I, LLC	R.A.G. 30-12	GST	CBM	25	364
P119807W	10/7/1999	48	71	30	NWSW	RMG I, LLC	R.A.G. 30-13	GST	CBM	25	341
P119808W	10/7/1999	48	71	30	SWSW	RMG I, LLC	R.A.G. 30-14	GST	CBM	25	339
P119809W	10/7/1999	48	71	30	NENW	RMG I, LLC	R.A.G. 30-21	GST	CBM	25	352
P119810W	10/7/1999	48	71	30	SENW	RMG I, LLC	R.A.G. 30-22	GST	CBM	25	379
P119811W	10/7/1999	48	71	30	NESW	RMG I, LLC	R.A.G. 30-23	GST	CBM	25	359
P119812W	10/7/1999	48	71	30	SESW	RMG I, LLC	R.A.G. 30-24	GST	CBM	25	334
P131551W	12/13/2000	48	71	30	NWNW	RMG I, LLC	ENL. R.A.G. 30-11	GST	CBM	70	384
P131552W	12/13/2000	48	71	30	SWNW	RMG I, LLC	ENL. R.A.G. 30-12	GST	CBM	70	364
P131553W	12/13/2000	48	71	30	NWSW	RMG I, LLC	ENL. R.A.G. 30-13	GST	CBM	70	341
P131554W	12/13/2000	48	71	30	SWSW	RMG I, LLC	ENL. R.A.G. 30-14	GST	CBM	70	339
P131555W	12/13/2000	48	71	30	NENW	RMG I, LLC	ENL. R.A.G. 30-21	GST	CBM	70	352
P131556W	12/13/2000	48	71	30	SENW	RMG I, LLC	ENL. R.A.G. 30-22	GST	CBM	70	379
P131557W	12/13/2000	48	71	30	NESW	RMG I, LLC	ENL. R.A.G. 30-23	GST	CBM	70	359
P131558W	12/13/2000	48	71	30	SESW	RMG I, LLC	ENL. R.A.G. 30-24	GST	CBM	70	334
P130703W	11/3/2000	48	71	31	NWNW	RMG I, LLC	RAG 31-11-48-71-A	GST	CBM	25	351
P130704W	11/3/2000	48	71	31	SWNW	RMG I, LLC	RAG 31-12-48-71-A	GST	CBM	25	321
P132092W	12/29/2000	48	71	31	NWNW	RMG I, LLC	ENL R.A.G. 31-11-48-71-A	UNA	CBM		
P132093W	12/29/2000	48	71	31	SWNW	RMG I, LLC	ENL R.A.G. 31-12- 48-71- A	UNA	CBM		
P132094W	12/29/2000	48	71	31	NWSW	RMG I, LLC	ENL R.A.G. 31-13- 48-71- A	UNA	CBM		
P132095W	12/29/2000	48	71	31	NENW	RMG I, LLC	ENL R.A.G. 31-21- 48-71- A	UNA	CBM		
P132096W	12/29/2000	48	71	31	SENW	RMG I, LLC	ENL R.A.G. 31-22- 48-71- A	UNA	CBM		
P132097W	12/29/2000	48	71	31	NESW	RMG I, LLC	ENL R.A.G. 31-23- 48-71- A	UNA	CBM		
P99057W	4/24/1995	48	71	36	NENE	PETROGULF CORPORATION	CLABAUGH #41-2 WSW	UNA	IND	30	3400
P108411W	12/15/1997	48	72	10	NWNW	BARRETT RESOURCES CORPORATION	AP #11-10	GST	CBM	26	845
P123376W	2/16/2000	48	72	1	SENW	JM HUBER CORPORATION	MCCREERY 1-22	GST	CBM, STO	2	460
P123377W	2/16/2000	48	72	1	NWNE	JM HUBER CORPORATION	MCCREERY 1-31	GST	CBM, STO	3	462
P123378W	2/16/2000	48	72	1	SWSE	JM HUBER CORPORATION	MCCREERY 1-34	GST	CBM, STO	18	444
P116912W	7/1/1999	48	72	1	NWNW	PENNACO ENERGY, INC.	MCCREERY #4-1-48-72	GST	CBM, STO	50	519
P116913W	7/1/1999	48	72	1	SWNW	PENNACO ENERGY, INC.	MCCREERY #5-1-48-72	GST	CBM, STO	50	460
P116914W	7/1/1999	48	72	1	NWSW	PENNACO ENERGY, INC.	MCCREERY #12-1-48-72	GST	CBM, STO	50	453
P116928W	7/1/1999	48	72	1	SWSW	PENNACO ENERGY, INC.	MCCREERY #13-1-48-72	GST	CBM, STO	50	456
P10602P	12/31/1916	48	72	1	NENE	PLACIDE ROBBINS	RANCH #1	GST	DOM	10	60
P170168W	8/31/2005	48	72	1	NENE	KYLE G. & CINDY BUTTS	KBI	GSI	DOM, STO		

Supplementary Information on the Affected Environment

Table S3-4. Groundwater Rights for Caballo West LBA Tract (Continued).											
Permit No.	Priority	TNS	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
P83051W	7/19/1990	48	72	1	SEW	MARIE R. MCCREERY	SHED #2	GST	DOM, STO	10	285
P16046P	12/31/1921	48	72	1	SEW	ROBERT P. MCCREERY	SHED #1	GST	DOM, STO	5	240
39/1/268W	8/31/2006	48	72	1	SEW	WINDSOR ENERGY GROUP LLC	MCCREERY #1-24	UNA	MIS, CBM		
39/10/267W	8/31/2006	48	72	1	NENW	WINDSOR ENERGY GROUP LLC	MCCREERY #1-21	UNA	MIS, CBM		
39/2/268W	8/31/2006	48	72	1	SWNE	WINDSOR ENERGY GROUP LLC	MCCREERY #1-32	UNA	MIS, CBM		
39/3/268W	8/31/2006	48	72	1	NWSE	WINDSOR ENERGY GROUP LLC	MCCREERY #1-33	UNA	MIS, CBM		
P104198W	3/1/1996	48	72	1	NWSE	TORCH OPERATING CO	ENL MCCREERY #1-33	GST	MIS, STO, CBM	5	345
P104199W	3/1/1996	48	72	1	SWNE	TORCH OPERATING CO	ENL MCCREERY #1-32	GST	MIS, STO, CBM	19	420
P104207W	3/1/1996	48	72	1	NENW	TORCH OPERATING CO	ENL MCCREERY #1-21	GST	MIS, STO, CBM	19	435
P104218W	3/18/1996	48	72	1	NESW	TORCH OPERATING CO	ENL MCCREERY #1-23	GST	MIS, STO, CBM	10	380
P104260W	3/25/1996	48	72	1	SEW	TORCH OPERATING CO	ENL MCCREERY #1-24	GST	MIS, STO, CBM	5	447
P773G	2/28/1958	48	72	1	NESE	MARTY AND KIM AUCH	#1 GUMBO FLAT	UNA	STO, IRR	350	215
P124268W	3/23/2000	48	72	2	SWNE	COLEMAN OIL & GAS, INC.** RAG/AMAX LAND COMPANY** CABALLO COAL COMPANY	MCCREERY FEDERAL #31-2	GST	CBM	9	580
P124269W	3/23/2000	48	72	2	SWNE	COLEMAN OIL & GAS, INC.** RAG/AMAX LAND COMPANY** CABALLO COAL COMPANY	MCCREERY FEDERAL #32-2	GST	CBM	6	540
P116915W	7/1/1999	48	72	2	NENE	PENNACO ENERGY, INC.	MCCREERY #1-2-48-72	GST	CBM, STO	30	575
P116916W	7/1/1999	48	72	2	NENW	PENNACO ENERGY, INC.	MCCREERY #3-2-48-72	GST	CBM, STO	50	632
P116917W	7/1/1999	48	72	2	NWNW	PENNACO ENERGY, INC.	MCCREERY #4-2-48-72	GST	CBM, STO	50	640
P116918W	7/1/1999	48	72	2	SWNW	PENNACO ENERGY, INC.	MCCREERY #5-2-48-72	GST	CBM, STO	50	643
P116919W	7/1/1999	48	72	2	SENE	PENNACO ENERGY, INC.	MCCREERY #8-2-48-72	GST	CBM, STO	50	508
P116920W	7/1/1999	48	72	2	NESE	PENNACO ENERGY, INC.	MCCREERY #9-2-48-72	GST	CBM, STO	50	486
P116921W	7/1/1999	48	72	2	NWSE	PENNACO ENERGY, INC.	MCCREERY #10-2-48-72	GST	CBM, STO	50	569
P116922W	7/1/1999	48	72	2	SWSE	PENNACO ENERGY, INC.	MCCREERY #15-2-48-72	GST	CBM, STO	50	570
P116927W	7/1/1999	48	72	2	SEW	PENNACO ENERGY, INC.	MCCREERY #6-2-48-72	GST	CBM, STO	50	628
P116930W	7/1/1999	48	72	2	SESE	PENNACO ENERGY, INC.	MCCREERY #16-2-48-72	GST	CBM, STO	50	510
P121320W	11/22/1999	48	72	2	NESW	PENNACO ENERGY, INC.	MCCREERY 11-2-48-72	GST	CBM, STO	50	617

Table S3-4. Groundwater Rights for Caballo West LBA Tract (Continued).

Permit No.	Priority	TNS	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
P121321W	11/22/1999	48	72	2	NWSW	PENNACO ENERGY, INC.	MCCREERY 12-2-48-72	GST	CBM, STO		
P116064W	5/28/1999	48	72	2	SWSW	WILLIAMS PRODUCTION RMT, COMPANY	MCCREERY 14-2-4872	GST	CBM, STO	22	749
P129728W	9/15/2000	48	72	3	SESW	BARRETT RESOURCES CORPORATION	RM FED. 24-3	GST	CBM	19	740
P134746W	5/4/2001	48	72	3	NESE	WILLIAMS PRODUCTION RMT, COMPANY	MCCREERY FED. 43-3	GST	CBM	21	717
P109073W	2/17/1998	48	72	3	SWNW	BARRETT RESOURCES CORPORATION	MCCREERY FED. 12-3	GST	CBM, STO	31	922
P114557W	3/15/1999	48	72	3	NESW	BARRETT RESOURCES CORPORATION	MCCREERY 23-3-4872	GST	CBM, STO	19	871
P115772W	5/10/1999	48	72	3	SWSE	BARRETT RESOURCES CORPORATION	MCCREERY 34-3-4872	GST	CBM, STO	22	740
P116923W	7/1/1999	48	72	3	NENE	PENNACO ENERGY, INC.	MCCREERY #1-3-48-72	GST	CBM, STO	50	654
P116924W	7/1/1999	48	72	3	NENW	PENNACO ENERGY, INC.	MCCREERY #3-3-48-72	GST	CBM, STO	50	776
P116925W	7/1/1999	48	72	3	SENW	PENNACO ENERGY, INC.	MCCREERY #6-3-48-72	GST	CBM, STO	50	862
P116926W	7/1/1999	48	72	3	SWNE	PENNACO ENERGY, INC.	MCCREERY #7-3-48-72	GST	CBM, STO	50	793
P116929W	7/1/1999	48	72	3	SENE	PENNACO ENERGY, INC.	MCCREERY #8-3-48-72	GST	CBM, STO	50	710
P134101W	3/12/2001	48	72	3	NWNE	PENNACO ENERGY, INC.	MCCRERY FEDERAL2-3-48-72	GST	CBM, STO	50	735
P17457W	12/27/1972	48	72	3	NWNE	ROBERT P. MCCREERY	BUTTE #8	GST	STO	3	194
P114436W	3/8/1999	48	72	10	NWSW	BARRETT RESOURCES CORPORATION	APPEL INVESTMENT FEDERAL 13-10-4872	GST	CBM, STO	22	782
P114437W	3/8/1999	48	72	10	SENW	BARRETT RESOURCES CORPORATION	APPEL FEDERAL 22-10-4872	GST	CBM, STO	21	800
P114438W	3/8/1999	48	72	10	SESW	BARRETT RESOURCES CORPORATION	DUWALL FEDERAL 24-10-4872	GST	CBM, STO	21	779
P125077W	4/24/2000	48	72	10	NENE	PENNACO ENERGY, INC.	RAG GRUENENFELDER 1-10-48-72	GST	CBM, STO	45	664
P125078W	4/24/2000	48	72	10	SENE	PENNACO ENERGY, INC.	RAG GRUENENFELDER 8-10-48-72	GST	CBM, STO	45	652
P125079W	4/24/2000	48	72	10	SWNE	PENNACO ENERGY, INC.	RAG GRUENENFELDER 7-10-48-72	GST	CBM, STO	45	653
P125080W	4/24/2000	48	72	10	NESE	PENNACO ENERGY, INC.	RAG GRUENENFELDER 9-10-48-72	GST	CBM, STO	45	639
P125081W	4/24/2000	48	72	10	NWSE	PENNACO ENERGY, INC.	RAG GRUENENFELDER 10-10-48-72	GST	CBM, STO	45	676
P125082W	4/24/2000	48	72	10	SESE	PENNACO ENERGY, INC.	RAG GRUENENFELDER 16-10-48-72	GST	CBM, STO	45	622
P134102W	3/12/2001	48	72	10	NWNE	PENNACO ENERGY, INC.	APPEL FEDERAL 2-10-48-72	GST	CBM, STO	50	733
P147716W	10/21/2002	48	72	11	SESW	JM HUBER CORPORATION	RAG 14E-11 48-72	GSI	CBM		
P128669W	9/5/2000	48	72	11	NWSW	JM HUBER CORPORATION	HUBER/RAG 11-13	GST	CBM	6	592
P128670W	9/5/2000	48	72	11	SWSW	JM HUBER CORPORATION	HUBER/RAG 11-14	GST	CBM	5	581
P128671W	9/5/2000	48	72	11	NESW	JM HUBER CORPORATION	HUBER/RAG 11-23	GST	CBM	5	590
P128672W	9/5/2000	48	72	11	SESW	JM HUBER CORPORATION	HUBER/RAG 11-24	GST	CBM	6	555
P128675W	9/5/2000	48	72	11	SENE	JM HUBER CORPORATION	HUBER/RAG 11-42	GST	CBM	2	569
P138929W	9/5/2001	48	72	11	SENW	JM HUBER CORPORATION	RAG FED 11-22 48-72	GST	CBM	7	665
P128674W	9/5/2000	48	72	11	NENE	JM HUBER CORPORATION	HUBER/RAG 11-41	GST	CBM	1	520
P128673W	9/5/2000	48	72	11	NWSE	JM HUBER CORPORATION	HUBER/RAG 11-33	GST	CBM	7	625
P131961W	1/10/2001	48	72	11	NENW	JM HUBER CORPORATION	RAG FEDERAL 11-21-48-72	GST	CBM, STO	7	735

Supplementary Information on the Affected Environment

Table S3-4. Groundwater Rights for Caballo West LBA Tract (Continued).											
Permit No.	Priority	TNS	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
P126000W	5/24/2000	48	72	11	NWNE	JM HUBER CORPORATION	FEDERAL 11-31	GST	CBM, STO	9	635
P126001W	5/24/2000	48	72	11	SWSE	JM HUBER CORPORATION	FEDERAL 11-34	GST	CBM, STO	9	541
P126002W	5/24/2000	48	72	11	SESE	JM HUBER CORPORATION	FEDERAL 11-44	GST	CBM, STO	5	594
P122490W	1/24/2000	48	72	11	NESE	PENNACO ENERGY, INC.	HARROD 9-11-48-72	GST	CBM, STO		659
P125083W	4/24/2000	48	72	11	NWNW	PENNACO ENERGY, INC.	RAG GRUENENFELDER 4-11-48-72	GST	CBM, STO	45	674
P125084W	4/24/2000	48	72	11	SWNW	PENNACO ENERGY, INC.	RAG GRUENENFELDER 5-11-48-72	GST	CBM, STO	45	626
39/10/282W	9/12/2006	48	72	11	SWNE	WINDSOR ENERGY GROUP LLC	GRUENENFELDER #11-32	UNA	MIS, CBM		
P99038W	4/21/1995	48	72	11	NENW	TORCH OPERATING COMPANY	FEDERAL 11-21	UNA	STO, MIS, CBM		
P99039W	4/21/1995	48	72	11	NENW	TORCH OPERATING COMPANY	FEDERAL #15-42	UNA	STO, MIS, CBM		
P128676W	9/5/2000	48	72	12	NWNW	JM HUBER CORPORATION	HUBER/RAG 12-11	GST	CBM	0	467
P128677W	9/5/2000	48	72	12	NENW	JM HUBER CORPORATION	HUBER/RAG 12-21	GST	CBM	15	457
P126003W	5/24/2000	48	72	12	SWSW	JM HUBER CORPORATION	FEDERAL 12-14	GST	CBM, STO	2	595
P122481W	1/24/2000	48	72	12	NWSW	PENNACO ENERGY, INC.	HARROD 12-12-48-72	GST	CBM, STO	50	530
P122482W	1/24/2000	48	72	12	SWNE	PENNACO ENERGY, INC.	HARROD 7-12-48-72	GST	CBM, STO	50	511
P122483W	1/24/2000	48	72	12	SENE	PENNACO ENERGY, INC.	HARROD 6-12-48-72	GST	CBM, STO	50	529
P122484W	1/24/2000	48	72	12	SWNW	PENNACO ENERGY, INC.	HARROD 5-12-48-72	GST	CBM, STO	50	495
P122485W	1/24/2000	48	72	12	SWSE	PENNACO ENERGY, INC.	HARROD 15-12-48-72	GST	CBM, STO	50	544
P122486W	1/24/2000	48	72	12	SESW	PENNACO ENERGY, INC.	HARROD 14-12-48-72	GST	CBM, STO	50	564
P122487W	1/24/2000	48	72	12	NESW	PENNACO ENERGY, INC.	HARROD 11-12-48-72	GST	CBM, STO	50	540
P113208W	12/2/1998	48	72	12	NENE	PENNACO ENERGY, INC.	TRUCHOT 1-12-48-72	UNA	CBM, STO	25	433
P113209W	12/2/1998	48	72	12	SENE	PENNACO ENERGY, INC.	TRUCHOT 8-12-48-72	UNA	CBM, STO	30	486
P81938W	3/9/1990	48	72	12	SESE	CURTIS AND LORI HJORTH	HJORTH #1	GST	DOM	10	1016
P70728W	7/1/1985	48	72	12	NESE	DAVID W. & JEAN M. WAGNER	WAGNER WELL #1	GST	DOM	20	647
P110249W	4/27/1998	48	72	12	NESE	MALCOLM P/LORALEI SHEPARD	SHEPARD #1	GST	DOM	10	490
P150217W	3/31/2003	48	72	12	NENE	RUSSELL & MICHELLE SHAHAN	SHAHAN 1	GST	DOM	20	330
P115296W	3/29/1999	48	72	12	SENE	MARC/JESS GRAY COLEMAN	COLEMAN #2 WELL	GST	DOM, STO	25	820
P18198P	12/31/1968	48	72	12	SESE	JAMES F. ROURKE** PAUL ROURKE** BERNARD ROURKE	LESTER #1	GST	STO	2	130
P90502W	12/21/1992	48	72	12	NENE	JESS I. GRAY	GRAY #1	GST	STO	3	35
P128668W	9/5/2000	48	72	13	SENE	JM HUBER CORPORATION	HUBER/RAG 13-22-48-72	GST	CBM	2	445
P130457W	10/25/2000	48	72	13	SESE	RMG I, LLC	DUNLAP 13-44-48-72-A	GST	CBM	25	412
P132128W	12/29/2000	48	72	13	SESE	RMG I, LLC	ENL DUNLAP 13-44-48-72---A	UNA	CBM		
P126004W	5/24/2000	48	72	13	SWSW	JM HUBER CORPORATION	FEDERAL 13-14	GST	CBM, STO	0	481

Table S3-4. Groundwater Rights for Caballo West LBA Tract (Continued).

Permit No.	Priority	TNS	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
P122488W	1/24/2000	48	72	13	SWNE	PENNACO ENERGY, INC.	HARROD 7-13-48-72	GST	CBM, STO	50	464
P122489W	1/24/2000	48	72	13	SENE	PENNACO ENERGY, INC.	HARROD 8-13-48-72	GST	CBM, STO	50	432
P122491W	1/24/2000	48	72	13	NESE	PENNACO ENERGY, INC.	HARROD 9-13-48-72	GST	CBM, STO	50	404
P122492W	1/24/2000	48	72	13	NENW	PENNACO ENERGY, INC.	HARROD 3-13-48-72	GST	CBM, STO	50	515
P122493W	1/24/2000	48	72	13	NWNE	PENNACO ENERGY, INC.	HARROD 2-13-48-72	GST	CBM, STO	50	494
P122494W	1/24/2000	48	72	13	SWSE	PENNACO ENERGY, INC.	RAG-HARROD 15-13-48-72	GST	CBM, STO	50	444
P122495W	1/24/2000	48	72	13	NWSE	PENNACO ENERGY, INC.	HARROD 10-13-48-72	GST	CBM, STO	50	444
P122496W	1/24/2000	48	72	13	NENE	PENNACO ENERGY, INC.	HARROD 1-13-48-72	GST	CBM, STO	50	484
39/1/283W	9/12/2006	48	72	13	NWNW	WINDSOR ENERGY GROUP LLC	GRUENENFELDER #13-11	UNA	MIS, CBM		
39/2/283W	9/12/2006	48	72	13	SWNW	WINDSOR ENERGY GROUP LLC	GRUENENFELDER #13-12	UNA	MIS, CBM		
39/3/283W	9/12/2006	48	72	13	NWSW	WINDSOR ENERGY GROUP LLC	GRUENENFELDER #13-13	UNA	MIS, CBM		
P147717W	10/21/2002	48	72	14	NWNE	J M HUBER CORPORATION	RAG 2E-14 48-72	GSI	CBM		
P147718W	10/21/2002	48	72	14	NENW	J M HUBER CORPORATION	RAG 3E-14 48-72	GSI	CBM		
P147719W	10/21/2002	48	72	14	NWNW	J M HUBER CORPORATION	RAG 4E-14 48-72	GSI	CBM		
P147720W	10/21/2002	48	72	14	SENW	J M HUBER CORPORATION	KFCCSTATE 13E-28-55-80	GSI	CBM		
P128658W	9/5/2000	48	72	14	NENW	JM HUBER CORPORATION	HUBER/RAG 14-21	GST	CBM	13	547
P128659W	9/5/2000	48	72	14	SENW	JM HUBER CORPORATION	HUBER/RAG 14-22	GST	CBM	5	549
P128662W	9/5/2000	48	72	14	NWNE	JM HUBER CORPORATION	HUBER/RAG 14-31	GST	CBM	1	505
P128663W	9/5/2000	48	72	14	SWNE	JM HUBER CORPORATION	HUBER/RAG 14-32	GST	CBM	5	509
P128666W	9/5/2000	48	72	14	NENE	JM HUBER CORPORATION	HUBER/RAG 14-41	GST	CBM	2	506
P128667W	9/5/2000	48	72	14	SENE	JM HUBER CORPORATION	HUBER/RAG 14-42	GST	CBM	4	481
P128660W	9/5/2000	48	72	14	NESW	JM HUBER CORPORATION	HUBER/RAG 14-23	GST	CBM	12	604
P128664W	9/5/2000	48	72	14	NWSE	JM HUBER CORPORATION	HUBER/RAG 14-33	GST	CBM	5	560
P128661W	9/5/2000	48	72	14	SESW	JM HUBER CORPORATION	HUBER/RAG 14-24	GST	CBM	1	593
P128665W	9/5/2000	48	72	14	SWSE	JM HUBER CORPORATION	HUBER/RAG 14-34-48-72	GST	CBM	4	528
39/3/309W	9/26/2006	48	72	14	SWSW	WINDSOR ENERGY GROUP LLC	FEDERAL 14-14	UNA	CBM		
P127639W	7/17/2000	48	72	14	NWSW	JM HUBER CORPORATION	FEDERAL 14-13	GST	CBM, STO	14	687
P109351W	4/6/1998	48	72	14	SWSW	JM HUBER CORPORATION	FEDERAL 14-14	GST	CBM, STO	15	565
P134103W	3/12/2001	48	72	14	SWNW	PENNACO ENERGY, INC.	APPEL FEDERAL 5-14-48-72	GST	CBM, STO	50	662
39/8/265W	8/31/2006	48	72	14	SESE	WINDSOR ENERGY GROUP LLC	GRUENENFELDER #14-44	UNA	MIS, CBM		
39/9/265W	8/31/2006	48	72	14	NESE	WINDSOR ENERGY GROUP LLC	GRUENENFELDER #14-43	UNA	MIS, CBM		
P54526W	11/5/1980	48	72	14	SWNW	LEONARD T. APPEL	APPEL #7	GST	STO	15	196
P131084W	11/24/2000	48	72	15	SWSE	JM HUBER CORPORATION	HUBER-RAG 15E-15 48-72	GSE	CBM		
P129545W	8/21/2000	48	72	15	NWNE	YATES PETROLEUM CORPORATION	JAMBALAYA CS FEDERAL #2	GST	CBM	200	720
P129546W	8/21/2000	48	72	15	NENW	YATES PETROLEUM CORPORATION	JAMBALAYA CS FEDERAL #3	GST	CBM	200	714
P129547W	8/21/2000	48	72	15	NWNW	YATES PETROLEUM CORPORATION	JAMBALAYA CS FEDERAL #4	GST	CBM	200	678
P129548W	8/21/2000	48	72	15	SWNW	YATES PETROLEUM CORPORATION	JAMBALAYA CS FEDERAL #5	GST	CBM	200	658
P129549W	8/21/2000	48	72	15	SENW	YATES PETROLEUM CORPORATION	JAMBALAYA CS FEDERAL #6	GST	CBM	200	660

Supplementary Information on the Affected Environment

Table S3-4. Groundwater Rights for Caballo West LBA Tract (Continued).											
Permit No.	Priority	TNS	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
P129550W	8/21/2000	48	72	15	NESW	YATES PETROLEUM CORPORATION	JAMBALAYA CS FEDERAL #11	GST	CBM	200	607
P129551W	8/21/2000	48	72	15	NWSW	YATES PETROLEUM CORPORATION	JAMBALAYA CS FEDERAL #12	GST	CBM	200	692
P129552W	8/21/2000	48	72	15	SWSW	YATES PETROLEUM CORPORATION	JAMBALAYA CS FEDERAL #13	GST	CBM	200	620
P120321W	10/25/1999	48	72	15	SWNE	JM HUBER CORPORATION	FEDERAL 15-32	GST	CBM, STO	9	588
P114143W	2/10/1999	48	72	15	SESW	MTG OPERATING COMPANY	BONE PILE 15-24	GST	CBM, STO	1	545
P114144W	2/10/1999	48	72	15	SESE	MTG OPERATING COMPANY	BONE PILE 15-44	GST	CBM, STO	1	548
P134100W	3/12/2001	48	72	15	NESE	PENNACO ENERGY, INC.	LYNDE FEDERAL 9-15-48-72	GST	CBM, STO	50	588
P134104W	3/12/2001	48	72	15	NENE	PENNACO ENERGY, INC.	APPEL FEDERAL 1-15-48-72	GST	CBM, STO	50	677
P134105W	3/12/2001	48	72	15	SENE	PENNACO ENERGY, INC.	LYNDE FEDERAL 8-15-48-72	GST	CBM, STO	50	640
P112399W	10/29/1998	48	72	15	SWSE	QUEST OPERATING LLC	STATE OF WYOMING 98-00331 #34-16	GST	CBM, STO	6	1041
39/1/265W	8/31/2006	48	72	15	NWSE	WINDSOR ENERGY GROUP LLC	FEDERAL #15-33	UNA	MIS, CBM		
39/3/266W	8/31/2006	48	72	15	SWSE	WINDSOR ENERGY GROUP LLC	LYNDE TRUST #15-34	UNA	MIS, CBM		
P99039W	4/21/1995	48	72	15	SENE	TORCH OPERATING COMPANY	FEDERAL #15-42	UNA	STO, IS, CBM		
P128657W	9/5/2000	48	72	22	NESE	JM HUBER CORPORATION	HUBER/RAG 14-11	GST	CBM	9	600
P131075W	11/24/2000	48	72	22	NENE	JM HUBER CORPORATION	HUBER-RAG 1E-22 48-72	GSE	CBM		
P131076W	11/24/2000	48	72	22	NWNE	JM HUBER CORPORATION	HUBER-RAG 2E-22 48-72	GSE	CBM		
P131077W	11/24/2000	48	72	22	NENW	JM HUBER CORPORATION	HUBER-RAG 3E-22 48-72	GSE	CBM		
P131078W	11/24/2000	48	72	22	SWNW	JM HUBER CORPORATION	HUBER-RAG 22-12 M	GSE	CBM		
P131079W	11/24/2000	48	72	22	SENW	JM HUBER CORPORATION	HUBER-RAG 22-22 M	GSE	CBM		
P131080W	11/24/2000	48	72	22	SWNE	JM HUBER CORPORATION	HUBER-RAG 7E-22 48-72	GSE	CBM		
P131081W	11/24/2000	48	72	22	NWSE	JM HUBER CORPORATION	HUBER-RAG 22-33 M	GSE	CBM		
P131082W	11/24/2000	48	72	22	SWSW	JM HUBER CORPORATION	HUBER-RAG 22-14 M	GSE	CBM		
P131083W	11/24/2000	48	72	22	SESW	JM HUBER CORPORATION	HUBER-RAG 22-24 M	GSE	CBM		
P126571W	6/12/2000	48	72	22	SESW	JM HUBER CORPORATION	RAG 22-24D	GSE	CBM, STO		
P120322W	10/25/1999	48	72	22	NESE	JM HUBER CORPORATION	FEDERAL 22-42	GST	CBM, STO	24	551
P120323W	10/25/1999	48	72	22	NESW	JM HUBER CORPORATION	FEDERAL 22-23	GST	CBM, STO	0	533
P120324W	10/25/1999	48	72	22	SESE	JM HUBER CORPORATION	FEDERAL 22-44	GST	CBM, STO	25	479
P114147W	2/10/1999	48	72	22	NWNW	MTG OPERATING COMPANY	BONE PILE 22-11	GST	CBM, STO	1	543
39/10/283W	9/12/2006	48	72	22	NWSE	WINDSOR ENERGY GROUP LLC	LYNDE TRUST #22-33	UNA	MIS, CBM		
39/4/266W	8/31/2006	48	72	22	NENW	WINDSOR ENERGY GROUP LLC	LYNDE TRUST #22-21	UNA	MIS, CBM		
39/5/265W	8/31/2006	48	72	22	NWSW	WINDSOR ENERGY GROUP LLC	FEDERAL #22-13	UNA	MIS, CBM		
39/5/266W	8/31/2006	48	72	22	SENW	WINDSOR ENERGY GROUP LLC	LYNDE TRUST #22-22	UNA	MIS, CBM		
39/6/283W	9/12/2006	48	72	22	SWSW	WINDSOR ENERGY GROUP LLC	LYNDE TRUST #22-14	UNA	MIS, CBM		

Table S3-4. Groundwater Rights for Caballo West LBA Tract (Continued).

Permit No.	Priority	TNS	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
39/7/266W	8/31/2006	48	72	22	SWNW	WINDSOR ENERGY GROUP LLC	LYNDE TRUST #22-12	UNA	MIS, CBM		
39/7/283W	9/12/2006	48	72	22	SESW	WINDSOR ENERGY GROUP LLC	LYNDE TRUST #22-24	UNA	MIS, CBM		
39/8/283W	9/12/2006	48	72	22	NWNE	WINDSOR ENERGY GROUP LLC	LYNDE TRUST #22-31	UNA	MIS, CBM		
39/9/283W	9/12/2006	48	72	22	SWNE	WINDSOR ENERGY GROUP LLC	LYNDE TRUST #22-32	UNA	MIS, CBM		
P104204W	3/1/1996	48	72	22	NWSW	TORCH OPERATING CO	ENL FEDERAL #22-13	GST	MIS, STO, CBM	5	503
P104205W	3/1/1996	48	72	22	SWSW	TORCH OPERATING CO	ENL LYNDE TRUST #22-14	GST	MIS, STO, CBM	5	508
P104213W	3/18/1996	48	72	22	NWSE	TORCH OPERATING CO	ENL LYNDE TRUST #22-33	GST	MIS, STO, CBM	20	506
P104268W	4/2/1996	48	72	22	NENE	TORCH OPERATING CO	ENL LYNDE TRUST #22-41	GST	MIS, STO, CBM	10	610
P90658W	1/19/1993	48	72	22	SENE	MARTENS & PECK OPERATING CO.	MON #22-42-C	GST	MON	0	516
P90659W	1/19/1993	48	72	22	SENE	MARTENS & PECK OPERATING CO.	MON #22-42-S	GST	MON	0	410
P110020W	5/12/1998	48	72	22	NENW	USDI, BLM	MP22SS	GST	MON	0	185
P110021W	5/12/1998	48	72	22	SENE	USDI, BLM	MP22VSS	GST	MON	0	80
P131085W	11/24/2000	48	72	23	SWNW	JM HUBER CORPORATION	HUBER/RAG 23-12 M	GSE	CBM		
P128678W	9/5/2000	48	72	23	SWNW	JM HUBER CORPORATION	HUBER/RAG 23-12	GST	CBM	0	465
P128679W	9/5/2000	48	72	23	SESW	JM HUBER CORPORATION	HUBER/RAG 23-22	GST	CBM	14	450
P128680W	9/5/2000	48	72	23	NWSE	JM HUBER CORPORATION	HUBER/RAG 23-33-48-72	GST	CBM	23	446
P128682W	9/5/2000	48	72	23	NESE	JM HUBER CORPORATION	HUBER/RAG 23-43-48-72	GST	CBM	1	420
P128681W	9/5/2000	48	72	23	NENE	JM HUBER CORPORATION	HUBER/RAG 23-41	GST	CBM	11	535
P130696W	11/3/2000	48	72	23	NESE	RMG I, LLC	RAG 23 - 23 - A	GST	CBM	25	489
P136851W	7/3/2001	48	72	23	SESE	RMG I, LLC	HIGH PLAINS 23-44	GST	CBM	100	435
P136852W	7/3/2001	48	72	23	SWSE	RMG I, LLC	HIGH PLAINS 23-34	GST	CBM	100	470
P126005W	5/24/2000	48	72	23	SWNE	JM HUBER CORPORATION	FEDERAL 23-32	GST	CBM, STO	7	459
P126006W	5/24/2000	48	72	23	SENE	JM HUBER CORPORATION	FEDERAL 23-42	GST	CBM, STO	8	514
39/1/284W	9/12/2006	48	72	23	NWSW	WINDSOR ENERGY GROUP LLC	LYNDE TRUST #23-13	UNA	MIS, CBM		
39/4/283W	9/12/2006	48	72	23	NWNE	WINDSOR ENERGY GROUP LLC	GRUENENFELDER #23-31	UNA	MIS, CBM		
P104217W	3/18/1996	48	72	23	NWSW	TORCH OPERATING CO	ENL LYNDE TRUST #23-13	GST	MIS, STO, CBM	10	487
P99040W	4/21/1995	48	72	23	SWNE	TORCH OPERATING COMPANY	FEDERAL #23-32	UNA	STO, MIS, CBM		
P130439W	10/25/2000	48	72	24	NESE	RMG I, LLC	DUNLAP 24-43-48-72-A	GST	CBM	25	425
P130440W	10/25/2000	48	72	24	SENE	RMG I, LLC	DUNLAP 24-42-48-72-A	GST	CBM	25	403
P130441W	10/25/2000	48	72	24	NWSE	RMG I, LLC	DUNLAP 24-33-48-72-A	GST	CBM	25	433
P130442W	10/25/2000	48	72	24	SWNE	RMG I, LLC	DUNLAP 24-32-48-72-A	GST	CBM	25	442
P130443W	10/25/2000	48	72	24	NWNE	RMG I, LLC	DUNLAP 24-31-48-72-A	GST	CBM	25	412
P130697W	11/3/2000	48	72	24	NWNW	RMG I, LLC	RAG 24 - 11 - A	GST	CBM	25	482
P130698W	11/3/2000	48	72	24	NWSW	RMG I, LLC	RAG 24 - 13 - A	GST	CBM	25	470
P130699W	11/3/2000	48	72	24	NENW	RMG I, LLC	RAG 24 - 21 - A	GST	CBM	25	455
P130700W	11/3/2000	48	72	24	SESW	RMG I, LLC	RAG 24 - 22 - A	GST	CBM	25	481

Supplementary Information on the Affected Environment

Table S3-4. Groundwater Rights for Caballo West LBA Tract (Continued).											
Permit No.	Priority	TNS	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
P130701W	11/3/2000	48	72	24	NESW	RMG I, LLC	RAG 24-23-48-72-A	GST	CBM	25	513
P131769W	12/29/2000	48	72	24	SESE	RMG I, LLC	DUNLAP 24 - 44 - 48 - 72 - A	GST	CBM	100	409
P131780W	12/29/2000	48	72	24	NENE	RMG I, LLC	DUNLAP 24-41-48-72-A	GST	CBM	100	392
P133824W	4/6/2001	48	72	24	SWSE	RMG I, LLC	DUNLAP 24-34-48-72-A	GST	CBM	100	446
P136823W	7/3/2001	48	72	24	SWSW	RMG I, LLC	HIGH PLAINS 24-14	GST	CBM	100	412
P132098W	12/29/2000	48	72	24	NWNW	RMG I, LLC	ENL R.A.G. 24-11- A	UNA	CBM		
P132099W	12/29/2000	48	72	24	NWSW	RMG I, LLC	ENL R.A.G. 24-13- A	UNA	CBM		
P132100W	12/29/2000	48	72	24	NENW	RMG I, LLC	ENL R.A.G. 24-21- A	UNA	CBM		
P132101W	12/29/2000	48	72	24	SENW	RMG I, LLC	ENL R.A.G. 24-22- A	UNA	CBM		
P132102W	12/29/2000	48	72	24	NESW	RMG I, LLC	ENL R.A.G. 24-23-48-72- A	UNA	CBM		
P132103W	12/29/2000	48	72	24	NWSE	RMG I, LLC	ENL DUNLAP 24-33-48-72- A	UNA	CBM		
P132104W	12/29/2000	48	72	24	NESE	RMG I, LLC	ENL DUNLAP 24-43-48-72- A	UNA	CBM		
P132148W	12/29/2000	48	72	24	NWNE	RMG I, LLC	ENL DUNLAP 24-31-48-72-A	UNA	CBM		
P132151W	12/29/2000	48	72	24	SENE	RMG I, LLC	ENL DUNLAP 24-42-48-72 - A	UNA	CBM		
P132152W	12/29/2000	48	72	24	SWNE	RMG I, LLC	ENL DUNLAP 24-32-48-72 - A	UNA	CBM		
P120315W	10/25/1999	48	72	24	SWNE	JM HUBER CORPORATION	FEDERAL 28-32	GST	CBM, STO	0	577
P84018W	11/13/1990	48	72	24	NENW	EP OPERATING COMPANY	RIDGEVIEW FIELD WATER SUPPLY #1	UNA	IND	80	2310
P84018W	11/13/1990	48	72	24	SENW	EP OPERATING COMPANY	RIDGEVIEW FIELD WATER SUPPLY #1	UNA	IND	80	2310
P119794W	10/7/1999	48	72	25	NWNE	RMG I, LLC	R.A.G. 25-31	GST	CBM	25	458
P119795W	10/7/1999	48	72	25	SWNE	RMG I, LLC	R.A.G. 25-32	GST	CBM	25	394
P119796W	10/7/1999	48	72	25	NWSE	RMG I, LLC	R.A.G. 25-33	GST	CBM	25	384
P119797W	10/7/1999	48	72	25	SWSE	RMG I, LLC	R.A.G. 25-34	GST	CBM	25	418
P119798W	10/7/1999	48	72	25	NENE	RMG I, LLC	R.A.G. 25-41	GST	CBM	25	389
P119799W	10/7/1999	48	72	25	NESE	RMG I, LLC	R.A.G. 25-43	GST	CBM	25	354
P119800W	10/7/1999	48	72	25	SESE	RMG I, LLC	R.A.G. 25-44	GST	CBM	25	370
P131543W	12/13/2000	48	72	25	NWNE	RMG I, LLC	ENL R.A.G. 25-31	GST	CBM	70	458
P131544W	12/13/2000	48	72	25	SWNE	RMG I, LLC	ENL R.A.G. 25-32	GST	CBM	70	394
P131545W	12/13/2000	48	72	25	NWSE	RMG I, LLC	ENL R.A.G. 25-33	GST	CBM	70	384
P131546W	12/13/2000	48	72	25	SWSE	RMG I, LLC	ENL R.A.G. 25-34	GST	CBM	70	418
P131547W	12/13/2000	48	72	25	NENE	RMG I, LLC	ENL R.A.G. 25-41	GST	CBM	70	389
P131549W	12/13/2000	48	72	25	NESE	RMG I, LLC	ENL R.A.G. 25-43	GST	CBM	70	354
P131550W	12/13/2000	48	72	25	SESE	RMG I, LLC	ENL R.A.G. 25-44	GST	CBM	70	370
P136848W	7/3/2001	48	72	25	NWNW	RMG I, LLC	HIGH PLAINS 25-11	GST	CBM	100	406
P26012W	2/5/1974	48	72	25	SENW	MARSHALL JEROME AND BEVERLY MORGAN	MORGAN #10	ADJ	DOM	15	190
P29727W	4/29/1975	48	72	25	SENW	ROBERT W. & BEVERLY B. LAWSON	LAWSON #1	GST	DOM	10	222
P68719W	10/1/1984	48	72	25	SENW	MARSHALL J. AND BEVERLY A. MORGAN	ENL MORGAN #10 WELL	GST	STO	0	190
P61463W	6/1/1982	48	72	25	SENW	MARSHAL JEROME & BEVERLY ANN MORGAN	MORGAN #20	ADJ	STO, MIS	15	180
P136826W	7/3/2001	48	72	26	NENE	RMG I, LLC	HIGH PLAINS 26-41	GST	CBM	100	416
P125932W	6/2/2000	48	72	26	SWSW	JM HUBER CORPORATION	RAG 26-14	GST	CBM, STO	24	423
P125933W	6/2/2000	48	72	26	SESW	JM HUBER CORPORATION	HUBER RAG 26-24-48-72	GST	CBM, STO	25	422
P125365W	5/9/2000	48	72	35	SWSW	NORTH FINN, LLC	OXBOW #14-35	GST	CBM	4	399
P125366W	5/9/2000	48	72	35	NWSW	NORTH FINN, LLC	OXBOW #13-35	GST	CBM	2	418
P125367W	5/9/2000	48	72	35	SWNW	NORTH FINN, LLC	OXBOW #12-35	GST	CBM	20	511
P134270W	4/19/2001	48	72	35	SENW	NORTH FINN, LLC	OXBOW #22-35	GST	CBM	0	481
P134271W	4/19/2001	48	72	35	NESW	NORTH FINN, LLC	OXBOW #23-35	GST	CBM	0	450
P125928W	6/2/2000	48	72	35	NENW	JM HUBER CORPORATION	RAG 35-21	GST	CBM, STO	22	431
P125929W	6/2/2000	48	72	35	NWNW	JM HUBER CORPORATION	HUBER RAG 35-11-48-72	GST	CBM, STO	25	459

Table S3-4. Groundwater Rights for Caballo West LBA Tract (Continued).

Permit No.	Priority	TNS	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
P125934W	6/2/2000	48	72	35	NWNE	JM HUBER CORPORATION	HUBER RAG 35-31-48-72	GST	CBM, STO	25	429
P125935W	6/2/2000	48	72	35	NENE	JM HUBER CORPORATION	HUBER RAG 35-41-48-72	GST	CBM, STO	25	372
P125936W	6/2/2000	48	72	35	SENE	JM HUBER CORPORATION	HUBER RAG 35-42-48-72	GST	CBM, STO	25	367
P125937W	6/2/2000	48	72	35	NESE	JM HUBER CORPORATION	HUBER RAG 35-43-48-72	GST	CBM, STO	25	384
P125938W	6/2/2000	48	72	35	SESE	JM HUBER CORPORATION	RAG 35-44	GST	CBM, STO	20	400
39/6/268W	8/31/2006	48	72	35	NWSE	WINDSOR ENERGY GROUP LLC	THOMPSON #35-33	UNA	MIS, CBM		
39/7/268W	8/31/2006	48	72	35	SWSE	WINDSOR ENERGY GROUP LLC	THOMPSON #35-34	UNA	MIS, CBM		
39/9/282W	9/12/2006	48	72	35	SWNE	WINDSOR ENERGY GROUP LLC	THOMPSON #35-32	UNA	MIS, CBM		
P104216W	3/18/1996	48	72	35	SWSE	TORCH OPERATING CO	ENL THOMPSON #35-34	GST	MIS, STO, CBM	10	392
P104265W	3/1/1996	48	72	35	NWSE	TORCH OPERATING CO	ENL MCCREERY #1-21	GST	MIS, STO, CBM	5	464
P70776W	7/31/1985	48	72	35	NWSW	SABINE CORPORATION** I. W. LYNDE TRUST	LYNDE TRUST #1	GST	STO	25	720
P133803W	4/6/2001	48	72	36	SWNW	RMG I, LLC	2ND ENL. STATE 36-12	GST	CBM	55	337
P132142W	12/29/2000	48	72	36	NWSW	RMG I, LLC	ENL STATE # 36 13	UNA	CBM	95	340
P132143W	12/29/2000	48	72	36	SWSW	RMG I, LLC	ENL STATE # 36 14	UNA	CBM	95	370
P132144W	12/29/2000	48	72	36	NWSE	RMG I, LLC	ENL STATE # 36-33	UNA	CBM	50	330
P134114W	4/13/2001	48	72	36	NWNW	RMG I, LLC** WY STATE BOARD OF LAND COMMISSIONERS	STATE 36-11-48-72-A	GST	CBM	100	367
P134115W	4/13/2001	48	72	36	NWNE	RMG I, LLC** WY STATE BOARD OF LAND COMMISSIONERS	STATE 36-31-48-72-A	GST	CBM	100	375
P134117W	4/13/2001	48	72	36	SWSE	WY STATE BOARD OF LAND COMMISSIONERS** RMG I, LLC	STATE 36-34-48-72-A	GST	CBM	100	314
P130383W	10/25/1999	48	72	36	NWSE	WY STATE BOARD OF LAND COMMISSIONERS** RMG I, LLC	2ND ENL STATE #36-33	GST	CBM, STO	25	330
P130386W	10/25/1999	48	72	36	SWNW	WY STATE BOARD OF LAND COMMISSIONERS** RMG I, LLC	ENL STATE # 36-12	GST	CBM, STO	25	337
P104263W	3/25/1996	48	72	36	SWSW	TORCH OPERATING CO	ENL STATE #36-14	GST	MIS, STO, CBM	5	370
P104264W	3/25/1996	48	72	36	NWSE	TORCH OPERATING CO	ENL STATE #36-33	GST	MIS, STO, CBM	5	328
P104201W	3/1/1996	48	72	36	NWSW	WYO BOARD OF LAND COMMISSIONERS** TORCH OPERATING CO	ENL STATE #36-13	GST	MIS, STO, CBM	5	340
P93190W	10/22/1993	48	72	36	NWSW	COMMISSIONER OF PUBLIC LANDS** WYO STATE ENGINEERS OFFICE	ECH-1A	GST	MON	0	350
P71739W	1/13/1986	48	72	36	SESW	WY BOARD OF LAND COMMISSIONERS** MARSHALL MORGAN	MORGAN #36	GST	STO	25	103
P112674W	11/2/1998	49	71	28	SWNW	PENNACO ENERGY, INC.	SHARP #5-28-49-71	GST	CBM, STO	40	501
P112676W	11/2/1998	49	71	28	NWSW	PENNACO ENERGY, INC.	ROURKE #12-28-49-71	GST	CBM, STO	25	571
P114249W	3/1/1999	49	71	28	SESW	PENNACO ENERGY, INC.	ROURKE #6-28-49-71	GST	CBM, STO	50	435

Supplementary Information on the Affected Environment

Table S3-4. Groundwater Rights for Caballo West LBA Tract (Continued).											
Permit No.	Priority	TNS	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
P114250W	3/1/1999	49	71	28	NESW	PENNACO ENERGY, INC.	ROURKE #11-28-49-71	GST	CBM, STO	30	436
P114251W	3/1/1999	49	71	28	SWSW	PENNACO ENERGY, INC.	ROURKE #13-28-49-71	GST	CBM, STO	50	491
P114252W	3/1/1999	49	71	28	SESW	PENNACO ENERGY, INC.	ROURKE #14-28-49-71	GST	CBM, STO	50	440
P112677W	11/2/1998	49	71	28	NWNW	PENNACO ENERGY, INC.	SHARP #4-28-49-71	UNA	CBM, STO	30	461
P78076W	9/9/1988	49	71	28	NWSE	PACIFIC ENTERPRISES OIL CO (USA)	T A BUTTES WIW #1		IND	6	1935
P96794W	8/11/1994	49	71	28	NWSE	HUNT OIL COMPANY	ENL - T.A. BUTTES WSW #1	UNA	MIS	0	1935
P130741W	11/14/2000	49	71	28	SENE	CHARLES T/ANNITTE ROURKE/TRUSTEES	TOWER # 1	GST	STO	9	280
P18197P	12/31/1951	49	71	28	SENE	JAMES F. ROURKE** PAUL D. ROURKE	HELLE #1	GST	STO	2	130
P123765W	2/25/2000	49	71	29	NESW	PENNACO ENERGY, INC.	ROURKE FEDERAL 11-29-49-71	GST	CBM	60	471
P118882W	9/2/1999	49	71	29	NESE	PENNACO ENERGY, INC.	ROURKE FED 09-29-49-71	GSE	CBM, STO		
P118883W	9/2/1999	49	71	29	NWSE	PENNACO ENERGY, INC.	ROURKE FED 10-29-49-71	GSE	CBM, STO		
P118897W	9/2/1999	49	71	29	SENE	PENNACO ENERGY, INC.	WOLFF FED #06-29-49-71	GSE	CBM, STO		
P120572W	11/4/1999	49	71	29	NWNE	PENNACO ENERGY, INC.	SHARP 2-29-49-71D	GSE	CBM, STO		
P120573W	11/4/1999	49	71	29	NENE	PENNACO ENERGY, INC.	SHARP 1-29-49-71D	GSE	CBM, STO		
P120574W	11/4/1999	49	71	29	SENE	PENNACO ENERGY, INC.	SHARP 8-29-49-71D	GSE	CBM, STO		
P112673W	11/2/1998	49	71	29	SWNE	PENNACO ENERGY, INC.	SHARP #7-29-49-71	GST	CBM, STO	25	530
P112675W	11/2/1998	49	71	29	NENE	PENNACO ENERGY, INC.	SHARP #1-29-49-71	GST	CBM, STO	30	458
P112681W	11/2/1998	49	71	29	NENW	PENNACO ENERGY, INC.	WOLFF #3-29-49-71	GST	CBM, STO	40	504
P112683W	11/2/1998	49	71	29	SENE	PENNACO ENERGY, INC.	SHARP #8-29-49-71	GST	CBM, STO	35	540
P112684W	11/2/1998	49	71	29	NWNE	PENNACO ENERGY, INC.	SHARP #2-29-49-71	GST	CBM, STO	33	496
P112685W	11/2/1998	49	71	29	NWNW	PENNACO ENERGY, INC.	WOLFF #4-29-49-71	GST	CBM, STO	30	499
P113220W	12/2/1998	49	71	29	SWSW	PENNACO ENERGY, INC.	ROURKE 13-29-49-71	GST	CBM, STO	33	415
P113221W	12/2/1998	49	71	29	SESW	PENNACO ENERGY, INC.	ROURKE 14-29-49-71	GST	CBM, STO	33	408
P113222W	12/2/1998	49	71	29	SWSE	PENNACO ENERGY, INC.	ROURKE 15-29-49-71	GST	CBM, STO	33	401
P121728W	12/21/1999	49	71	29	SESW	PENNACO ENERGY, INC.	ROURKE 14-29-49-71D	GST	CBM, STO	50	1142
P121729W	12/21/1999	49	71	29	SWSW	PENNACO ENERGY, INC.	ROURKE 13-29-49-71D	GST	CBM, STO	50	1152
P18196P	12/31/1947	49	71	29	SWSE	JAMES F. ROURKE** PAUL D. ROURKE	SMITH #2	GST	DOM	4	280
P36417W	12/8/1976	49	71	29	SWNE	ANDERSON OIL COMPANY** JAMES F. ROURKE	ROURKE WSW #1		IND	75	1210
P18195P	12/31/1915	49	71	29	SWSE	JAMES F. ROURKE** PAUL D. ROURKE	SMITH #1	GST	STO	3	120
P115117W	4/5/1999	49	71	30	NESW	PENNACO ENERGY INC.	ROBBINS 11-30-49-71	GST	CBM, STO	45	527
P112682W	11/2/1998	49	71	30	NENE	PENNACO ENERGY, INC.	WOLFF #1-30-49-71	GST	CBM, STO	25	497

Supplementary Information on the Affected Environment

Table S3-4. Groundwater Rights for Caballo West LBA Tract (Continued).

Permit No.	Priority	TNS	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
P113223W	12/2/1998	49	71	30	SESE	PENNACO ENERGY, INC.	ROURKE 16-30-49-71	GST	CBM, STO	33	439
P115115W	4/5/1999	49	71	30	SWSW	PENNACO ENERGY, INC.	ROBBINS 13-30-49-71	GST	CBM, STO	30	472
P115118W	4/5/1999	49	71	30	SWSE	PENNACO ENERGY, INC.	ROBBINS 15-30-49-71	GST	CBM, STO	45	411
P118881W	9/2/1999	49	71	30	SESW	PENNACO ENERGY, INC.	ROBBINS #14-30-49-71	GST	CBM, STO	30	463
P120579W	11/4/1999	49	71	30	SESW	PENNACO ENERGY, INC.	PETRASH #6-30-49-71	GST	CBM, STO	50	500
P121695W	12/17/1999	49	71	30	NENW	PENNACO ENERGY, INC.	ROBBINS 3-30-49-71	GST	CBM, STO	30	534
P121719W	12/21/1999	49	71	30	SWSE	PENNACO ENERGY, INC.	ROBBINS 15-30-49-71D	GST	CBM, STO	50	1152
P121727W	12/21/1999	49	71	30	SESE	PENNACO ENERGY, INC.	ROURKE 16-30-49-71D	GST	CBM, STO	50	1148
P112687W	11/2/1998	49	71	30	NWNE	PENNACO ENERGY, INC.	WOLFF #2-30-49-71	UNA	CBM, STO	25	455
P118210W	8/13/1999	49	71	30	NWSE	PENNACO ENERGY, INC.	ROBBINS #10-30-49-71	UNA	CBM, STO	30	475
P118283W	8/23/1999	49	71	30	SWNE	PENNACO ENERGY, INC.	ROBBINS #7-30-49-71	UNA	CBM, STO	30	505
P164913W	1/6/2005	49	71	30	NENW	AMBER BAKER	BAKER 2004	GST	DOM	20	730
P106937W	8/8/1997	49	71	30	SESW	BILL OR VICKY BOYD	BOYD #1	GST	DOM	20	722
P168621W	6/28/2005	49	71	30	NESW	BRIAN T. & RUTH I. WOODS	WOODS FAMILY 1	GS	DOM		
39/10/65W	5/25/2006	49	71	30	SWSW	CURTIS E. SCOTT	ROBBINS 13-30-49-71A	UNA	DOM		
P107526W	9/15/1997	49	71	30	SWNE	DAN/PAMELA THOMAS	GAP/THOMAS #1	GST	DOM	25	1400
P112419W	10/26/1998	49	71	30	NWSE	J. SALVADOR/CECILIA A CARRILLO	TWIN BUTTES OJO DE AGUA 4	GST	DOM	20	710
P168156W	6/8/2005	49	71	30	SESW	JAMES M. & MARY K. GRAY	MCHENRY'S WELL #1	GST	DOM	10	450
39/2/481W	1/5/2007	49	71	30	NWSW	JEREMY FERRIER	FORTUNE OF 40G'S	UNA	DOM		
P164022W	11/26/2004	49	71	30	NWSW	KENNEY & CARRIE HINZ	K C J HINZ 89	GST	DOM	20	767
39/6/258W	8/28/2006	49	71	30	SWSW	KEVIN & RHONDA SINCLAIR	SINCLAIR 01	UNA	DOM		
P146936W	9/10/2002	49	71	30	NENW	WES JR./SANDI MCKENNEY	SANDI #1	GST	DOM	25	800
P18199P	12/31/1965	49	71	30	SESE	JAMES F. ROURKE** PAUL D. ROURKE	YOCKUM #1	GST	DOM, STO	2	150
P102673W	6/18/1996	49	71	30	NENW	GARRY DAVIS	GAP #1	UNA	MIS	25	780
P25836W	12/14/1972	49	71	30	NESW	JAMES F. ROURKE** CAMPBELL COUNTY SCHOOL DISTRICT	GAP SCHOOL #1		MIS	35	212
P10599P	12/31/1940	49	71	30	NWSE	PLACIDE ROBBINS	#1 GAP	GST	STO	7	-1
P27119W	6/28/1974	49	71	30	SWNW	WILLIAM E. GREER	DRUM #1	GST	STO	150	288
P114563W	3/15/1999	49	71	31	NWNE	LANCE OIL & GAS COMPANY, INC.	STEPHANIE 31-31-4971	GST	CBM, STO	45	450
P113224W	12/2/1998	49	71	31	NENE	PENNACO ENERGY, INC.	ROURKE 1-31-49-71	GST	CBM, STO	33	347
P113482W	1/11/1999	49	71	31	SWNE	PENNACO ENERGY, INC.	ROURKE #7-31-49-71	GST	CBM, STO	33	401
P113483W	1/11/1999	49	71	31	SENE	PENNACO ENERGY, INC.	ROURKE #8-31-49-71	GST	CBM, STO	25	321
P113484W	1/11/1999	49	71	31	NESE	PENNACO ENERGY, INC.	ROURKE #9-31-49-71	GST	CBM, STO	33	350
P113485W	1/11/1999	49	71	31	NWSE	PENNACO ENERGY, INC.	ROURKE #10-31-49-71	GST	CBM, STO	25	375
P113486W	1/11/1999	49	71	31	SWSE	PENNACO ENERGY, INC.	ROURKE #15-31-49-71	GST	CBM, STO	25	378
P113487W	1/11/1999	49	71	31	SESE	PENNACO ENERGY, INC.	ROURKE #16-31-49-71	GST	CBM, STO	25	329

Supplementary Information on the Affected Environment

Table S3-4. Groundwater Rights for Caballo West LBA Tract (Continued).											
Permit No.	Priority	TNS	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
P113911W	2/1/1999	49	71	31	SWNW	PENNACO ENERGY, INC.	BARTOW 12-31-4971	GST	CBM, STO	30	586
P113912W	2/1/1999	49	71	31	SWSW	PENNACO ENERGY, INC.	BARTOW 14-31-4971	GST	CBM, STO	45	526
P113913W	2/1/1999	49	71	31	NESW	PENNACO ENERGY, INC.	BARTOW 23-31-4971	GST	CBM, STO	45	440
P116236W	6/2/1999	49	71	31	NWSW	PENNACO ENERGY, INC.	BARTOW #12-31-49-71	GST	CBM, STO	50	589
P116237W	6/2/1999	49	71	31	SESW	PENNACO ENERGY, INC.	BARTOW #14-31-49-71	GST	CBM, STO	50	436
P116238W	6/2/1999	49	71	31	NWNW	PENNACO ENERGY, INC.	BARTOW #4-31-49-71	GST	CBM, STO	50	413
P116239W	6/2/1999	49	71	31	SENW	PENNACO ENERGY, INC.	BARTOW #6-31-49-71	GST	CBM, STO	50	453
P121720W	12/21/1999	49	71	31	NWSE	PENNACO ENERGY, INC.	ROURKE 10-31-49-71D	GST	CBM, STO	50	1072
P121721W	12/21/1999	49	71	31	NWNE	PENNACO ENERGY, INC.	ROURKE 2-31-49-71D	GST	CBM, STO	50	1118
P118205W	8/13/1999	49	71	31	NENE	PENNACO ENERGY, INC.	ROURKE #1-31-49-71D	UNA	CBM, STO	50	1120
P118206W	8/13/1999	49	71	31	SWNE	PENNACO ENERGY, INC.	ROURKE #7-31-49-71D	UNA	CBM, STO	50	1101
P118207W	8/13/1999	49	71	31	SENE	PENNACO ENERGY, INC.	ROURKE #8-31-49-71D	UNA	CBM, STO	40	1074
P118208W	8/13/1999	49	71	31	NESE	PENNACO ENERGY, INC.	ROURKE #9-31-49-71D	UNA	CBM, STO	40	1055
P114497W	3/11/1999	49	71	31	NENW	LINDA K ROURKE	ROURKE #1	GST	DOM	15	680
P19817P	6/30/1956	49	71	31	SENW	THELMA M. CHANEY	CHANEY #2	GST	DOM	3	65
P126244W	6/22/2000	49	71	31	SESW	TROY/KIM SCOTT	SCOTT #1	GST	DOM	10	795
P40841W	11/21/1977	49	71	31	SWNW	USGS WATER RESOURCES DIVISION	49N 071W 31BC 01	GST	MON	0	336
P58231W	9/8/1981	49	71	31	SENE	JAMES F. ROURKE	YOICHEM #1	GST	STO	20	256
40/5/121W	5/8/2007	49	71	31	SENW	JON & VIKKI BARTOW	BARTOW 6-31-49-71	UNA	STO		
40/6/121W	5/8/2007	49	71	31	NENW	JON & VIKKI BARTOW	STEPHANIE 3-31-49-71A	UNA	STO		
P19816P	12/21/1945	49	71	31	SWNW	THELMA M. CHANEY	CHANEY #3	GST	STO	10	135
P19818P	12/21/1934	49	71	31	SENW	THELMA M. CHANEY	CHANEY #1	GST	STO	1	85
P113225W	12/2/1998	49	71	32	NWNE	PENNACO ENERGY, INC.	ROURKE 2-32-49-71	GST	CBM, STO	33	341
P113226W	12/2/1998	49	71	32	NENW	PENNACO ENERGY, INC.	ROURKE 3-32-49-71	GST	CBM, STO	33	369
P113227W	12/2/1998	49	71	32	NWNW	PENNACO ENERGY, INC.	ROURKE 4-32-49-71	GST	CBM, STO	33	393
P113228W	12/2/1998	49	71	32	SWNW	PENNACO ENERGY, INC.	ROURKE 5-32-49-71	GST	CBM, STO	33	316
P113229W	12/2/1998	49	71	32	SENW	PENNACO ENERGY, INC.	ROURKE 6-32-49-71	GST	CBM, STO	33	318
P113230W	12/2/1998	49	71	32	SWNE	PENNACO ENERGY, INC.	ROURKE 7-32-49-71	GST	CBM, STO	33	300
P113231W	12/2/1998	49	71	32	SENE	PENNACO ENERGY, INC.	ROURKE 8-32-49-71	GST	CBM, STO	40	332
P113232W	12/2/1998	49	71	32	NESE	PENNACO ENERGY, INC.	ROURKE 9-32-49-71	GST	CBM, STO	30	320
P113233W	12/2/1998	49	71	32	NWSE	PENNACO ENERGY, INC.	ROURKE 10-32-49-71	GST	CBM, STO	33	328
P113234W	12/2/1998	49	71	32	NESW	PENNACO ENERGY, INC.	ROURKE 11-32-49-71	GST	CBM, STO	33	341

Table S3-4. Groundwater Rights for Caballo West LBA Tract (Continued).

Permit No.	Priority	TNS	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
P113235W	12/2/1998	49	71	32	NWSW	PENNACO ENERGY, INC.	ROURKE 12-32-49-71	GST	CBM, STO	33	392
P113236W	12/2/1998	49	71	32	SWSE	PENNACO ENERGY, INC.	ROURKE 15-32-49-71	GST	CBM, STO	35	410
P113237W	12/2/1998	49	71	32	SESE	PENNACO ENERGY, INC.	ROURKE 16-32-49-71	GST	CBM, STO	30	285
P118885W	9/2/1999	49	71	32	NENE	PENNACO ENERGY, INC.	ROURKE FED 01-32-49-71	GST	CBM, STO	50	401
P118886W	9/2/1999	49	71	32	SWSW	PENNACO ENERGY, INC.	ROURKE FED 13-32-49-71	GST	CBM, STO	50	330
P118887W	9/2/1999	49	71	32	SESW	PENNACO ENERGY, INC.	ROURKE FED 14-32-49-71	GST	CBM, STO	50	372
P121722W	12/21/1999	49	71	32	NWSW	PENNACO ENERGY, INC.	ROURKE 12-32-49-71D	GST	CBM, STO	50	1132
P121723W	12/21/1999	49	71	32	NESW	PENNACO ENERGY, INC.	ROURKE 11-32-49-71D	GST	CBM, STO	50	1130
P121724W	12/21/1999	49	71	32	SENW	PENNACO ENERGY, INC.	ROURKE 6-32-49-71D	GST	CBM, STO	50	1075
P121725W	12/21/1999	49	71	32	NWNW	PENNACO ENERGY, INC.	ROURKE 4-32-49-71D	GST	CBM, STO	50	1097
P121726W	12/21/1999	49	71	32	NENW	PENNACO ENERGY, INC.	ROURKE 3-32-49-71D	GST	CBM, STO	50	1077
P118209W	8/13/1999	49	71	32	SWNW	PENNACO ENERGY, INC.	ROURKE #5-32-49-71D	UNA	CBM, STO	40	1082
P160352W	8/6/2003	49	71	33	SESE	L & J OPERATING INC	ROURKE #33-44	GSI	CBM		
P160354W	8/6/2003	49	71	33	NESE	L & J OPERATING INC	ROURKE #33-43	GSI	CBM		
P160355W	8/6/2003	49	71	33	SENE	L & J OPERATING INC	ROURKE #33-42	GSI	CBM		
P160353W	8/6/2003	49	71	33	NENE	L & J OPERATING INC	ROURKE #33-41A	GST	CBM	5	380
P113924W	2/8/1999	49	71	33	NWNW	PENNACO ENERGY, INC.	ROURKE #4-33-49-71	GST	CBM, STO	50	385
P113925W	2/8/1999	49	71	33	SWNW	PENNACO ENERGY, INC.	ROURKE #5-33-49-71	GST	CBM, STO	50	358
P113926W	2/8/1999	49	71	33	NWSW	PENNACO ENERGY, INC.	ROURKE #12-33-49-71	GST	CBM, STO	50	300
P113927W	2/8/1999	49	71	33	SWSW	PENNACO ENERGY, INC.	ROURKE #13-33-49-71	GST	CBM, STO	30	270
P114253W	3/1/1999	49	71	33	NWNE	PENNACO ENERGY, INC.	ROURKE #2-33-49-71	GST	CBM, STO	50	377
P114254W	3/1/1999	49	71	33	NENW	PENNACO ENERGY, INC.	ROURKE #3-33-49-71	GST	CBM, STO		
P114255W	3/1/1999	49	71	33	SENW	PENNACO ENERGY, INC.	ROURKE #6-33-49-71	GST	CBM, STO	50	357
P114256W	3/1/1999	49	71	33	SWNE	PENNACO ENERGY, INC.	ROURKE #7-33-49-71	GST	CBM, STO	50	345
P114257W	3/1/1999	49	71	33	NWSE	PENNACO ENERGY, INC.	ROURKE #10-33-49-71	GST	CBM, STO	50	312
P114258W	3/1/1999	49	71	33	NESW	PENNACO ENERGY, INC.	ROURKE #11-33-49-71	GST	CBM, STO	50	305
P114259W	3/1/1999	49	71	33	SESW	PENNACO ENERGY, INC.	ROURKE #14-33-49-71	GST	CBM, STO	50	271
P114260W	3/1/1999	49	71	33	SWSE	PENNACO ENERGY, INC.	ROURKE #15-33-49-71	GST	CBM, STO	50	275
P160358W	8/6/2003	49	71	34	SWSW	L & J OPERATING INC	ROURKE #34-14	GSI	CBM		
P160351W	8/6/2003	49	71	34	NWNW	L & J OPERATING INC	ROURKE #34-11A	GST	CBM	10	390
P160356W	8/6/2003	49	71	34	NWSW	L & J OPERATING INC	ROURKE #34-13	GST	CBM	10	390
P160357W	8/6/2003	49	71	34	SWNW	L & J OPERATING INC	ROURKE #34-12	GST	CBM	10	380

Supplementary Information on the Affected Environment

Table S3-4. Groundwater Rights for Caballo West LBA Tract (Continued).											
Permit No.	Priority	TNS	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
P13080P	8/3/1954	49	71	34	NWNE	DONALD L. & DOROTHY A. WOLFF	STOCKWELL #6	GST	STO	5	165
P13078P	2/28/1961	49	71	35	NWNE	DONALD L. & DOROTHY A. WOLFF	HOME #4	GST	DOM, STO	5	530
P148362W	11/1/2002	49	71	35	SWNE	CHARLES T. ROURKE, II AND CABALLO COAL COMPANY	GARBER MEMORIAL # 2	GSE	DOM, STO, MIS		
P13079P	12/31/1959	49	71	35	NESE	DONALD L. & DOROTHY A. WOLFF	STOCKWELL #5	GST	STO	4	300
P131235W	11/30/2000	49	72	25	SWSW	PENNACO ENERGY, INC.	J. MILL FEDERAL #13-25-49-72	GSE	CBM		
P113130W	11/20/1998	49	72	25	NWNW	PENNACO ENERGY, INC.	WOLFF #4-25-49-72	GST	CBM	30	703
P113131W	11/20/1998	49	72	25	SWNW	PENNACO ENERGY, INC.	WOLFF #5-25-49-72	GST	CBM	30	663
P113132W	11/20/1998	49	72	25	NENW	PENNACO ENERGY, INC.	WOLFF #3-25-49-72	GST	CBM	30	570
P113133W	11/20/1998	49	72	25	SENW	PENNACO ENERGY, INC.	WOLFF #6-25-49-72	GST	CBM	30	570
P113134W	11/20/1998	49	72	25	NWNE	PENNACO ENERGY, INC.	WOLFF #2-25-49-72	GST	CBM	30	527
P113135W	11/20/1998	49	72	25	SWNE	PENNACO ENERGY, INC.	WOLFF #7-25-49-72	GST	CBM	30	544
P113136W	11/20/1998	49	72	25	NENE	PENNACO ENERGY, INC.	WOLFF #1-25-49-72	GST	CBM	30	533
P113137W	11/20/1998	49	72	25	SENE	PENNACO ENERGY, INC.	WOLFF #8-25-49-72	GST	CBM	30	501
P131211W	11/30/2000	49	72	25	SWSE	PENNACO ENERGY, INC.	MILL IRON FEDERAL 15-25-49-72A	GST	CBM	60	667
P114561W	3/15/1999	49	72	25	NWSW	LANCE OIL & GAS COMPANY, INC.	MILL IRON FEDERAL 12-25-4972	GST	CBM, STO	45	677
P114439W	3/8/1999	49	72	25	NESW	LANCE OIL AND GAS COMPANY, INC.	MILL IRON FEDERAL 11-25-4972	GST	CBM, STO	45	670
P115401W	4/23/1999	49	72	25	SESW	PENNACO ENERGY, INC.	MILL IRON FEDERAL 14-25-49-72	GST	CBM, STO	30	713
P118894W	9/2/1999	49	72	25	NESE	PENNACO ENERGY, INC.	MILL IRON FED #09-25-49-72	GST	CBM, STO	50	577
P114558W	3/15/1999	49	72	25	NWSE	PENNACO ENERGY, INC.	MILL IRON FEDERAL 33-25-4972	UNA	CBM, STO	30	543
39/7/49W	5/19/2006	49	72	25	SWSE	JAMES L. & DEBORAH M. WILLIAMSON	WILIAMSON 82716	UNA	DOM		
P170282W	8/24/2005	49	72	25	SESE	THOMAS & BARB LAVALLE	TBJ-CT	GSI	DOM, STO		
P10598P	12/31/1940	49	72	25	NWSE	PLACIDE ROBBINS	WEST GAP #1	GST	STO	17	180
P131229W	11/30/2000	49	72	35	SWNW	PENNACO ENERGY, INC.	MCCREERY FEDERAL 5-35-49-72A	GST	CBM	60	674
P131231W	11/30/2000	49	72	35	NWNW	PENNACO ENERGY, INC.	MCCREERY FEDERAL 5-35-49-72A	GST	CBM	60	742
P131260W	11/30/2000	49	72	35	NENE	PENNACO ENERGY, INC.	WOLFF FEDERAL #1-35-49-72A	GST	CBM	60	725
P113908W	2/1/1999	49	72	35	NENE	PENNACO ENERGY, INC.	WOLF FEDERAL 41-35-4972	GSE	CBM, STO		
P113909W	2/1/1999	49	72	35	NESE	PENNACO ENERGY, INC.	WOLF STATE 9-35-49-72	GST	CBM, STO	45	600
P116509W	6/21/1999	49	72	35	SENE	PENNACO ENERGY, INC.	WOLFF STATE #8-35-49-72	GST	CBM, STO	50	633
P118224W	8/25/1999	49	72	35	NWNE	PENNACO ENERGY, INC.	STATE WOLFF #2-35-49-72	GST	CBM, STO	30	674
P122093W	1/18/2000	49	72	35	SWSW	ROBERT P. & MARIE R. MCCREERY** COLEMAN OIL & GAS, INC.	MCCREERY #14-35	GST	CBM, STO	15	640
P128224W	8/11/2000	49	72	35	NENW	ROBERT P/MARIE R MCCREERY** COLEMAN OIL & GAS, INC.	MCCREERY #21-35	GST	CBM, STO	0	677
P128225W	8/11/2000	49	72	35	SENW	ROBERT P/MARIE R MCCREERY** COLEMAN OIL & GAS, INC.	MCCREERY #22-35	GST	CBM STO	0	670
P122092W	1/18/2000	49	72	35	NWSE	WY STATE BOARD OF LAND COMMISSIONERS** COLEMAN OIL & GAS, INC.	WOLFF STATE #33-35	GST	CBM, STO	15	605
P16048P	12/31/1951	49	72	35	SESW	ROBERT P. MCCREERY	HOUSE #3	GST	DOM	4	165
P16047P	12/31/1919	49	72	35	SESW	ROBERT P. MCCREERY	STOCK #2	GST	STO	5	110
P16051P	11/30/1955	49	72	35	NWSW	ROBERT P. MCCREERY	LOHMAN #6	GST	STO	5	170
P115758W	5/6/1999	49	72	36	NWNE	COLEMAN OIL & GAS, INC.** WY STATE BOARD OF LAND COMMISSIONERS	BARTOW STATE 31-36	GST	CBM	18	631

Table S3-4. Groundwater Rights for Caballo West LBA Tract (Continued).

Permit No.	Priority	TNS	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
P115759W	5/6/1999	49	72	36	SWNE	COLEMAN OIL & GAS, INC.** WY STATE BOARD OF LAND COMMISSIONERS	BARTOW STATE 32-36	GST	CBM	15	587
P115760W	5/6/1999	49	72	36	NENE	COLEMAN OIL & GAS, INC.** WY STATE BOARD OF LAND COMMISSIONERS	BARTOW STATE 41-36	GST	CBM	18	545
P115761W	5/6/1999	49	72	36	SENE	COLEMAN OIL & GAS, INC.** WY STATE BOARD OF LAND COMMISSIONERS	BARTOW STATE 42-36	GST	CBM	19	593
P121516W	12/20/1999	49	72	36	SESW	COLEMAN OIL & GAS, INC.** WY STATE BOARD OF LAND COMMISSIONERS	BARLOW STATE 24-36	GST	CBM, STO	6	563
P121517W	12/20/1999	49	72	36	NWSE	COLEMAN OIL & GAS, INC.** WY STATE BOARD OF LAND COMMISSIONERS	BARLOW STATE 33-36	GST	CBM, STO	11	544
P121518W	12/20/1999	49	72	36	SESE	COLEMAN OIL & GAS, INC.** WY STATE BOARD OF LAND COMMISSIONERS	BARLOW STATE 44-36	GST	CBM, STO	12	498
P118225W	8/25/1999	49	72	36	NWNW	PENNACO ENERGY, INC.	STATE WY #4-36-49-72	GST	CBM, STO	30	670
P116510W	6/21/1999	49	72	36	SENW	PENNACO ENERGY, INC.** WY STATE BOARD OF LAND COMMISSIONERS	STATE WY #6-36-49-72	GST	CBM, STO	40	588
P109790W	4/22/1998	49	72	36	SWSE	WY STATE BOARD OF LAND COMMISSIONERS** COLEMAN OIL & GAS, INC.	STATE 34-36	GST	CBM, STO	24	518
P115425W	4/23/1999	49	72	36	SWSW	WY STATE BOARD OF LAND COMMISSIONERS** COLEMAN OIL & GAS, INC.	BARLOW STATE 14-36-4972	GST	CBM, STO	11	622
P115428W	4/23/1999	49	72	36	NESE	WY STATE BOARD OF LAND COMMISSIONERS** COLEMAN OIL & GAS, INC.	BARLOW STATE 43-36-4972	GST	CBM, STO	4	542
P115426W	4/23/1999	49	72	36	NENW	WY STATE BOARD OF LAND COMMISSIONERS** PENNACO ENERGY, INC.	STATE WY 3-36-49-72	GST	CBM, STO	30	661
P122266W	1/10/2000	49	72	36	NWSW	WY STATE BOARD OF LAND COMMISSIONERS** PENNACO ENERGY, INC.	STATE WY 12-36-49-72	GST	CBM, STO	50	626
P115424W	4/23/1999	49	72	36	SWNW	WY STATE BOARD OF LAND COMMISSIONERS** PENNACO ENERGY, INC.	STATE WY 5-36-49-72	UNA	CBM, STO	45	620
P115427W	4/23/1999	49	72	36	NESW	WY STATE BOARD OF LAND COMMISSIONERS** PENNACO ENERGY, INC.	STATE WY 11-36-49-72	UNA	CBM, STO	30	518
36/9/250W	4/27/2004	49	72	36	SWSW	CITY OF GILLETTE	SF-1 WELL	UNA	MUN, MIS		

**Notes for Non Mining-Related Groundwater Rights  
Within Three Miles of the Caballo West LBA Tract**

**Search Conducted June 25, 2007**

**Groundwater Right Search Area:**

Township	Range	Sections
47N	71W	2-6
48N	71W	2-36
48N	72W	1-3, 10-15, 22-26, 35-36
49N	71W	28-35
49N	72W	25, 35-36

Water rights were searched to the nearest quarter-quarter of each section listed above. Any part of a quarter-quarter that lies within three miles of the LBA tract is included.

**Permit number suffixes are denoted as follows:**

"A" Adjudicated (finalized) rights; unless the right is a territorial appropriation, there will be a match in the reference column from one of the following permit types for the unadjudicated portion:

"P" Stock and domestic use wells completed prior to May 24, 1969 and registered with the State Engineer's Office prior to December 31, 1972

"W" Permits are for wells with a priority date for the date of filing with the State Engineer

**Status Codes**

APP	Application
ADJ	Adjudicated
GSE	Good standing, permitted time limits have been extended
GSI	Good standing incomplete; required notices not received; not yet expired
GSM	Good standing but map is still required
GST	Good standing
GSX	Good standing, extension requested
UNA	Unadjudicated (domestic, stock, monitor, CBNG, and some miscellaneous wells are not adjudicated)

Approximately 1,193 separate water rights with a status code of ABA (Abandoned), A&C (Abandoned and Cancelled), CAN (Cancelled), or EXP (Expired) have been eliminated from the listing provided above, as none of these well codes represent a valid current right.

**Use Codes**

CBM	Coal Bed Methane
DEW	Dewatering
DOM	Domestic
DRI	Drilling
IND	Industrial
IRR	Irrigation
MIS	Miscellaneous
MON	Monitoring
RES	Reservoir Supply
STO	Stock
TEM	Temporary Use

Lands described in these copies are the water rights of record in the SEO database and may or may not reflect the actual situation on the ground. Failure to exercise a water right for five years, when water is available, may constitute grounds for forfeiture.

Table S3-4. Surface Water Rights for Caballo West LBA Tract.

Permit #	Priority	TNS	RNG	SEC	QQ	Applicant	Facility Name	Source	Uses
C23/077A	5/29/1905	48	71	7	SENE	M. Elizabeth Spaeth	Walbridge Reservoir	Bonepile Creek	IRR
C23/078A	5/29/1905	48	71	7	SENE	M. Elizabeth Spaeth	Walbridge Ditch	Bonepile Creek	IRR
C29/466A	10/12/1905	48	71	7	NWNE	Miss M. E. Spaeth	Walbridge Supply Ditch	Tisdale Creek	RES
CR2/332A	12/12/1956	48	71	7	SWNE	J.M. Robbins	Steer Pasture Stock Reservoir	South Fork Tisdale Creek	STO
P1798S	12/12/1956	48	71	7	SWNE	J.M. Robbins	Steer Pasture Stock Reservoir	South Fork Tisdale Creek	STO
P668R	5/29/1905	48	71	7	SENE	Leonard K. Walbridge	Walbridge Reservoir	Bonepile Creek	IRR
P6694D	5/29/1905	48	71	7	SENE	Leonard K. Walbridge	Walbridge Ditch	Bonepile Creek	RES, IRR
P6904D	10/12/1905	48	71	7	NWNE	Leonard K. Walbridge	Walbridge Supply Ditch	Bonepile Creek	RES, IRR, DOM
P11683R	8/16/2002	48	71	8	SESW	Caballo Coal Company** RAG Wyoming Land Company**Paul D. Rourke**Charles T. Rourke	T7 Reservoir	Tisdale Creek	IND, TEM

**Notes for Non Mining-Related Surface Water Rights  
Within Three Miles of the Caballo West LBA Tract**

**Search Conducted July 2, 2007**

**Surface Water Right Search Area:**

Township	Range	Sections
48N	71W	5-9, 16-21, 28, 29

Water rights were searched to the nearest quarter-quarter of each section listed above. Any part of a quarter-quarter that lies within three miles of the LBA tract is included.

**Record suffixes are denoted as follows:**

"A" Adjudicated (finalized) rights; unless the right is a territorial appropriation, there will be a match in the reference column from one of the following permit types for the unadjudicated portion

"D" Ditch or pipeline permit

"E" Enlargement of a ditch or pipeline permit

"R" Reservoir permit

"S" Stock reservoir permit

**Status Codes**

ABA Abandoned

A&C Abandoned and Cancelled

ADJ Adjudicated

AME Amended (moved)

CAN Cancelled

DSC Description

ELI Eliminated

EXP Expired

E&C Eliminated and Cancelled

GST Good standing

OTH Other

PU Point of use non irrigation (not actual status)

PUD Point of diversion (not actual status)

PUO Point of reservoir outlet (not actual status)

REJ Rejected

TEM Temporary

TRA Transferred

UNA Unadjudicated

**Use Codes**

DOM Domestic

DSP Domestic supply

FIR Fire protection

FIS Fish propagation

FLO Flood control

IRR Irrigation

POW Power development

REC Recreation

RES Reservoir supply

STO Stock

WET Wetlands

WIL Wildlife

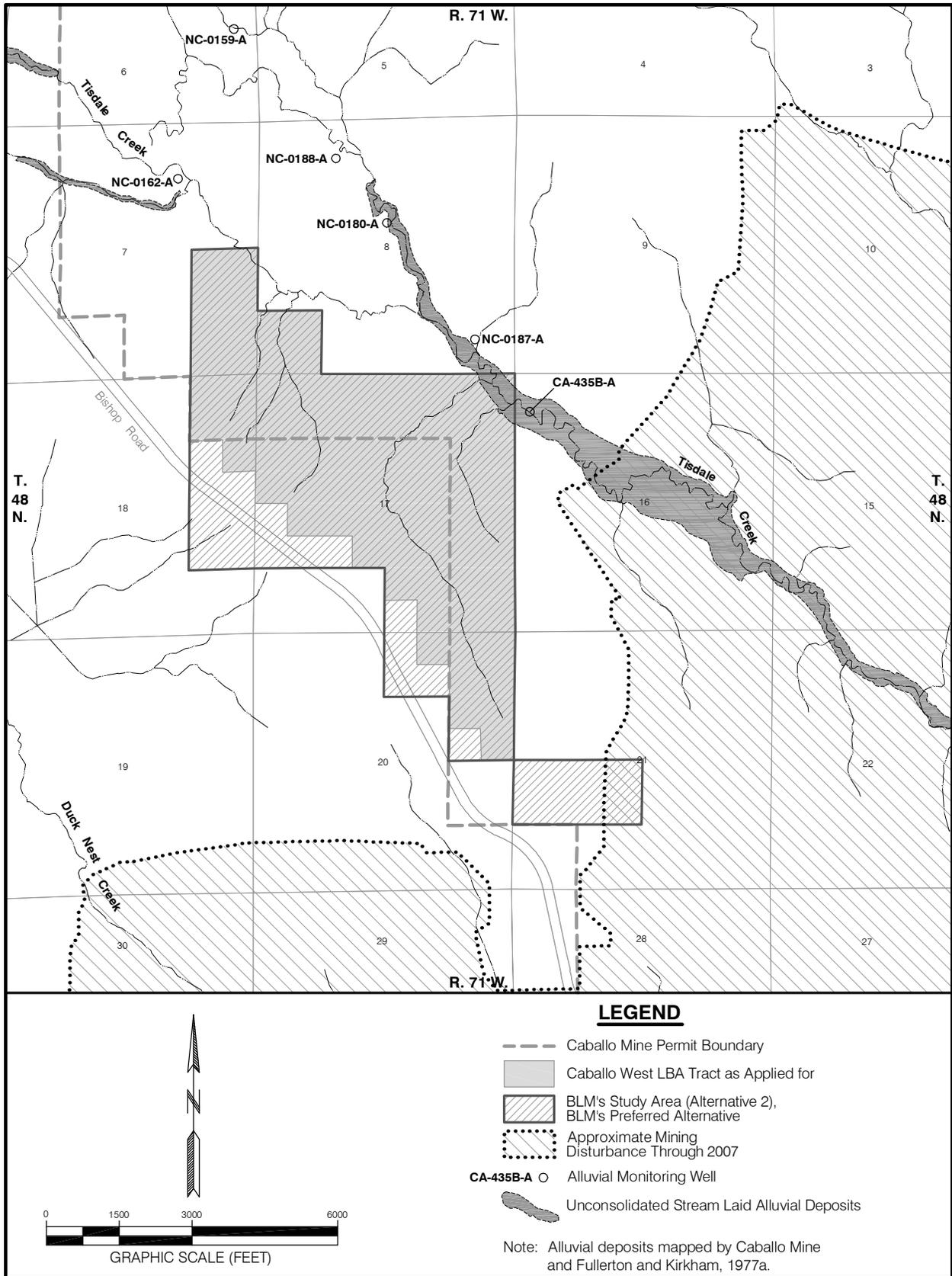


Figure S3-5. Stream Laid Alluvial Deposits Within and Adjacent to the Caballo West LBA Tract.

Caballo West LBA Tract, have been investigated for the presence of AVFs by the Caballo Mine. Appendix D-11 in Caballo Mine's approved mine permit (CCC 2003) contains the AVF assessment for lands included within the current mine permit boundary. WDEQ/LQD determined that Tisdale Creek does not meet the regulatory definition of an AVF; however, a short reach of Tisdale Creek located at its confluence with Gold Mine Draw was determined to be an AVF (CCC 2003 and WDEQ/LQD 2004). That AVF area, which was determined to be insignificant to agriculture, is approximately 4 miles downstream and to the southeast of the Caballo West general analysis area. The entire reach of Tisdale Creek downstream of the LBA tract has been affected by previous and current mining operations at the Caballo Mine. In addition, within Section 13, T.48N., R.71W., Gold Mine Draw was declared by WDEQ/LQD to be an AVF that is significant to agriculture and therefore will not be disturbed by mining activities. A tributary of Tisdale Creek, known locally as North Tisdale Creek, is located east and north of the Caballo West LBA Tract, and it too has received a negative AVF declaration from WDEQ/LQD.

An AVF predetermination document has been submitted to the WDEQ/LQD by the Caballo Mine for lands within a proposed permit amendment area, which includes that portion of the Caballo West general analysis area that is outside of the existing permit boundary. There are no streams that meet the definition of an AVF within one-half mile of the proposed permit amendment area, because the streams are incised and contain few stream laid deposits. In addition, there are no present or historical records of agricultural use, other than undeveloped range land, of the stream valleys and associated stream laid deposits within the proposed permit amendment area. Based on previous non-AVF declarations made on Tisdale Creek within and adjacent to the Caballo West LBA Tract, it is unlikely that the WDEQ/LQD would declare an AVF is present on the LBA tract that lies outside of Caballo Mine's existing permit boundary where the drainages are smaller and AVF characteristics are negligible.

### **S3-7 WETLANDS**

Tisdale Creek, a southeast-flowing ephemeral tributary of Caballo Creek, drains the northern and eastern portions of the Caballo West LBA Tract, and a large playa drains the southern and western portions of the tract. Wetland inventories have been completed and confirmed by the U.S. Army Corps of Engineers on those portions of Caballo Creek and its tributaries that lie within the adjacent Caballo Mine's existing permit area. A large portion of the Caballo West LBA Tract is within Caballo Mine's permit area (Figure S3-6); therefore, a wetland inventory on Tisdale Creek that lies within the BLM study area for the LBA tract has been conducted and is included in the mine's approved mine permit.

Figure S3-6 depicts the wetlands analysis area for the Caballo West LBA Tract, which includes the BLM study area for the LBA tract plus a ¼-mile disturbance buffer around the study area sufficient to mine and reclaim the tract as a part of the Caballo Mine operation. Caballo Mine conducted a

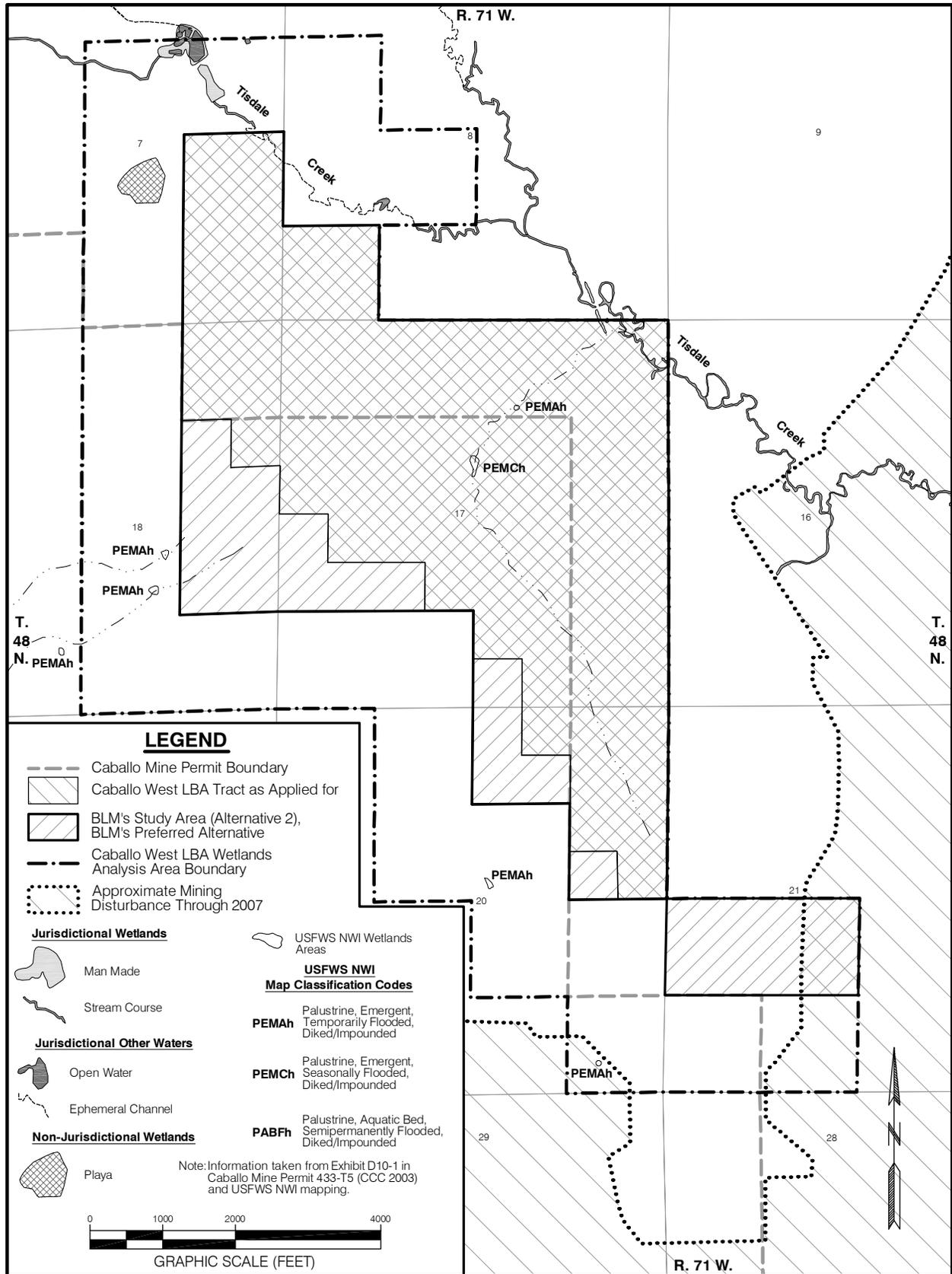


Figure S3-6. Wetlands and Other Waters Within the Caballo West LBA Wetlands Analysis Area.

preliminary wetlands inventory in 2007, based on USFWS NWI mapping and vegetation mapping in the field, on the portions of the wetlands analysis area that are outside of the current Caballo Mine permit area. A formal wetland delineation survey would be conducted and submitted to the COE for verification as part of the mining and reclamation permit process, if the tract is leased and proposed for mining.

Most of the wetlands within the wetlands analysis area are associated with the watercourses of Tisdale Creek and an internally drained playa. Within the portion of the wetlands analysis area that is inside the adjacent existing Caballo Mine permit area, a total of 5.96 acres of jurisdictional wetlands are located along Tisdale Creek. NWI mapping shows small areas (approximately 0.55 acre total) of probable wetlands located in stock ponds or pools along a tributary draw in Section 17, T.48N., R.71W., which are outside of Caballo Mine's permit area, and therefore have not been previously confirmed by the COE. Within the wetlands analysis area is approximately 3,964 linear feet of ephemeral stream channel that is jurisdictional other Waters of the U.S.

Therefore, based on preliminary wetlands mapping completed in 2007 and earlier wetland delineation confirmed by the COE, a total of approximately 15.0 acres of Waters of the U.S., including a total of 8.63 acres of jurisdictional Waters of the U.S., occur within the entire wetlands analysis area. Approximately 6.51 of those acres are jurisdictional wetlands that occur along the water courses of Tisdale Creek. The 2.12 acres of jurisdictional other Waters of the U.S. that did not qualify as wetlands consist primarily of open water that is held within the in-channel impoundments along Tisdale Creek. The internally drained playa located near the center of Section 7, T.48N., R.71W., adjacent to the LBA tract as applied for and within the wetlands analysis area, was delineated in 1996 as a jurisdictional wetland, but was later declared non-jurisdictional by the COE following a decision of the U.S. Supreme Court in *Solid Waste Agency of Northern Cook County v U.S. Army Corps of Engineers* (No. 99-1178, January 9, 2001). Approximately 6.37 acres of non-jurisdictional wetlands are included in this playa. These areas that occur within and adjacent to the Caballo Wet LBA Tract are shown on Figure S3-6.

### **S3-8 SOILS**

The Caballo West LBA resource report area (1,390.4 total acres) includes the BLM study area (the LBA tract as applied for under the Proposed Action and some of the additional area evaluated under Alternative 2) plus an additional area (assumed to be a ¼-mile buffer) that would be disturbed in order to recover the coal in the resource report area. The resource report area has been subjected to three separate Orders 1-2 or Order 3 soil surveys in the recent past. The northern portion of the LBA resource report area is included in the original baseline soil survey of the Caballo Mine and is part of the approved WDEQ/LQD mine permit. Another portion of the LBA resource report area is included in the North Caballo Permit Expansion Area soil survey (Mariah

Associates Inc., September 1994). The balance of the LBA resource report area is included in the ongoing, Order 1-2 Caballo West soil survey (BKS 2007b). Preliminary results of this survey have been added to previously completed surveys for overall project evaluation. The LBA resource report area has also been covered by the recent NRCS Order 3 soil survey of southern Campbell County.

All existing mine soil surveys were 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. Soils within the analysis area 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.

The soil depths and types on the Caballo West LBA resource report area are similar to soils currently being salvaged and utilized for reclamation at the adjacent Caballo Mine and other mines in the eastern PRB. The following is a list of the soil types and map units that were delineated in the Caballo West LBA resource report area. The major soils series encountered within the survey area were grouped according to the primary soil formation processes and are listed as follows (numbers in parentheses are the soil map units):

***Soils developing predominantly in thin residuum from sandstone or shale on upland ridges and hillsides***

- Taluce (Tassel) loamy fine sand, 3 to 30 percent slopes (R-40 and 40)
- Shingle-Thedalund complex, 6 to 30 percent slopes (35)
- Ustic Torriorthents rolling (47)
- Shingle-Samday complex, 1 to 9 percent slopes (W-65)

***Soils developing predominantly in residuum and colluvium on rolling uplands***

- Pugsley sandy loam, 3 to 6 percent slopes (28)
- Bowbac fine sandy loam, 0 to 15 percent slopes (R-6 and 6)
- Terro-Turnercrest complex, 3 to 15 percent slopes (R-54)
- Tullock loamy sand, 10 to 30 percent slopes (41)
- Parmleed (Briggsdale) fine sandy loam, 3 to 6 percent slopes (11)
- Renohill-Parmleed (Briggsdale) complex, 0 to 15 percent slopes (R-53)
- Parmleed (Briggsdale)-Bowbac complex, 0 to 15 percent slopes (R-7 and 7)
- Ucross loam, 0 to 6 percent slopes (W-67)

**Soils developing predominantly in residuum, colluvium or alluvial fan deposits from mixed sources on gently sloping uplands**

- Bidman fine sandy loam, 0 to 6 percent slopes (5)
- Forkwood-Hiland (Olney) complex, 0 to 15 percent slopes (R-52)
- Ulm-Bidman complex, 0 to 15 percent slopes (R-45 and 45)
- Ulm loam, 0 to 6 percent slopes (46)

**Soils developing predominantly in coarse-textured alluvium and sandy eolian deposits on rolling uplands**

- Vonalee fine sandy loam, 0 to 15 percent slopes (R-48)
- Vona fine sandy loam, 0 to 6 percent slopes (48)
- Decolney fine sandy loam, 0 to 15 percent slopes (R-15)
- Decolney-Hiland (Olney) association, gently sloping (16)
- Maysdorf-Rauzi association, 0 to 6 percent slopes (24)
- Rauzi fine sandy loam, 0 to 6 percent slopes (30)
- Olney fine sandy loam, 0 to 6 percent slopes (26)
- Embry sandy loam, 6 to 15 percent slopes (54)

**Drainage soils developing in mixed stream laid alluvium on terraces and channels and in fine-textured playa deposits in depressions and closed basins**

- Bahl, saline, 0 to 3 percent slopes (R-57)
- Bidman, saline substratum-Bahl, 0 to 3 percent slopes (R-56)
- Aeric Haplaquents, 0 to 6 percent slopes (3)
- Aeric Haplaqupts saline, 0 to 6 percent slopes (4)

Table S3-5 provides the extent of six depth classes of suitable topsoil within the soils analysis area. Figure S3-7 depicts the soil map units delineated within the Caballo West soils analysis area.

Table S3-5. Acres of Topsoil Available for Reclamation Within the Caballo West LBA Resource Report Area.

<b>Thickness of Suitable Topsoil (inches)</b>	<b>Acres</b>	<b>Percent</b>
0	0	0
0 – 12	263.40	18.95
12 – 30	293.50	21.10
30 – 48	0	0
48 – 60	833.50	59.95
<b>Total</b>	<b>1,390.4</b>	<b>100.0</b>

The Caballo West LBA resource report area baseline soils analysis indicates that the amount of suitable topsoil that would be available for redistribution on



all disturbed acres within the analysis area during reclamation would have an average depth of 3.6 ft. Areas of unsuitable soils include sites with high alkalinity, salinity, sand or clay content. The tract is expected to have adequate quantity and quality of soil for reclamation.

### **S3-9 VEGETATION**

The resource report area (1,390.4 total acres) includes the BLM study area (the LBA tract as applied for under the Proposed Action and some of the additional area evaluated under Alternative 2) plus an additional area that would be disturbed in order to recover the coal in the LBA tract as applied for. The Caballo West LBA Tract resource report area is partially located within and west of the current Caballo Mine permit boundary. Portions of the area were previously mapped and sampled in accordance with the current WDEQ/LQD mine permitting requirements. The remaining portion of the vegetation assessment was completed by BKS Environmental Associates, Inc. of Gillette, Wyoming in 2007. The vegetation communities in this area were appraised and mapped to provide a preliminary assessment.

A total of 10 vegetation types have been preliminarily identified and mapped within the Caballo West LBA resource report area. Developed, disturbed and rough breaks areas were also mapped. Table S3-6 presents the acreage and percent of the analysis area encompassed by each vegetation type. Figure S3-8 depicts the vegetation communities delineated within the Caballo West vegetation analysis area. The vegetation types include Big Sagebrush, Cropland, Silver Sagebrush, Saline Grassland, Upland Grassland, Hayland, Grainland, Pastureland, Lowland Grassland, and Meadow. These vegetation types are described as follows:

Table S3-6. Vegetation Types Identified and Mapped Within the Caballo West LBA Tract Resource Report Area.

<b>Vegetation Type</b>	<b>Acres</b>	<b>Percent of Area</b>
Big Sagebrush	302.6	21.77%
Cropland	296.8	21.35%
Silver Sagebrush	276.8	19.91%
Saline Grassland	104.7	7.53%
Upland Grassland	98.5	7.09%
Hayland	83.9	6.04%
Grainland	83.9	6.04%
Disturbed	65.7	4.72%
Pastureland	28.0	2.01%
Lowland Grassland	21.6	1.56%
Rough Breaks	13.9	1.00%
Meadow	5.4	0.39%
Developed	4.6	0.33%
Water	3.8	0.27%
	<b>1,390.4</b>	<b>100.00%</b>

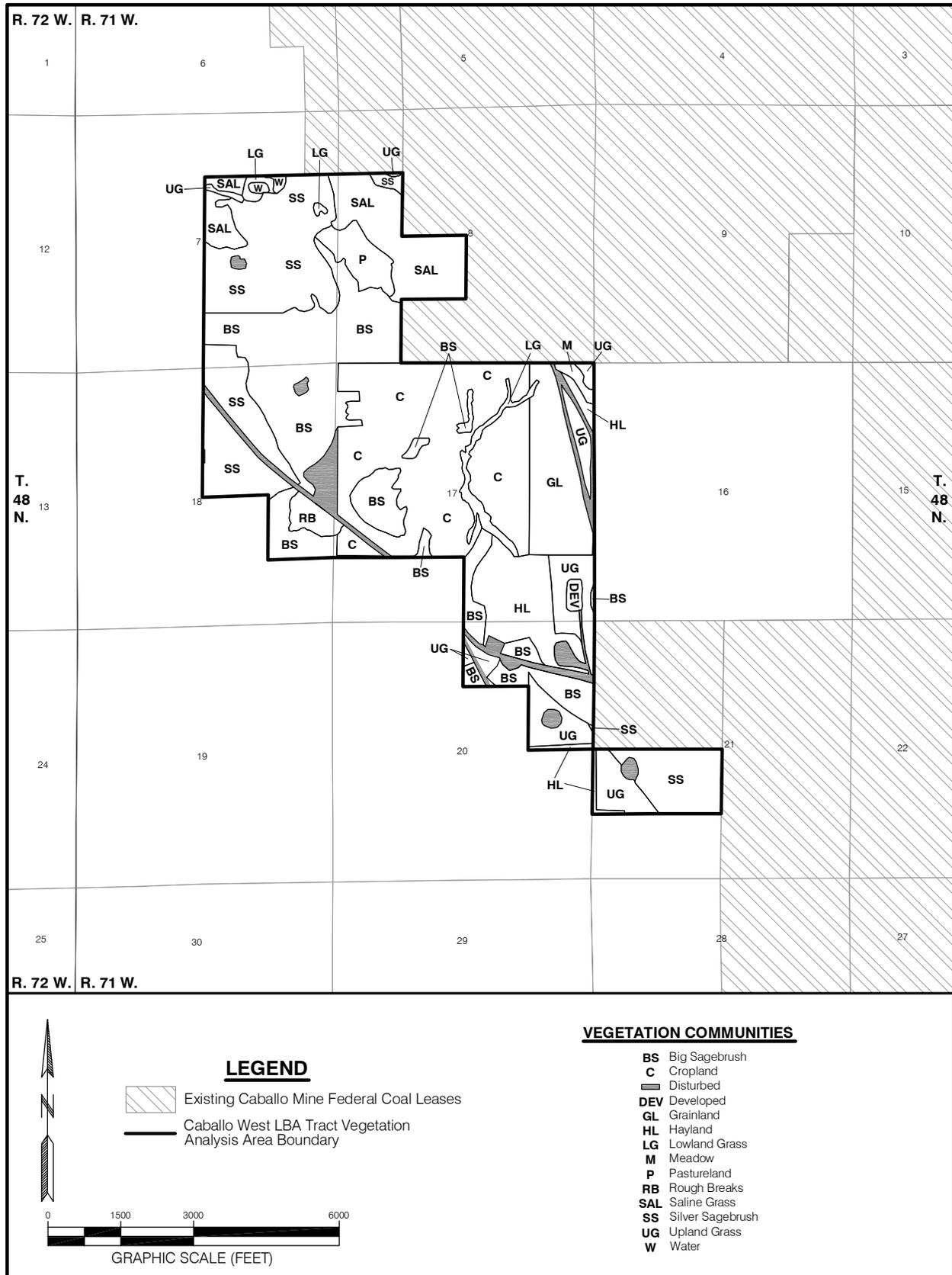


Figure S3-8. Vegetation Communities Within the Caballo West LBA Tract Analysis Area.

The predominant vegetation types, in terms of total acres of occurrence in the resource report area are the Big Sagebrush (21.77 percent) and Cropland (21.35 percent). The Big Sagebrush vegetation type is characterized by Wyoming big sagebrush and upland grasses of the region. The Cropland vegetation type is dominated by crested wheatgrass and alfalfa medic. Both the Meadow and the Lowland Grassland are stream-side vegetation types. The Meadow (0.39 percent) is distinguished from the Lowland Grassland areas (1.62 percent) by the lack of perennial forbs found in the Meadow area.

Due to heavy rain in the spring and early summer 2007 there was an abundance of vegetation in the Caballo West LBA resource report area that has not been seen in recent years.

The **Big Sagebrush** vegetation type is characterized by the moderate to heavy presence of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) in addition to silver sagebrush. Upland grasses of the region include western wheatgrass (*Elymus smithii*), prairie junegrass, bulbous bluegrass (*Poa bulbosa*), and Sandberg bluegrass.

The introduced annual grasses cheatgrass and Japanese brome were minor contributors to the vegetation cover in the area.

Plains prickly-pear cactus is frequently a component of the vegetation cover as is ground dwelling lichen.

Perennial forbs are a common but minor cover component. Present are the textile onion, grassy deathcamas, American vetch, Hood's phlox, pale agoseris, field cerastium, large Indian breadroot, white penstemon, common dandelion (*Taraxacum officinale*), and scarlet globemallow (*Sphaeralcea coccinea*).

The biennial forb, yellow salsify (*Tragopogon dubius*), is present in the Big Sagebrush but contributes little vegetation cover.

Annual forbs provide a minor contribution to vegetation cover. Annual forbs present include desert alyssum, littleseed falseflax, threadleaf phacelia, and pinnate tansymustard.

The native sub-shrubs fringed sagewort (*Artemisia frigida*) and broom snakeweed (*Gutierrezia sarothrae*) are usually present in small amounts.

The Big Sagebrush community is found on moderately sloping hillsides with medium textured soils and generally low salinity.

The **Cropland** vegetation type is located in various, large parcels throughout the Caballo West resource report area. With the passage of time after these seedings, native plants, including sagebrush and cactus as well as most of the native grasses, return slowly and the area begins to resemble native areas again. The areas included in this mapping unit within this analysis area are

those that are still predominately crested wheatgrass and alfalfa medic. However, many annual species including cheatgrass, Japanese brome, desert alyssum, pinnate tansymustard and common blue mustard are becoming major contributors to vegetation cover.

The **Silver Sagebrush** vegetation type is characterized by the moderate to heavy presence of silver sagebrush (*Artemisia cana*) in addition to the upland grasses of the region, in particular prairie junegrass (*Koeleria macrantha*) and Sandberg bluegrass (*Poa secunda*).

Visibly abundant is the introduced annual grasses cheatgrass (aka downy brome, *Bromus tectorum*) and Japanese brome (*Bromus japonicus*).

Plains prickly-pear cactus (*Opuntia polyacantha*) is frequently a large component of the vegetation cover as are ground dwelling lichen and moss. Soapweed yucca (*Yucca glauca*) is also a minor contributor to vegetation cover.

Due to heavy spring rain in 2007 forbs are a major cover component of this community. Present perennial forbs include the textile onion (*Allium textile*), grassy deathcamas (*Zigadenus venenosus*), American vetch (*Vicia americana*), pale agoseris (*Agoseris glauca*), field cerastium (*Cerastium arvense*), buttecandle (*Cryptantha celosioides*), western fleabane (*Erigeron bellidiasturm*), plains wallflower (*Erysimum asperum*), scarlet gaura (*Gaura coccinea*), liatris (*Liatris* species), large Indian breadroot (*Pediomelum esculentum*), Hood's phlox (*Phlox hoodii*), white penstemon (*Penstemon albidus*), groundsel (*Senecio* species), golden pea (*Thermopsis rhombifolia*), and palmleaf Indian breadroot (*Pediomelum digitatum*).

With the exception of wet years, annual forbs typically provide a minor contribution to vegetation cover in this community. Annual forbs present include desert alyssum (*Alyssum desertorum*), littleseed falseflax (*Camelina microcarpa*), tiny trumpet (*Collomia linearis*), field pennycress (*Thlaspi arvense*), threadleaf phacelia (*Phacelia linearis*), and pinnate tansymustard (*Descurainia pinnata*).

The native sub-shrub fringed sagewort (*Artemisia frigida*) is usually present in small amounts.

The Silver Sagebrush community is found near the toe slopes of gently sloping hillsides and on medium to coarse textured soils with generally low salinity.

The **Saline Grassland** vegetation type is confined to locations where the soil parent material is apparently derived from a stratum with higher inherent salt content. As a consequence, the grassland vegetation, otherwise resembling Big Sagebrush (with generally sparse shrub presence) is possessed of a varying co-dominance between inland saltgrass (*Distichlis stricta*), Kentucky bluegrass and thickspike wheatgrass (*Elymus lanceolatus*). Other perennial grasses in the

area are crested wheatgrass, prairie junegrass, needle-and-thread (*Hesperostipa comata*), and Sandberg bluegrass.

Cheatgrass and Japanese brome were common in the area along with the annual grass sixweeks fescue (*Vulpia octoflora*).

Plains prickly-pear cactus is common in the area along with purple ballcactus (*Coryphantha vivipara*). Mushrooms and ground dwelling lichen were also found in the area.

Perennial forbs contribute to a portion of ground cover in the Saline Grassland. Western yarrow is common along with textile onion, two-grooved milkvetch, western fleabane, scarlet gaura, bitter root (*Lewisia rediviva*), alfalfa medic, palmleaf Indian breadroot, Hood's phlox, longleaf phlox (*Phlox longifolia*), large Indian breadroot, common dandelion, and American vetch.

The biennial forbs yellow sweetclover (*Melilotus officinalis*) and yellow salsify contribute to vegetation cover in the Saline Grassland.

Annual forbs contribute significantly to vegetation cover. Western rockjasmine was found in the Saline Grassland along with desert alyssum, lambsquarter goosefoot, littleseed falseflax, tumbling hedgemustard, field pennycress, shield cress, Pursh's plantain, fetid marigold (*Dyssodia papposa*), and flixweed tansymustard.

The native sub-shrubs Gardner's saltbush, fringed sagewort, and broom snakeweed are found in areas. Few individuals of Wyoming big sagebrush and silver sagebrush are also present on some sites.

The Saline grassland community is found in upland areas, the soils are fine to coarse textured with low to high areas of salinity.

The **Upland Grassland** vegetation type is characterized by the strong dominance of cheatgrass and upland perennial grass species, especially western wheatgrass and Sandberg bluegrass. Minor species of grass often include the introduced perennial crested wheatgrass (*Agropyron cristatum*).

Plains prickly-pear cactus is a minor component of the vegetation cover as is ground dwelling lichen.

Forbs contribute a major portion of ground cover in the Upland Grassland. Besides American vetch which is frequent in Upland Grassland, more commonly encountered perennial forbs include Hood's phlox, white penstemon, silverleaf scurfpea (*Psoralea argophylla*), Tufted evening primrose (*Oenothera caespitosa*), western wallflower (*Erysimum asperum*), scarlet globemallow, textile onion, sand lily (*Leucocrinum montanum*), and puccoon (*Lithospermum incisum*).

Annual forbs are also present and provide a major contribution to vegetation cover. Desert alyssum is a major contributor along with beggar's tick (*Lappula redowskii*), tumbling hedgemustard (*Sisymbrium altissimum*), threadleaf phacelia, and pinnate tansymustard.

The native sub-shrub fringed sagewort is commonly present. Few individuals of silver sagebrush and Wyoming big sagebrush are also present on some sites.

The Upland grassland community is found on gently sloping hillsides with medium to coarse textured soils and generally low salinity.

The **Hayland** vegetation type that is located in various, relatively small parcels throughout the Caballo West resource report area is similar to the Cropland and Grainland vegetation types dominated by crested wheatgrass and other perennial grass species including western wheatgrass and thickspike wheatgrass. As with the other types, with the passage of time after these seedings, native plants return slowly and the area begins to resemble native areas again. This area seems to be less invaded by annual species than the former two pastures.

The **Grainland** vegetation type that is located in various, relatively small parcels throughout the Caballo West resource report area is similar to the Cropland type. The main difference between the two pastures is the dominance of cheatgrass over other species in the Grainland type. As with the Cropland type, with the passage of time after these seedings, native plants return slowly and the area begins to resemble native areas again. The areas included in this mapping unit within this analysis area are those that are still predominately crested wheatgrass and alfalfa medic. Enough time has passed that many opportunistic annual species including cheatgrass, desert alyssum, pinnate tansymustard and common blue mustard are becoming major contributors to vegetation cover, as well.

With the abundance of CBNG networks in the Caballo West resource report area, **Disturbed** areas are present that overlay much of the Sagebrush Grassland and Upland Grassland vegetation types. Disturbance consists primarily of roads and well pads that have been graded or are stabilized with scoria gravel. There are also small tank batteries and numerous miles of pipeline disturbance that to varying degrees are recovering vegetation cover.

The **Pastureland** vegetation type is located in a small parcel within the Caballo West resource report area. Pastureland within the area is dominated by crested wheatgrass and alfalfa medic. The disturbance of soil in this area, due to the historical use of the land for livestock, is greater than that of other native areas, creating an environment that many opportunistic species favor. Enough time has passed that many of these opportunistic annual species including cheatgrass, desert alyssum, flixweed tansymustard and tumbling hedgemustard are becoming major contributors to vegetation cover, as well.

Plains prickly-pear cactus is sporadically found in the area as well as mushroom species.

Perennial forbs contribute to a portion of ground cover in the Pastureland. Textile onion is found in the area along with western fleabane, scarlet gaura, sand lily, common dandelion, golden pea, and American vetch.

Annual forbs contribute significantly to vegetation cover. Western rockjasmine was found in the Pastureland along with pitseed goosefoot (*Chenopodium berlandieri*), Aunt Lucy (*Ellisia nyctelea*), littleseed falseflax, field pennycress, shield cress (*Lepidium perfoliatum*), and Pursh's plantain (*Plantago patagonica*).

The native sub-shrub winterfat (*Krascheninnikovia lanata*) is found in areas. Few individuals of Wyoming big sagebrush and silver sagebrush are also present on some sites.

The Pastureland community within the Caballo West resource report area is found streamside; the soils are fine textured with generally low salinity.

The **Lowland Grassland** vegetation type is characterized by the dominance of perennial grass species, especially common spikerush (*Eleocharis palustris*), green needlegrass (*Nassella viridula*), bulbous bluegrass, and Kentucky bluegrass (*Poa pratensis*).

The introduced annual grasses cheatgrass and Japanese brome were minor contributors to vegetation cover in areas.

Plains prickly-pear cactus (*Opuntia polyacantha*) is sporadically found in the area as are mushroom species.

Perennial forbs contribute a major portion of ground cover in the Lowland Grassland. Besides Alfalfa medic (*Medicago sativa*), which has spread to the area from adjoining agricultural areas, more commonly encountered perennial forbs include American vetch, rubberweed (*Hymenoxys richardsonii*), purple milkvetch (*Astragalus agrestis*), two-grooved milkvetch (*Astragalus bisulcatus*), textile onion, pale agoseris, western yarrow (*Achillea millefolium*), and golden pea.

Annual forbs are also present but provide a minor contribution to vegetation cover. Desert Alyssum is a main contributor along with beggar's tick, common blue mustard (*Chorispora tenella*), tumbling hedgemustard, textile onion, field pennycress, and lambsquarter goosefoot (*Chenopodium album*).

The native sub-shrub Gardner's saltbush (*Atriplex gardneri*) is found in areas. Few individuals of Wyoming big sagebrush and wild rose (*Rosa* species) are also present on some sites.

The Lowland Grassland community is found along drainage channels and in concave upland areas. The soils are fine to medium textured with generally low salinity.

The **Rough Breaks** vegetation type occupies 13.9 acres of upland areas with generally shallow and rocky or gravelly soils. This unit is found on hilltops within the Big Sagebrush vegetation type.

The **Meadow** vegetation type is characterized by the dominance of perennial grass species, especially smooth brome (*Bromus inermis*), western wheatgrass, Sandberg bluegrass and Kentucky bluegrass.

Perennial forbs are sparse and contribute to a minor portion of ground cover in the Meadow type. Besides alfalfa medic, which has spread to the area from adjoining agricultural areas, more commonly encountered perennial forbs include the common dandelion and palmleaf Indian breadroot.

Annual forbs are a major contributor to vegetation cover. Western rockjasmine (*Androsace occidentalis*) was found in the Meadow along with beggar's tick, littleseed falseflax, tumbling hedgemustard, field pennycress and flixweed tansymustard (*Descurainia sophia*).

The Meadow community is found along drainage channels and stream banks that slope gently to the channel. The soils are fine to medium textured with generally low salinity.

The **Developed Area** includes the former homestead within the Caballo West resource report area and its surrounding buildings and driveways. These areas have been abandoned and are to some degree recovering vegetation cover.

### **S3-9.1 Threatened, Endangered, Proposed, and Candidate Plant Species**

Potential habitat for T&E species and their occurrence on the Caballo West LBA Tract are discussed in Appendices E and F of the SGAC EIS document.

## **S3-10 WILDLIFE**

### **S3-10.1 Wildlife Resources**

Background information on wildlife in the vicinity of the Caballo West BLM study area (tract as applied for and lands added under Alternative 2) was drawn from several sources, including the South Powder River Basin Coal FEIS, WGFD and USFWS records, and personal contacts with WGFD and USFWS biologists. Site-specific data for the Caballo West LBA Tract general analysis area were obtained from several sources, including WDEQ/LQD mine permit applications and annual wildlife monitoring reports for the applicant and nearby coal mines. CCC initiated baseline investigations in 2006 and 2007 expressly for the Caballo West LBA Tract. Jones & Stokes, formerly

Thunderbird Wildlife Consulting, Inc., formulated the Caballo West LBA Tract wildlife baseline study plan and obtained approval from N. Doelger and M. Karbs (BLM) in August 2006 to use annual monitoring data collected at the Belle Ayr and Caballo mines during 2006 for most of the wildlife baseline study analyses. The proposed lease area has received comprehensive coverage during annual wildlife monitoring surveys for the adjacent Belle Ayr and Caballo mines since 1984 and 1994, respectively, with additional baseline studies dating back to 1974. Because those surveys covered a large perimeter around the mine permit areas, the entire proposed lease area (as applied for and additional lands) and a majority of the relevant adjacent lands were included in wildlife monitoring efforts during each of those survey years. Continued site-specific wildlife surveys for the entire Caballo West LBA Tract (both action alternatives) and appropriate perimeters will be part of the mine permitting process if the lease sale is held and the tract is proposed for mining.

In an undisturbed condition, the major vegetation types in the wildlife general analysis area provide habitats for many species. Vegetation types tend to occur in a mosaic across the landscape; therefore, many wildlife species can be expected to utilize more than one habitat type. Predominant habitat types classified on the LBA tract and adjacent area correspond with the major plant communities defined by the vegetation survey and consist primarily of big sagebrush, silver sagebrush, and croplands. Various, relatively small parcels of grassland occur throughout the area and networks of road and well pad disturbance areas overlay much of the sagebrush. Numerous tank batteries and miles of pipeline disturbance also occur in the area, with varying degrees of recovering vegetation cover in those disturbed areas. No designated critical, crucial, or unique wildlife habitats are present in the area.

The predominant natural habitat is big sagebrush, and cropland is the next largest habitat type. Sagebrush grassland includes terrain with greater topographic relief and heavier soils that favor shrub growth. Wyoming big sagebrush is the dominant shrub in this habitat type. Cropland is dominated by crested wheatgrass and alfalfa medic.

Caballo Creek, a major tributary of the Belle Fourche River, drains the existing Caballo Mine permit area and Caballo West general analysis area. The Caballo Mine is currently permitted to disturb approximately 12 percent of the Caballo Creek watershed. Tisdale Creek, a southeasterly-flowing tributary of Caballo Creek, drains the northern and eastern portions of the Caballo West general analysis area, and a large playa drains the southern and western portions of the tract. All streams, including Tisdale Creek, within and adjacent to the LBA tract are typical for the region, in that flow events are ephemeral. Stream runoff is typically of short duration and exhibits temporal patterns similar to precipitation events. Tisdale Creek is listed in the WDEQ/WQD Surface Water Classification List as a Class 3B stream, which is an intermittent or ephemeral stream with sufficient hydrology to normally support and sustain communities of aquatic life, including invertebrates, amphibians, or other flora and fauna that inhabit waters at some stage of their life cycles. All other ephemeral streams draining the existing permit area and Caballo West general analysis area are categorized as Class 3 or 4 streams.

### **S3-10.2 Big Game**

Pronghorn (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*) are the only two big game species that regularly occur in the wildlife general analysis area. The nearest elk (*Cervis elaphus*) population is the Rochelle Hills Herd, approximately 5 miles east of the LBA study area. Elk have been seen west of that area during some winter aerial surveys, but never in the LBA tract itself or surrounding two-mile perimeter. White-tailed deer (*Odocoileus virginianus*) have rarely been observed in the vicinity. No crucial big game habitat or migration corridors are recognized by the WGFD in this area. Crucial range is defined as any particular seasonal range or habitat component that has been documented as the determining factor in a population's ability to maintain and reproduce itself at a certain level.

Pronghorn are by far the most common big game species in this area. This species is most abundant in the sagebrush grassland or mixed-grass prairie habitats. Reclaimed grassland constitutes only a small portion of the available habitat around the PRB mines, although pronghorn are observed during all seasonal surveys in these areas. Home range for pronghorn can vary between 400 acres to 5,600 acres, according to several factors including season, habitat quality, population characteristics, and local livestock occurrence. Typically, daily movement does not exceed 6 miles. Pronghorn may make seasonal migrations between summer and winter habitats, but migrations are often triggered by availability of succulent plants and not local weather conditions (Fitzgerald et al. 1994). The WGFD has classified the general analysis area as primarily winter/yearlong pronghorn range, which means that a population or a portion of a population of animals makes general use of this habitat on a year-round basis and that there is a significant influx of additional animals into this habitat from other seasonal ranges in the winter. The entire general south Gillette analysis area is within the WGFD Hilight Herd Unit. In post-season 2007, the WGFD estimated the Hilight Herd Unit to be 12,397 animals, with an objective of 11,000 (WGFD 2008).

Mule deer use nearly all habitats, but prefer sagebrush grassland, rough breaks, and riparian bottomland. Browse is an important component of the mule deer's diet throughout the year, comprising as much as 60 percent of total intake during autumn, while forbs and grasses typically make up the rest of their diet (Fitzgerald et al. 1994). More than 20 percent of the mule deer observed during most winter surveys conducted at the adjacent Caballo Mine over the years were in reclaimed habitats. In certain areas of the state, this species tends to be more migratory than white-tailed deer, traveling from higher elevations in the summer to winter ranges that provide more food and cover. However, monitoring has indicated that mule deer are not very migratory in the vicinity of the Caballo West LBA Tract. The WGFD has classified a majority of the general analysis area as being out of normal mule deer use range and a small portion as being yearlong mule deer use range, which means that a population or substantial portion of a population of animals makes general use of this habitat on a year-round basis, but may leave the area under severe conditions on occasion. The entire area is located

within the WGFD Thunder Basin Mule Deer Herd Unit. No crucial or critical mule deer ranges or migration corridors occur on or within several miles of the Caballo West LBA Tract or in the general analysis area. Crucial range is defined as any particular seasonal range or habitat component that has been documented as the determining factor in a population's ability to maintain and reproduce itself at a certain level. The WGFD estimated the 2007 post-season mule deer for the herd unit at 20,098, which is above the current objective of 20,000 (WGFD 2008).

White-tailed deer are generally managed separately by the WGFD in the Central Herd Unit. White-tailed deer prefer riparian habitats and are therefore seldom observed in the general analysis area due to the lack of that particular habitat. The WGFD classifies the entire general analysis area as out of the normal white-tailed deer use range. A narrow corridor along the Belle Fourche River is classified as yearlong range. White-tailed deer are occasionally recorded along the Belle Fourche River and Pine Hills to the southeast, but have rarely been recorded in the general analysis area.

Elk reside in the Rochelle Hills southeast of the wildlife general analysis area. Elk do wander from the protection of the Rochelle Hills to forage in native and reclaimed grasslands within the general south Gillette analysis area. None of the Caballo West wildlife general analysis area is classified by the WGFD as within normal elk use range. As more lands are reclaimed from mining, elk are shifting their winter use to these areas. The WGFD has recently designated an approximately 5 square mile area on reclaimed lands within the Jacobs Ranch Mine permit area as crucial winter habitat for the Rochelle Hills elk herd (Oedekoven 1994). The Jacobs Ranch Mine is located about 25 miles south of the Caballo West LBA Tract (Figure 1-1 in the SGAC EIS document). Elk have been observed within the general south Gillette analysis area in recent years, but they are typically restricted to the pine breaks east of the Cordero Rojo and Coal Creek Mines. Rare observations have also been documented in and near the adjacent Belle Ayr Mine permit area in the last few years.

### **S3-10.3 Other Mammals**

A variety of small and medium-sized mammalian species occur in the vicinity of the general analysis area, although not all have been observed on the Caballo West LBA Tract itself. These include predators and furbearers, such as coyote (*Canis latrans*), red fox (*Vulpes vulpes*), bobcat (*Lynx rufus*), striped skunk (*Mephitis mephitis*), long-tailed weasel (*Mustela frenata*), badger (*Taxidea taxus*), muskrat (*Ondatra zibethicus*), raccoon (*Procyon lotor*), and beaver (*Castor canadensis*). Prey species include various rodents (such as mice, rats, voles, gophers, ground squirrels, chipmunks, muskrats, black-tailed prairie dogs [*Cynomys ludovicianus*], and lagomorphs [jackrabbits and cottontails]). These prey species are cyclically common and widespread throughout the region. Porcupines (*Erethizon dorsatum*) and bats (such as hoary [*Lasiurus cinereus*] and big brown [*Eptesicus fuscus*]) have limited habitat in the vicinity. The prey species are important for raptors and other predators.

Surveys have been conducted to locate prairie dog colonies on and within one mile of the LBA tract as applied for and the area added by Alternative 2. No colonies were found within this survey area.

### **S3-10.4 Raptors**

The raptor species expected to occur in suitable habitats in the general analysis area include the golden eagle (*Aquila chrysaetos*), ferruginous hawk (*Buteo regalis*), red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*Buteo swainsoni*), rough-legged hawk (*Buteo lagopus*), northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius*), great horned owl (*Bubo virginianus*), burrowing owl (*Athene cunicularia*), and short-eared owl (*Asio flammeus*). The bald eagle (*Haliaeetus leucocephalus*) is a migrant and winter resident. As cliff nesters, prairie falcons (*Falco mexicanus*) are not common in the coal mine region of northeast Wyoming. Those species that commonly nest in the general analysis area are the red-tailed hawk, Swainson's hawk, northern harrier, and great horned owl. Ferruginous hawks, golden eagles, short-eared owls, and burrowing owls occasionally nest in the area. Habitat is limited for those species that nest exclusively in trees or on cliffs, but several species are adapted to nesting on the ground, creek banks, buttes, or rock outcrops. Over time, natural forces have destroyed many nests, while others have been relocated for mitigation or removed by mining activities. In some cases, nests have been created to mitigate other nest sites impacted by mining operations at the Caballo Mine.

Through 2008, surveys conducted by Jones & Stokes had documented eight raptor species (golden eagle, ferruginous hawk, red-tailed hawk, Swainson's hawk, northern harrier, great horned owl, short-eared owl, and burrowing owl) that had nested at least once within the wildlife survey area for the Caballo West LBA Tract. That raptor survey area is defined as a 2-mile radius around the Caballo West wildlife general analysis area (Figure 3-27 in the SGAC EIS document). Of those eight species, the Swainson's hawk has been the most common nester in the raptor survey area for this tract over time. The presence of other nesting raptor species has been associated with cyclic lagomorph or small rodent populations and the availability of nest sites (e.g., intact nests of other species for great horned owls, and the presence of platform nests for ferruginous hawks and golden eagles).

In 2008, 38 intact raptor nests were present in the Caballo West raptor survey area. No active nests were observed in the Caballo West wildlife general analysis area (BLM study area and one-quarter mile perimeter), though one active Swainson's hawk nest was located immediately south of that area. The only intact nests within the wildlife general analysis area were a Swainson's hawk nest (on the tract as applied for) and a burrowing owl nest site (on lands added under Alternative 2). The Swainson's hawk nest is also within the current permit area for the Caballo mine; that nest was last active in 2002. The burrowing owl nest was active only in 1988.

### **S3-10.5 Upland Game Birds**

Four upland game bird species have been documented in suitable habitats on or near the general analysis area over time. These species are the mourning dove (*Zenaida macroura*), gray partridge (*Perdix perdix*), sharp-tailed grouse (*Tympanuchus phasianellus*), and sage-grouse (*Centrocercus urophasianus*).

Mourning doves are a migrant and relatively common in the area during migration, particularly near sites with water sources and trees, and in the summer for breeding and nesting. This species is a relatively common breeding bird in Campbell County and may be found in a variety of habitat types. Mourning doves were observed on the survey area in 2004 and 2005 (CCC 2005b).

Gray (or Hungarian) partridge, an introduced species, have been infrequently observed on reclaimed areas, sagebrush shrublands, upland grasslands, and cultivated lands in the vicinity of the LBA tract. In some years, this species is occasionally encountered while in other years partridge appear to be totally absent. No partridge were observed on the survey area in recent years (CCC 2004b-2006b).

Sharp-tailed grouse were observed in 2004 approximately 1 mile southeast of the LBA tract (including both action alternatives), but those sightings were infrequent and limited to winter. The nearest sharp-tailed grouse lek is over 6 miles northeast of the survey area.

The sage-grouse is a large upland game bird that is considered to be a “landscape species”, annually using widespread areas of sagebrush habitats. The sagebrush grassland vegetation type comprises only approximately 22 percent of the vegetation in the analysis area. At the present time, sage-grouse do not appear to be abundant or common in the area.

No sage-grouse leks have ever been documented on or within 2 miles of the Caballo West wildlife general analysis area. Four greater sage-grouse leks (Belle Ayr I, Belle Ayr II, Lynde, Stowe) were found within 3 miles of the Caballo West wildlife general analysis area during previous studies conducted for the adjacent Caballo and Belle Ayr Mines. The Gold Mine Draw lek is located just northeast of this 3-mile radius; that site was historically included as part of the Caballo Mine annual monitoring program. These five leks have essentially been inactive since at least 2004. The 3-mile radius around the Lynde lek overlaps the west-central portion of the Caballo West LBA Tract as applied for, as well as lands added under Alternative 2 and the Caballo West wildlife general analysis area in that region (Figure 3-27). The 3-mile radius for the Stowe lek just overlaps the extreme southern extent of the Caballo West wildlife general analysis area, while the radii for the Belle Ayr I and Belle Ayr II leks fall just outside of that perimeter. The 3-mile radius for the Gold Mine Draw lek does not intersect the Caballo West wildlife general analysis area, but does overlap the 2-mile wildlife survey area for the Caballo West LBA Tract.

### S3-10.6 Migratory Bird Species of Management Concern in Wyoming

USFWS uses a list entitled *Coal Mine List of 40 Migratory Bird Species of Management Concern in Wyoming*, for reviews related to existing and proposed surface coal leases (USFWS 2002). This list was taken directly from the Wyoming Bird Conservation Plan (Cerovski, et al. 2001), and replaced the previous *Migratory Birds of High Federal Interest* list. The regional status and expected occurrence, historical observations, and breeding records on or near the Caballo West LBA Tract (as applied for and lands added under Alternative 2) for each listed species are included in Table S3-7. Surveys for current avian species of concern are conducted annually under the Caballo Mine's annual wildlife monitoring program, with species lists updated as they become available from regulatory agencies. The surveys, which are conducted primarily in the spring and summer, typically target the permit area and a ½-mile perimeter; surveys extend out 1 mile for some species as mining operations warrant.

Twenty-two of the 40 listed species have historically been observed on or near the general analysis area. Species that have been recorded nesting in the area include the burrowing owl, greater sage-grouse, Brewer's sparrow (*Spizella breweri*), Swainson's hawk, short-eared owl, ferruginous hawk, lark bunting (*Calamospiza melanocorys*), grasshopper sparrow (*Ammodramus savannarum*), McCown's longspur (*Calcarius mccownii*), chestnut-collared longspur (*Calcarius ornatus*), sage thrasher (*Oreoscoptes montanus*), loggerhead shrike (*Lanius ludovicianus*), lark sparrow (*Chondestes grammacus*), upland sandpiper (*Bartramia longicauda*), and the vesper sparrow (*Pooecetes gramineus*). Other species observed in the area include the bald eagle, long-billed curlew (*Numenius americanus*), merlin (*Falco columbarius*), red-headed woodpecker (*Melanerpes erthrocephalus*), mountain plover (*Charadrius montanus*), western screech-owl (*Megascops kennicottii*), and barn owl (*Tyto alba*). Of those species, only the bald eagle has been seen with any regularity, and those sightings are limited to winter. Long-billed curlews and merlins have only been recorded as spring migrants. The mountain plover, western screech-owl, and barn owl have only been observed once each during baseline and annual monitoring surveys completed since 1989.

The mountain plover is included on the list of *Migratory Bird Species of Management Concern in Wyoming*. The mountain plover was designated as a proposed threatened species by the USFWS in 1999. The agency subsequently published a withdrawal of the proposed rule to list the mountain plover as threatened on September 9, 2003 (USFWS 2003). As noted above, mountain plovers were only recorded within the Caballo West survey area one time in more than 18 years of annual monitoring associated with the overlapping Belle Ayr and Caballo mines. That lone sighting occurred in August 1992 when a migrant flock of 12 individuals was seen in saline grassland habitat in NE¼ SE¼ Section, 17, T48N, R71W, within the LBA tract itself (under both action alternatives). Despite subsequent surveys targeting that location, mountain plovers have never been observed at the Caballo or Belle Ayr Mines since then.

*Supplementary Information on the Affected Environment*

Table S3-7. Migratory Bird Species of Management Concern in Wyoming: Their Regional Status, and Expected and Actual Occurrence on or Near the Caballo West LBA Tract.

<b>Species</b>	<b>Seasonal Status/Breeding Records in Northeastern WY<sup>1</sup></b>	<b>Expected Occurrence on and in Vicinity of the LBA Tract <sup>2</sup></b>	<b>Historical Sighting Records and Breeding Status in Vicinity of the LBA Tract<sup>3</sup></b>
<b>LEVEL I (species need conservation action)</b>			
Mountain plover	Summer/Observed	Uncommon	Observed Once
Greater sage-grouse	Resident/Breeder	Uncommon	Uncommon Breeder
McCown's longspur	Summer/Breeder	Uncommon	Uncommon Breeder
Baird's sparrow	Never Recorded	Not Expected	None
Ferruginous hawk	Resident/Breeder	Uncommon	Historic Breeder
Brewer's sparrow	Summer/Breeder	Common	Common Breeder
Sage sparrow	Summer/Observed	Not Expected	None
Swainson's hawk	Summer/Breeder	Common	Common Breeder
Long-billed curlew	Summer/Breeder	Uncommon	Rare Migrant
Short-eared owl	Eruptive/Breeder	Uncommon	Historic Breeder
Peregrine falcon	Migrant/Observed	Not Expected	None
Burrowing owl	Summer/Breeder	Uncommon	Historic Breeder
Bald eagle	Winter/Observed	Uncommon	Occasional Winter Resident
Upland sandpiper	Summer/Breeder	Common	Occasional Breeder
<b>LEVEL II (species need monitoring)</b>			
Cassin's kingbird	Summer/Observed	Not Expected	None
Lark bunting	Summer/Breeder	Common	Common Breeder
Dickcissel	Summer/Observed	Not Expected	None
Chestnut-collared longspur	Summer/Breeder	Uncommon	Uncommon Breeder
Black-chinned hummingbird	Never Recorded	Not Expected	None
Pygmy nuthatch	Resident/Observed	Not Expected	None
Marsh wren	Summer/Observed	Not Expected	None
Western bluebird	Summer/Observed	Not Expected	None
Sage thrasher	Summer/Breeder	Uncommon	Uncommon, Unlikely Breeder
Grasshopper sparrow	Summer/Breeder	Common	Common Breeder
Bobolink	Summer/Observed	Rare	None
Common loon	Summer/Observed	Not Expected	None
Black-billed cuckoo	Summer/Observed	Not Expected	None
Red-headed woodpecker	Summer/Observed	Not Expected	Rare Migrant
Yellow-billed cuckoo	Never Recorded	Not Expected	None
Eastern screech-owl	Never Recorded	Not Expected	None
Western screech-owl	Never Recorded	Not Expected	Observed Once
Western scrub-jay	Never Recorded	Not Expected	None
Loggerhead shrike	Summer/Breeder	Common	Occasional Breeder
Vesper sparrow	Summer/Breeder	Common	Common Breeder
Lark sparrow	Summer/Breeder	Uncommon	Uncommon Breeder
Ash-throated flycatcher	Never Recorded	Not Expected	None
Bushtit	Never Recorded	Not Expected	None
Merlin	Resident/Breeder	Uncommon	Uncommon Migrant
Sprague's pipit	Migrant/Observed	Not Expected	None
Barn owl	Summer/Breeder	Unknown Distribution	Observed Once

<sup>1</sup> Compiled from Cerovski et al. (2004) for the Campbell County area.

<sup>2</sup> Expected occurrence in the study area was based on range, history of occurrence, and habitat availability.

<sup>3</sup> Sighting records were derived from actual occurrence on or within one-half-mile of the LBA tract as applied for and the Alternative 2 Tract configuration area during baseline and annual monitoring surveys conducted at the Caballo Mine since 1989.

The USFWS removed the bald eagle from protection under the Endangered Species Act on July 9, 2007 (Federal Register, July 9, 2007). However, that species is still under the purview of the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act, both of which are administered and

enforced by that agency. Bald eagles are relatively common winter residents and migrants in northeastern Wyoming's PRB. However, no bald eagle nests or winter roost sites have been documented on or within one mile of the Caballo West LBA Tract or areas added by Alternative 2 during more than two decades of annual monitoring in that region. In the winters of 2004-2005, 2005-2006, and 2006-2007, bald eagles frequently used a large windbreak within the existing Cordero-Rojo Mine permit area approximately 6 miles south of the Caballo West LBA Tract. Bald eagles had never been observed concentrating in this windbreak during the previous 25+ years of wildlife surveys. A maximum of 29 bald eagles was observed at this roost site on February 16, 2005, with maximums of 20 and 15 recorded in 2005-2006 and 2006-2007, respectively. This roost site is within ¼ mile of active mining operations and bald eagles were commonly observed around mining activities during those years. No unique, concentrated, or predictable sources of prey or carrion occur in the study area, so foraging bald eagles would not ordinarily be attracted to the location in great numbers.

Burrowing owls have nested in the vicinity of the Caballo West LBA Tract sporadically over time. Despite their low nesting frequency, burrowing owls produce relatively large clutch sizes and consequently have one of the highest long-term production averages for the study area. One pair of burrowing owls has nested within the Caballo West wildlife general analysis area, on lands added under Alternative 2. The nest site was active only in 1988, with no other active burrowing owl nests recorded through 2006.

Sage-grouse, currently considered as a Level I species of concern, are becoming less common in the general analysis area but are still classified as a common breeder on and in the near vicinity of the Caballo West LBA Tract. That classification is due to the presence of recently active leks within 3 miles of the tract, rather than the actual occurrence of grouse on or in the immediate vicinity of the area itself.

Suitable nesting habitat is scarce, if not absent, in the general analysis area for the remainder of the *Migratory Bird Species of Management Concern in Wyoming*; therefore, the other species have never been recorded in the wildlife study area.

### **S3-10.7 Other Species**

Wildlife surveys completed specifically for the applicant and other mines in the area, as well as biological research projects in the eastern PRB, have documented numerous other wildlife species that inhabit the region, including various amphibians, reptiles, and aquatic species. All of these species can be locally common inhabitants of the area, depending on the quantity and quality of aquatic habitats present.

The Caballo West LBA Tract provides limited waterfowl and shorebird habitat. Most sightings over the years have occurred on native and diverted reaches of

Tisdale Creek, as well as at the Tisdale Creek flood control reservoir within the current Caballo Mine permit area.

Under natural conditions, aquatic habitat is limited by the ephemeral nature of surface waters in the general analysis area. The lack of deep-water habitat, and extensive and persistent water sources limits the presence and diversity of fish and other aquatic species.

Surveys for aquatic species are not required or conducted as part of the annual monitoring program at the Caballo Mine, nor were they required or conducted specifically for the Caballo West LBA Tract. The nearest regular monitoring of aquatic species occurs as part of regular voluntary surveys in Caballo Creek, south of the Caballo West LBA Tract, for the neighboring Belle Ayr Mine. All baseline and annual report documents for the Caballo and Belle Ayr Mines are on file with WDEQ/LQD in Sheridan, Wyoming.

### **S3-10.8 Threatened, Endangered, Proposed, and Candidate Animal Species**

Potential habitat for T&E species and their occurrence on the Caballo West LBA Tract are discussed in Appendices E and F of the SGAC EIS document.

### **S3-11 LAND USE AND RECREATION**

All of the surface estate on the Caballo West LBA Tract as applied for and the area added under Alternative 2 is privately owned. FCW is the major private surface owner, but there are two other private surface owners in the western portion of the study area. The ownership of the surface estate is shown in detail in Figure 3-33 in the SGAC EIS document. Livestock grazing is the primary land use within the LBA tract as applied for and the area added under Alternative 2, while oil and gas production, wildlife habitat, and recreation are secondary land uses for both public and private lands.

Areas of disturbance within the general analysis area include power transmission lines, ranching-related roads, producing, shut-in and plugged and abandoned conventional oil and gas and CBNG wells, roads and production facilities associated with these oil and gas wells including numerous buried pipelines, residential developments, and surface mine-related facilities. The Bishop Road, a paved county road, crosses portions of the southern limits of the LBA study area. Highway 59 is located roughly one mile west of the LBA tract.

The oil and gas estate within the Caballo West LBA Tract as applied for and the area added under Alternative 2 is federally and privately owned, with the majority (approximately 92 percent) being privately owned. The ownership of the oil and gas estate is shown in Figure 3-37 in the SGAC EIS document. A list of the current federal oil and gas lessees of record is included as Table 3-15 in the SGAC EIS document.

According to the WOGCC records as of December 13, 2007, there were 10 permitted conventional oil and gas wells on lands included in the Caballo West LBA Tract as proposed and the lands added under Alternative 2 (refer to Figure 3-37 in the SGAC EIS document). All ten of the conventional oil wells that were drilled were unproductive and subsequently plugged and abandoned. The most recent conventional test well in the general analysis area was drilled in 1992 (WOGCC 2007). Conventional oil and gas wells capable of production within the Caballo West general analysis area are listed in Appendix G of the SGAC EIS document.

According to the WOGCC records as of December 13, 2007, there were 5 CBNG wells that were producing and 9 were shut-in within the lands encompassed by the Caballo West LBA Tract as applied for and the lands added under Alternative 2 (refer to Figure 3-37 in the SGAC EIS document). Extensive CBNG development has occurred north and west of the tract. CBNG wells capable of production on or in sections adjacent to the Caballo West LBA Tract are listed in Appendix G of the SGAC EIS document.

Coal mining is a dominant land use to the north, east, and south of the LBA tract. The Caballo, Belle Ayr, Cordero Rojo, and Coal Creek Mines form a group of contiguous or nearly contiguous surface coal mines located in Campbell County (Figure SI-1). Coal production from these four active mines increased by nearly 47 percent between 1997 and 2007 (from approximately 74 million tons in 1997 to 108.5 million tons in 2007). Since decertification, three coal leases (the West Rocky Butte LBA Tract, the North Maysdorf LBA Tract, and the South Maysdorf LBA Tract) have been issued within the group of four mines.

Big game hunting is the principal recreational land use within the general analysis area, and pronghorn, mule deer, and white-tailed deer are present within the area. On private lands, hunting is allowed only with landowner permission. Land ownership within the PRB is largely private (approximately 80 percent), with some private landowners permitting sportsmen to cross and/or hunt on their land. There has been a trend over the past two to three decades towards a substantial reduction in private lands that are 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 for sportsmen who desire access to these animals (WGFD 2004). Pronghorn, mule deer, and white-tailed deer occur on or adjacent to the LBA tract. Sage grouse, mourning dove, waterfowl, rabbit, and coyote may be also harvested in the vicinity, and some trapping of red fox may also occur.

The WGFD has classified the general south Gillette analysis area as primarily winter/yearlong pronghorn range (a population or a portion of a population of animals makes general use of this habitat on a year-round basis, with a significant influx of additional animals onto this habitat from other seasonal ranges in the winter) and yearlong pronghorn range (a population or

substantial portion of a population of animals makes general use of this habitat on a year-round basis, but may leave the area under severe conditions on occasion). The Caballo West LBA Tract wildlife general analysis area is within the WGFD Hilight Herd Unit. In post-season 2007, the WGFD estimated the Hilight Herd Unit to be 12,397 animals, with an objective of 11,000 (WGFD 2008).

In 2007, the WGFD issued 1,200 licenses for the Hilight Herd Unit, Hunt Area 24, and 1,056 antelope were harvested (88 percent success rate). In the years 2002 through 2006, hunters on average harvested 735 animals with better than 90 percent success and spent 2.8 days per animal harvested. Approximately 2,964 recreation days were spent on antelope hunting in 2007. Due to the fact that the Hilight Herd Unit is slightly above herd objectives and the population is in a trend of increasing numbers, additional harvest may be needed to better control the herd and stabilize the population near objectives. Increased harvest may be difficult to achieve because of the increased CBNG development and the presence of coal mines, which are limiting hunter rifle hunting on associated lands. Given the predicted harvest and average winter conditions, the 2008 post-season population was expected to be 12,129 antelope.

The Caballo West LBA Tract as applied for and the area added by Alternatives 2 and 3 is located within the WGFD Thunder Basin Mule Deer Herd Unit. According to WGFD maps, a majority of the proposed lease area is considered yearlong mule deer range. Crucial or critical mule deer ranges do not occur on or within several miles of the LBA tract. The LBA tract is in mule deer Hunt Area 21, part of the Thunder Basin Herd Unit, which also includes Hunt Areas 7, 8, 9, 10, and 11. The Thunder Basin Herd Unit encompasses 3,642 square miles, of this, 71 percent is privately owned. Access fees are common, resulting in heavy hunting pressure on accessible public land, particularly in recent years. Much of the public owned surface lands are scattered and inaccessible without crossing private land.

The 2007 postseason mule deer population was estimated at 20,098, which is 5 percent above the herd objective of 20,000 animals. In 2007, the WGFD issued 2,073 licenses and 1,355 mule deer were harvested from the Thunder Basin Herd Unit and the hunter success rate was 65 percent. The days spent per animal harvested were 6.1 in 2007, which was slightly below the five-year average. It is likely that insufficient harvest within the Thunder Basin Mule Deer Herd Unit will result in a population increase in the future.

White-tailed deer are generally managed separately by the WGFD in the Central Herd Unit. White-tailed deer prefer riparian habitats and are therefore seldom observed in the general analysis area due to the lack of that particular habitat. The WGFD classifies the entire general analysis area as out of the normal white-tailed deer use range. A narrow corridor along the Belle Fourche River southeast of the Caballo West LBA Tract is classified as yearlong range. White-tailed deer are occasionally recorded along the Belle Fourche River and Pine Hills to the east but have rarely been recorded in the general analysis area.

Elk reside in the Rochelle Hills south of the general analysis area. Elk do wander from the protection of the Rochelle Hills to forage in native and reclaimed grasslands within the general analysis area. None of the general analysis area is classified by the WGF D as within normal elk use range. As more lands are reclaimed from mining, elk are shifting their winter use to these areas. The WGF D has designated an approximately five square mile area on reclaimed lands within the Jacobs Ranch Mine permit area as crucial winter habitat for the Rochelle Hills elk herd (Odekoven 1994). The Jacobs Ranch Mine is located about 15 miles south of the Cordero Rojo Mine (Figure 1-1 in the SGAC EIS document). No elk have been observed recently within the Caballo West LBA Tract but they are occasionally recorded in the Pine Hills southeast of the Caballo Mine.

Under natural conditions, aquatic habitat is limited by the ephemeral nature of surface waters in the general analysis area. The lack of deep-water habitat and extensive and persistent water sources limits the presence and diversity of fish and other aquatic species. Tisdale Creek, which drains the northern and eastern portions of the Caballo West general analysis area, and a large playa drains the southern and western portions of the tract, and all other streams within and adjacent to the LBA tract are typical for the region, in that flow events are ephemeral. Tisdale Creek is listed in the WDEQ/WQD Surface Water Classification List as a Class 3B stream, which is an intermittent or ephemeral stream with sufficient hydrology to normally support and sustain communities of aquatic life, including invertebrates, amphibians, or other flora and fauna that inhabit waters at some stage of their life cycles. All other ephemeral streams draining the existing permit area and Caballo West general analysis area are categorized as Class 3 or 4 streams.

### **S3-12 CULTURAL RESOURCES**

In 2006, Powder River Coal, LLC, Gillette, Wyoming contracted GCM Services to conduct a Class I cultural resource inventory (records search) for the Caballo Mine, consisting of a contiguous block encompassing approximately 27,520 acres. The Caballo West cultural resources general analysis area, comprising roughly 1360 acres, is wholly contained within the 2006 Class I inventory area.

#### **S3-12.1 Previous Investigations**

The Class I review of previous survey records identified seven archeological sites, of which five are prehistoric, one is historic, and one is multi-component, within the Caballo West cultural resources general analysis area. Prehistoric sites consist primarily of lithic scatters and open camps. All prehistoric sites are considered not eligible. Historic sites consist primarily of homesteads and trash dumps. The historic site is considered not eligible. The one multi-component site consists of an open camp and homestead and is considered not eligible. A total of seven isolated occurrences were identified during the Class I records search. The four prehistoric isolates consist of two projectile

point/tools and two historic debris items. The three historic isolates consist of trash scatters.

### **S3-12.2 Current Investigations**

No recent (post 2004) Class III cultural resource surveys have been completed on the Caballo West LBA Tract resource analysis area.

### **S3-12.3 Summary**

To summarize the identified cultural resources, a total of seven archaeological sites are located in the Caballo West LBA Tract project area. Of these seven cultural sites, five are prehistoric, one is historic, and one is multi-component. All seven sites are considered not eligible. Table S3-8 lists the cultural sites and their classifications.

---

Table S3-8. Sites and Isolated Finds in the Class III Cultural Resources Inventory of the Caballo West LBA Tract Survey Area.

---

#### **Prehistoric sites:**

Lithic Scatter:	48CA2703, 48CA2704, 48CA5323, 48CA5324
Habitation:	48CA2702
Isolated finds:	4 items

#### **Historic sites:**

Livestock/Ranching:	48CA503
Isolated Finds:	3 debris items

#### **Multi-component sites:**

Prehistoric and historic habitation:	48CA2706
--------------------------------------	----------

---

---

A majority of the Caballo West LBA Tract cultural survey area has been surveyed for cultural resources at a Class III level. Approximately 220 acres of the 1,390 acre Caballo West Cultural resources general analysis area have not been surveyed at a Class III level and approximately 360 acres were surveyed at a Class III level in 1975 and are considered substandard in terms of current methodology.