SECTION 1

BELLE AYR NORTH LBA TRACT

S1-1 TOPOGRAPHY AND PHYSIOGRAPHY

The Belle Ayr North LBA Tract is in an area of gently rolling terrain of moderate relief influenced by Duck Nest Creek and other tributaries of Caballo Creek. Elevations range from 4,515 to 4,666 feet (ft) within the LBA tract and from 4,515 to 4,704 ft including the area added under Alternative 2. Within the LBA tract and the area added under Alternative 2, slopes range from flat to over 28 percent in the eastern portion of the tract, south of the Bishop Road. The slopes of the gently rolling uplands, which comprise most (about 74 percent) of the LBA tract, seldom exceed 4 percent. A slope analysis would be done for the LBA tract if a lease sale is held and it is proposed for mining.

S1-2 GEOLOGY

Surficial deposits in the general analysis area include fan and sheetwash materials where the terrain is nearly flat. Alluvial (unconsolidated streamlaid) deposits are present within the LBA tract and are associated with Duck Nest Creek.

The Eocene Wasatch Formation forms most of the overburden in the general analysis area. The boundary between the Wasatch Formation and the underlying Paleocene Fort Union Formation is not distinct. From a practical standpoint, the top of the mineable coal zone is considered as the contact between the two formations. Overburden thicknesses in the Belle Ayr North LBA Tract as applied for average about 295 ft. 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. Overburden thickness in the Belle Ayr North LBA Tract area ranges from around 120 ft to 400 ft and averages around 295 ft.

The Fort Union Formation is divided into three members: the Tongue River, the Lebo, and the Tullock, in descending order (refer to Figure 3-2 in the SGAC EIS document).

The mineable coal seams in the PRB are part of the Tongue River Member of the Fort Union Formation. There is one mineable coal seam at the Belle Ayr Mine and within the Belle Ayr North LBA Tract. There are several thin laterally discontinuous coal seams in the Wasatch formation that are not considered to be economic at mines in the area. Locally, the mineable coal seam is referred to as the Wyodak-Anderson seam (Figures S1-1 and S1-2). This coal zone is referred to as the Anderson and Canyon, and Wyodak coal beds at other localities in the eastern PRB. Approximately four feet below the Wyodak-Anderson seam is a thin coal seam that is not recovered at mines in the area. The thickness of coal on the Belle Ayr North LBA Tract as applied for and the area added by Alternative 2 ranges from approximately 66 ft to 76 ft,

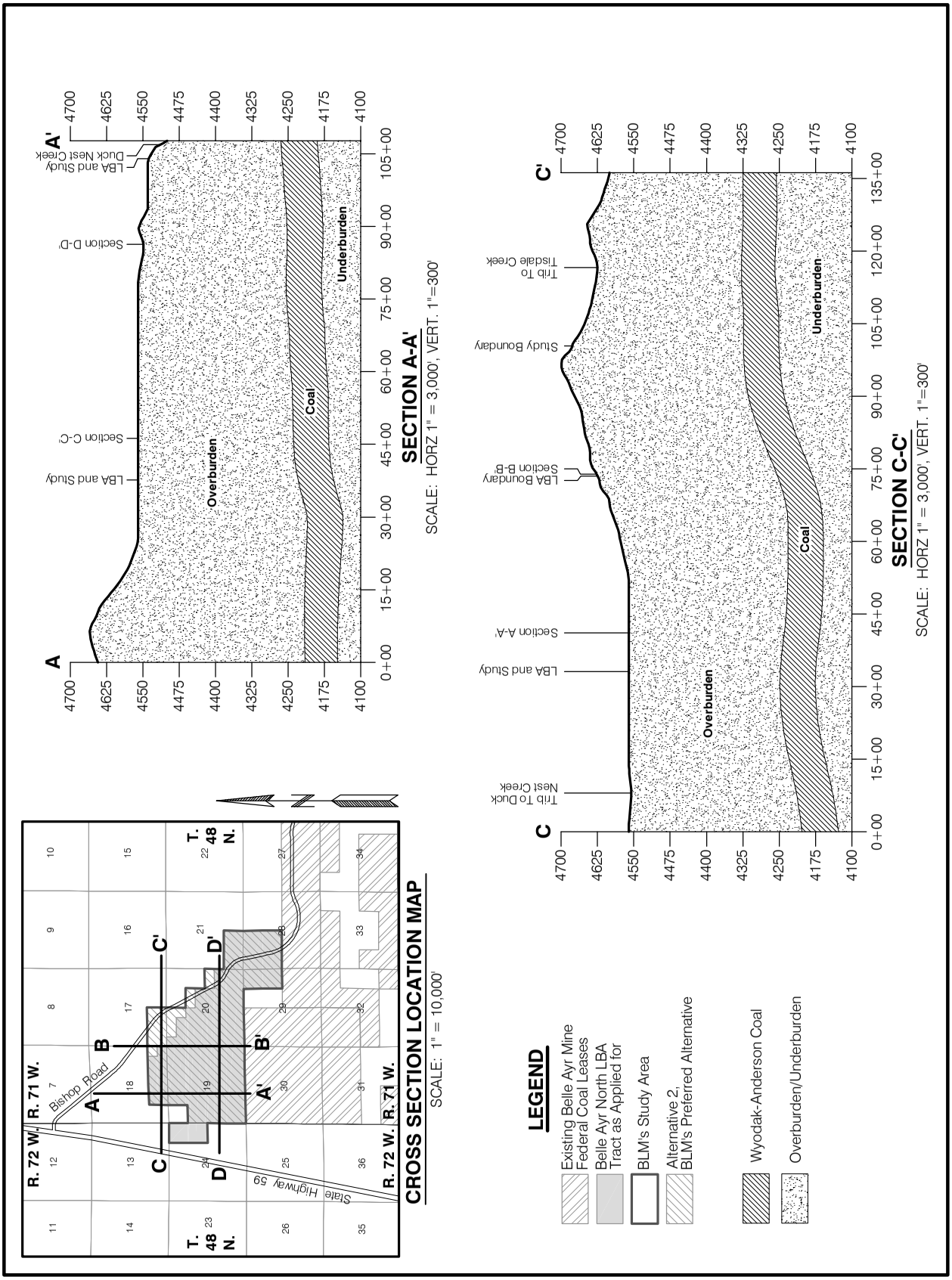

Figure S1-1. Geologic Cross Sections A-A' and C-C' for the Belle Ayr North LBA Tract.

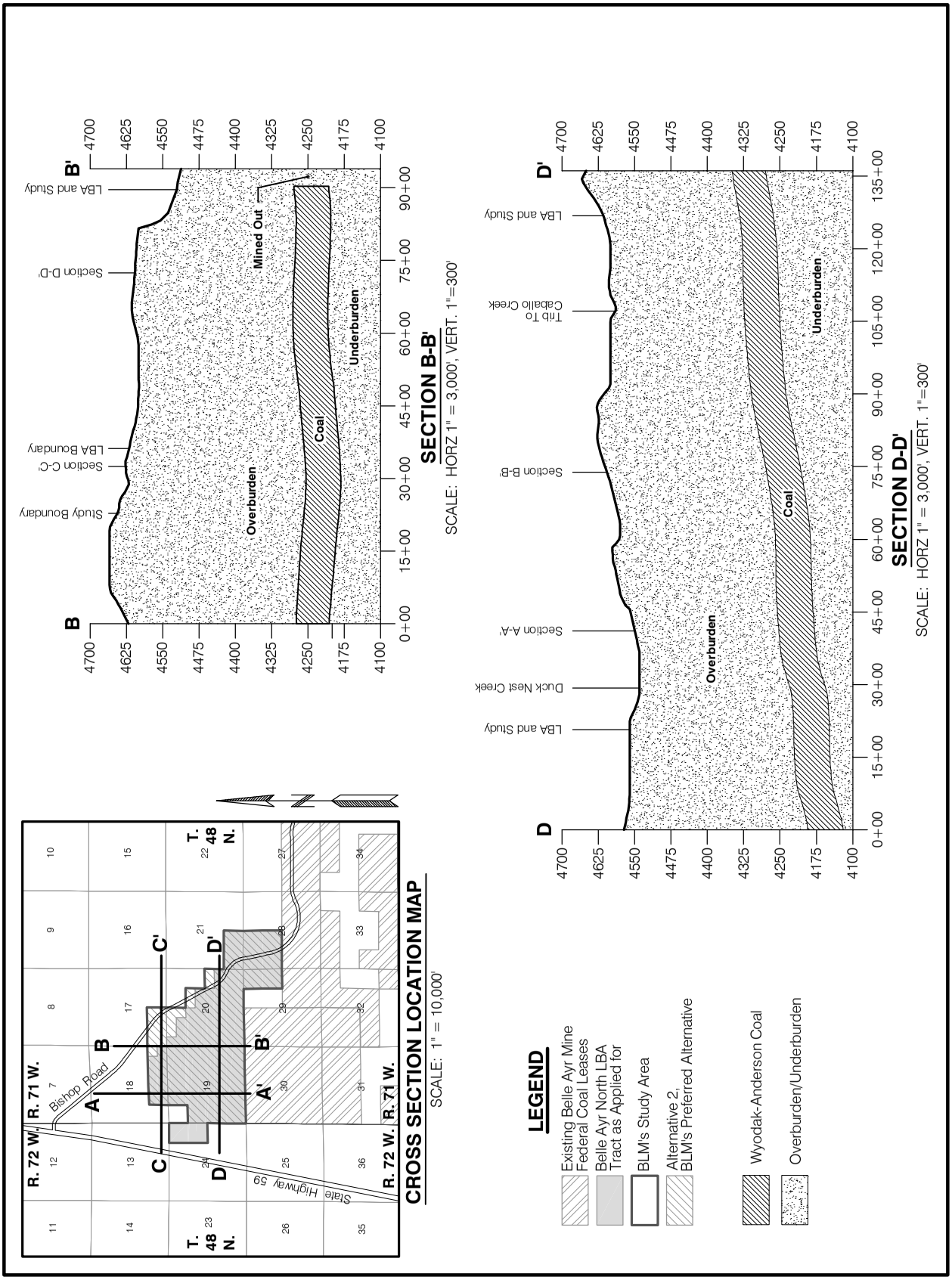

Figure S1-2. Geologic Cross Sections B-B' and D-D' for the Belle Ayr North LBA Tract.

averaging approximately 72 ft in thickness. Table S1-1 presents the average thickness of the overburden and the coal seam for the Belle Ayr North Tract.

Table S1-1. Average Overburden and Coal Thicknesses in the Belle Ayr North LBA Tract.

Mining Unit	Proposed Action (ft)	Alternative 2 (ft)
Overburden	295.0	295.0
Coal	72.0	72.0

The Fort Union coal seams are subbituminous and are generally low-sulfur, low-ash coals. Typically, the coal being mined in the PRB has a lower heating value and higher sulfur content north of Gillette than south of Gillette. According to the analyses (which were done on an as-received basis) of exploration drilling samples collected in the Belle Ayr North LBA Tract as applied for and the area added under Alternative 2, the average heating value of the coal is approximately 8,550 British thermal units per pound (Btu/lb), with an average of about 0.32 percent sulfur, 4.45 percent ash, and 29.8 percent moisture.

S1-3 PALEONTOLOGY

Paleontological surveys were conducted in conjunction with the cultural resources inventories of the current Belle Ayr Mine permit area, the Belle Ayr North LBA Tract as applied for, and the area added under Alternative 2. Pedestrian examinations for fossil indications were conducted along outcrops. One of the primary goals of the paleontological surveys was to locate unique pockets of fossilized bone such as those reported elsewhere in the Wasatch Formation in the PRB. Such concentrations of fossil bone were not found, nor were any fossil vertebrates found in any exposures of the Wasatch Formation. The only other fossils inventoried to date have been fossilized wood fragments. Fossilized wood is common and can be observed at many unrecorded locations, particularly in associated with coal outcrops. Due to the widespread nature of the fossilized plant remains and gastropods in the Wasatch and Fort Union Formations within the PRB, the recording of fossil locations is limited to unique finds. No localities produced exceptional examples and no unique finds were located on the LBA tract. Fossil leaves, wood, and gastropods can be collected elsewhere in the PRB.

S1-4 AIR QUALITY

S1-4.1 Existing Emission Sources

In the vicinity of the Belle Ayr North 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 90 miles southwest) and the Wyodak Complex (approximately 11 miles 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.

S1-4.2 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 Belle Ayr North tract. Table S1-2 provides the approximate distances from the Belle Ayr North LBA Tract to each of the other 12 pending LBAs.

Table S1-2. Distances to Pending LBAs.

LBA Tract Name	Adjacent Mine	Distance from Belle Ayr North LBA
North Maysdorf	Cordero Rojo	3 miles south
Eagle Butte West	Eagle Butte	16 miles north
Maysdorf II	Cordero Rojo	3 miles south
Caballo West	Caballo	Proximate
West Coal Creek	Coal Creek	11 miles southeast
West Antelope II	Antelope	39 miles south
North Hilight Field	Black Thunder	22 miles south
South Hilight Field	Black Thunder	29 miles south
West Hilight Field	Black Thunder	27 miles south
West Jacobs Ranch	Jacobs Ranch	23 miles south
Hay Creek II	Buckskin	23 miles northwest
North Porcupine	North Antelope Rochelle	35 miles south
South Porcupine	North Antelope Rochelle	39 miles south

S1-4.3 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

Wyoming Department of Environmental Quality/Air Quality Division (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_{10} 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, Belle Ayr Mine operates a particulate and meteorological monitoring network. Figure 3-3 in the SGAC EIS document shows the locations of the particulate (PM_{10} and total suspended particles [TSP]) air quality sampling sites and the meteorological stations at the Belle Ayr Mine. Ambient particulate data are currently collected at four sites: BA-1, BA-3, BA-4, and BA-4S. Ambient particulate data were also collected at sites BA-5N and BA-5S up through 2005. TSP was originally monitored at sites BA-1, BA-3, and BA-4 but FCW began reporting particulate emissions using low-volume PM_{10} samplers at sites BA-1 and BA-4 in 2001 and at site BA-4S in 2005. The State of Wyoming added PM_{10}-based standards in 1989 and retained the TSP standards until March 2000; therefore, the TSP standard is no longer being enforced. The mine continues to monitor TSP at Site BA-3.

There were no exceedances of the 24-hour TSP standard at the Belle Ayr Mine when TSP was the federally regulated pollutant, and there have been no exceedances of the 24-hour and annual average PM_{10}-based standards at the Belle Ayr Mine since PM_{10} became the federally regulated pollutant. Table S1-3 presents the average annual particulate emissions measured at the mine's three currently active air quality monitoring sites from 1997 through 2006. In effort to relate measured particulate emissions to mine activity, Belle Ayr Mine's annual coal and overburden production are included in Table S1-3.

Control Measures

The WDEQ/AQD requires the use of Best Available Control Technology (BACT) on all sources of emissions in the State of Wyoming. FCW practices control measures that are applicable to surface mining operations, which are outlined in Section 14 of the Wyoming Air Quality Standards and Regulations (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 PEC dust control system (stilling shed). Mine-wide emissions are further reduced by the use of pavement where possible.

Table S1-3. Summary of Belle Ayr 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*					
			BA-1	BA-3	BA-4	BA-4S	BA-5N	BA-5S
1997	22.8	60.9	41	21	54	--	(15)	(15)
1998	22.5	59.0	44	19	47	--	(14)	(14)
1999	17.4	57.3	52	23	54	--	(13)	(12)
2000	15.0	54.3	63	28	64	--	(18)	(18)
2001	11.8	45.6	(22)	29	(22)	--	73	72
2002	17.5	68.4	(13)	26	(17)	--	73	73
2003	17.9	68.6	(13)	30	(16)	--	62	66
2004	18.7	70.4	(11)	29	(14)	--	72	75
2005	19.5	71.5	(9.4)	31.3	(13.7)	(14.3)	57.3	53.9
2006	24.6	80.6	(10.4)	35.6	(14.3)	(15.6)	--	--

* TSP $\mu g/m^3$
(PM_{10}) $\mu g/m^3$
Source: Belle Ayr Mine (2007)

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 Belle Ayr 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. The WDEQ/AQD has issued several new air quality permits modifying Belle Ayr Mine's air quality controls/operating procedures and in 2006, WDEQ/AQD issued air quality permit MD-1476 to allow a maximum annual production of 45 mmtpy.

S1-4.4 Historical Ambient Air Quality: NO_2 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_x). Tailpipe emissions consist primarily of nitrogen dioxide (NO_2), carbon monoxide (CO), and volatile organic compounds (VOCs), but may also include sulfur dioxide (SO_2) and other trace constituents. Overburden blasting also sometimes produces gaseous orange-colored clouds that contain NO_2. NO_2 is one of several products resulting from the incomplete combustion of the explosives used in the blast.

Monitoring Results

NO_2 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 38 miles north-northeast of the LBA tract; the Campbell County Site, located approximately 4 miles west of the LBA tract; and the Tracy Ranch Site, 34 miles south-southeast 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_2 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_2 from blasting activities at the Belle Ayr Mine. Control measures to limit both emissions and public exposure to NO_x from blasting are presently being instituted at the Belle Ayr Mine. These control measures that are defined, in part, by conditions in the WDEQ/LQD Mine Permit No. 214-T6 and the provisions of the Wyoming EQC ruling of June 26, 2003 include such procedures as limiting blast size, using low-NO_x blasting techniques, consideration of wind conditions, and establishment of safe setback distances as effective methods for mitigating exposure to NO_2.

S1-5 WATER RESOURCES

S1-5.1 Groundwater

The Belle Ayr North 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 Belle Ayr Mine and other nearby coal mines, but these units are not physically disturbed by mining activities. Baseline hydrogeologic conditions within and around the Belle Ayr Mine are characterized in the Wyoming Department of Environmental Quality (WDEQ) mining and reclamation permit (FCW 2003), and groundwater monitoring data (depth to water and water quality) are included in the WDEQ Mine Permit and Annual Reports. Belle Ayr Mine's current groundwater monitoring program is addressed in their 2007 WDEQ Annual Report (FCW 2007), and Figure S1-3 depicts the locations of the currently active monitoring wells.

Recent Alluvium

The Belle Ayr North LBA Tract is within the Caballo Creek watershed, and Duck Nest Creek, an ephemeral tributary of Caballo Creek, drains most of the LBA tract. Alluvial (unconsolidated streamlaid) deposits are present within the

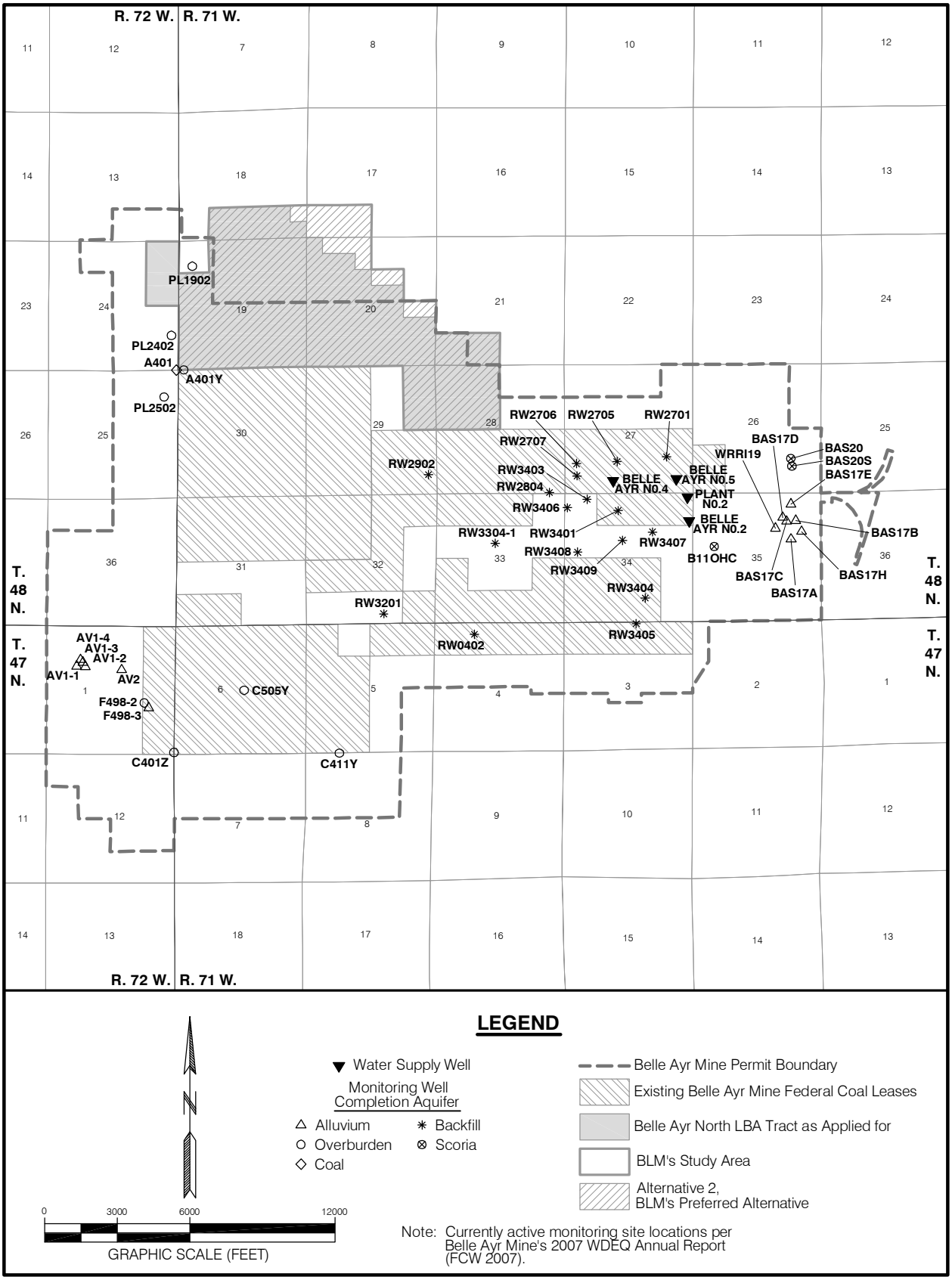

Figure S1-3. Locations of Currently Active Groundwater Monitoring and Water Supply Wells at the Belle Ayr Mine.

LBA tract and are associated with only Duck Nest Creek. Duck Nest Creek alluvium overlies Wasatch Formation bedrock and the lithologies are very similar at their contact. The alluvial deposits consist of intermixed fine-grained sands, silts, and clays. The surficial deposits adjacent to the alluvium consist of fan and sheetwash materials where the terrain is nearly flat. The textures of these deposits are similar, making the outer edge of alluvial deposits difficult to distinguish. The thickness of alluvial deposits along Duck Nest Creek within the BLM study area varies from absent along the outermost limits of the stream's valley to approximately 20 feet, and is typically around 10 to 15 feet. The majority of alluvium in the Duck Nest Creek valley is very fine-grained due to the small drainage area (6.6 square miles) and limited streamflow energy that deposited the sediments. Colluvial and playa deposits associated with other minor surface drainages within the BLM study area are generally very thin and not laterally extensive enough to be considered aquifers (FCW 2003).

Belle Ayr Mine does not currently monitor the Duck Nest Creek alluvial aquifer. Historical data from Duck Nest Creek alluvial monitoring wells, which were installed for the purpose of conducting an alluvial valley floor assessment (refer to the Alluvial Valley Floors section below), indicate that alluvial groundwater flow is down-valley. The alluvium of Duck Nest Creek is recharged by streamflow, water in the channel impoundments, and groundwater from a bedrock source in the area where the stream crosses the border between Sections 19 and 30, T.48N., R.71W. Groundwater discharge from the alluvial aquifer is primarily by evapotranspiration. Alluvial groundwater levels tend to fluctuate seasonally, increasing rapidly in the spring in response to recharge from streamflow, and then decreasing throughout the remainder of the year in response to evapotranspiration (FCW 2003 and 2007).

Groundwater yields from the monitoring wells were very low, ranging from 0 – 3 gallons per minute (gpm). Aquifer testing of Duck Nest Creek alluvium within the current Belle Ayr Mine permit area, and the LBA tract, indicates that the alluvial aquifer has a very low hydraulic conductivity. These tests yield transmissivity values ranging from 4 – 26 gallons per day per foot (gpd/ft). The alluvium's saturated thickness in the BLM study area averages about 10 feet. Hydraulic conductivity values are likewise low, ranging from about 0.05 – 0.35 feet per day (ft/day) (FCW 2003). These test results demonstrate the low permeability of the fine-grained alluvial sediments.

Several seeps are found along the reach of the Duck Nest Creek near the border between Sections 19 and 30, T.48N., R.71W. Groundwater discharge from a saturated overburden sand body to the overlying alluvial deposits occurs in this area. The seepage rate is quite low and insufficient to sustain a base flow in the channel. The overburden groundwater discharge rate was estimated by FCW to be less than 0.1 acre-feet per year, which is only enough to create a marshy area with some small shallow pools of stagnant water. Patches of thick alkali crust is present around the edges of the pools and on the soil surface in this area. This marshy area, referred to as the "saline seeps", was disturbed by the currently permitted mining operation in 2006.

Duck Nest Creek alluvial groundwater quality is highly variable spatially and poor to very poor. At the saline seeps area, the average TDS concentration is over 30,000 milligrams per liter (mg/L), with a range of from about 20,000 mg/L to 51,000 mg/L. The alluvial groundwater type in this area is a magnesium or sodium sulfate type with the sulfate concentration averaging over 25,000 mg/L and ranging up to almost 33,000 mg/L. Both TDS and sulfate values are well over the maximum allowed in any Wyoming Department of Environmental Quality/Water Quality Division (WDEQ/WQD) use classification (WDEQ/WQD 2005). Discharge from overburden units in this area contributes to the poor alluvial water quality.

Alluvial groundwater quality in Section 19, about 2,000 feet upstream of the saline seeps area, is somewhat better but still poor. The TDS concentration is generally around 20,000 mg/L to 25,000 mg/L. The sulfate concentration ranges from approximately 12,500 mg/L to over 15,000 mg/L and the sodium adsorption ration (SAR) values are also high, ranging from 17.6 to 19.8. The alluvial water quality in the upper reach of the AVF study area is considerably above the recommended limits for any use classification.

Alluvial groundwater quality in Section 30, about 2,000 feet downstream of the saline seeps area, is considerably better but remains poor. The average TDS concentration is roughly 3,800 mg/L, and ranges from about 2,650 mg/L to 6,300 mg/L. The predominant constituents are magnesium and sulfate. The sulfate concentration averages around 1,900 mg/L and ranges from approximately 1,500 mg/L to 4,000 mg/L. Based on WDEQ/WQD standards, this water would be classified as Class III, which is suitable for livestock consumption only.

Wasatch Formation

Within the Powder River Basin (PRB), the Wasatch Formation (the strata lying above the mineable coal, also called the overburden) consists of non-marine, fluvial and aeolian deposits of interbedded sands, silts, and clays with occasional discontinuous deposits of coal and carbonaceous material. This description basically holds true for the area within and around the Belle Ayr North LBA Tract. The Wasatch strata range in cohesion from unconsolidated (i.e., loose sands and silts) 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. Overburden thickness in the Belle Ayr North LBA Tract area ranges from around 120 feet to 400 feet and averages around 295 feet.

The discontinuous nature of the sediments in the Wasatch Formation produces considerable variability in the occurrence of groundwater in the overburden both laterally and vertically. The hydraulic connection between water-bearing units 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. However, Wasatch sands and sandstones do provide limited amounts of groundwater for livestock and domestic uses on a local scale, provided the water quality is suitable.

Another geologic unit that may be 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 be a very permeable aquifer and can extend laterally for miles in the eastern PRB. The occurrence of scoria is site specific, typically occurring in areas where coal seams crop out at the surface. The hydrologic function of scoria is to provide infiltration of precipitation and recharge to laterally contiguous overburden and coal beds. Clinker outcrop areas occur along the Belle Ayr Mine's eastern permit boundary. Scoria does not occur on the LBA tract as applied for or on BLM's study area.

Water production from the overburden within and around the Belle Ayr Mine area is typically low. Most of the overburden is composed of massive silty and clayey shales of very low permeability. Distinct zones of relatively unconsolidated, discontinuous sand bodies are also present in the overburden in the Belle Ayr Mine permit area, some of which are saturated. These lenticular-shaped sand bodies are variable in nature and tend to be both vertically and horizontally isolated and discontinuous. Thicknesses range from 0 to over 150 feet and average around 30 to 40 feet. Given the low permeability of the silts and clays that isolate these sand bodies, groundwater yields from them are generally low. The overburden sand bodies therefore constitute minor aquifers of interest in the Belle Ayr Mine permit area (FCW 2003).

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 Belle Ayr North LBA Tract is recharged naturally by precipitation infiltration and infiltration of surface water runoff stored in nearby playa areas. Additional, artificial recharge occurs where in-channel reservoirs have been constructed for ranching operations and where groundwater is discharged to the surface from coal bed natural gas (CBNG) production. 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, there is likely some leakage between the aquifers that provides vertical recharge to the coal aquifer (FCW 2003).

Due to the discontinuous nature of the permeable overburden sediments, premine overburden groundwater movement generally followed the topography.

Before mining, overburden groundwater flow in the vicinity of the Belle Ayr Mine was generally toward, and discharged to the Belle Fourche River and Caballo Creek valleys. Groundwater flow has since been affected in the mine area by the removal of overburden, and west of the mine by dewatering operations. Monitor well data indicate that overburden groundwater in the Belle Ayr North general analysis area now flows toward the Belle Ayr's and neighboring mine's open pits. Overburden groundwater levels show steady decline in areas within about one-half mile of the mine pits as a result of mine drainage. Discharge from the overburden occurs in localized areas along Duck Nest and Caballo Creeks, where the saturated overburden sand bodies intercept the overlying alluvium. FCW (2003) estimated discharge from the overburden to be 22 acre-feet/year to Caballo Creek alluvium and 0.07 acre-feet/year to Duck Nest Creek alluvium.

For the Wasatch Formation as a whole in the PRB, the discontinuous nature of the water bearing units results in low overall hydraulic conductivity and low groundwater flow rates. Because of the varied nature of the aquifer units within the Wasatch, hydraulic properties are variable as well. Martin et al. (1988) reported that hydraulic conductivities within the Wasatch ranged from 10^{-4} ft/day to 10^{2} ft/day, 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 for the Cordero Rojo Mine, located south of and adjacent to the Belle Ayr Mine, indicate that the water-bearing Wasatch strata in this area have a low hydraulic conductivity, with a range of roughly two orders of magnitude (0.03 to 3.3 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. Hydraulic conductivity values determined for the overburden in the Caballo Mine area immediately north of the LBA tract are also low, ranging from 0.02 to 78 ft/day (Ogle et al. 2004). Transmissivity values calculated by aquifer testing of monitoring wells completed in the overburden sand bodies within the Belle Ayr Mine permit area are much greater, ranging from 1,650 gpd/ft to 2,580 gpd/ft, which is comparable to the Wyodak coal seam.

The quality of groundwater in the Wasatch Formation near the Belle Ayr North LBA Tract is variable and generally poor. TDS concentrations range from approximately 1,200 mg/L to 3,200 mg/L and the water type is characterized as a calcium/sodium-sulfate. Groundwater sampled from monitoring well PL 1902, which is located in Section 19, T.48N., R.71W. (Figure S1-3) and completed in shallow playa deposits, is of very poor quality, having a TDS concentration exceeding 7,000 mg/L (FCW 2007). The median TDS for the Wasatch Formation for the group of mines located between Gillette and Wright, as calculated by WDEQ/LQD based on 1,109 samples, is 2,996 mg/L (Ogle et al. 2005). Overburden groundwater is generally considered to be unsuitable for

domestic consumption and irrigation use, but is suitable for livestock and wildlife use.

Wyodak Coal

The Tongue River Member of the Fort Union Formation contains the mineable coal zone, which is often divided by partings that separate it into two or more units. The mineable coal zones are variously referred to as the Anderson and Canyon, Roland and Smith, Wyodak-Anderson, Upper and Lower Wyodak, or Wyodak seams. At the Belle Ayr Mine it is referred to as the Wyodak seam. In the Belle Ayr North LBA Tract area, the Wyodak seam ranges from 66 to 76 feet thick, with an average thickness of approximately 72 feet. A general discussion of the coal seam aquifer is presented as follows.

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. Historically, the Fort Union coal seams have been a source of groundwater for domestic and livestock uses in the eastern PRB. However, due to the 1 to 3 degree west-northwest dip of the coal beds, the coal generally becomes too deep to be an economical source of water within a couple of miles west of the PRB surface coal mines, including Belle Ayr Mine.

Hydraulic conductivity within the coal seams 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. Localized zones of moderately high transmissivity occur 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. 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 increased by orders of magnitude over that in the coal fractured by unloading only. Such increased permeability in the coal aquifer is seen southwest of the Belle Ayr Mine area, and is attributed to structural development that has produced additional fracturing. Coal permeability values are highly variable in the general south Gillette analysis area, indicating extreme variations in the fracture densities. Hydraulic conductivity values, using a mean saturated thickness of 75 feet, range from 0.008 to 6.0 ft/day in the Belle Ayr Mine area (FCW 2003).

Recharge to the coal occurs principally by infiltration of precipitation in the clinker outcrop areas along the flank of the eastern Powder River structural basin. Secondary vertical recharge from the overburden also occurs, but is highly variable. Prior to mining, the direction of groundwater flow within the

areally continuous 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 the outcrop area. Water levels were generally above the top of the coal away from the outcrop.

Site-specific water-level data collected from monitoring wells by Belle Ayr Mine and other Gillette area coal mining companies and 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. Groundwater levels observed near active mining areas prior to 1997 were likely due to mine dewatering alone and the groundwater flow direction within the coal aquifer was typically toward the mine excavations. By 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 closeness 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 and areally extensive drawdown caused by CBNG development.

Recent coal seam water level data presented in the GAGMO 25-year report (Hydro-Engineering 2007) illustrate that approximately 150 feet of drawdown has occurred near the western edge of the Belle Ayr North LBA Tract, and approximately 50 feet of drawdown has occurred near the tract's eastern edge. The 2005 coal seam water level contours in the area of the Caballo, Belle Ayr, and Cordero Rojo mines depict the groundwater flow direction to be entirely to the west, away from the open pits. Roughly 30 years of surface mining and CBNG development has resulted in complete dewatering of the coal seams in localized areas, particularly near the mines' pits and where the coal seams are structurally highest.

Coal groundwater is typically only suitable for livestock and wildlife watering purposes because certain constituent concentrations commonly exceed many suitability criteria for domestic uses, and the water may have a high salinity and sodium hazard, which makes it unsuitable for agricultural uses. Within the Belle Ayr Mine 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 fairly uniform and there are no seasonal or long-term trends in composition. The predominant cation is sodium, while the predominant anion is bicarbonate. Those coal monitoring wells located closer to the coal-scoria contact have greater sulfate concentrations (FCW 2003). In the Belle Ayr Mine area, TDS concentrations range from 442 mg/L to 2,224 mg/L, and average approximately 950 mg/L. This compares to a median TDS of 920 mg/L calculated by the WDEQ/LQD for

the Belle Aye Mine and adjacent mines, based on 1,200 samples collected from the coal aquifer (Ogle et al. 2005).

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. The most productive wells in the vicinity of the Belle Ayr Mine are completed in the Tullock aquifer at depths ranging from 800 to 1,200 feet below ground level.

Mining does not directly disturb the hydrogeologic units below the mineable 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 the aquifer's 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 shallower 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^2/day. Two industrial water supply wells within Belle Ayr Mine's existing permit area are completed in the Fort Union Formation. Belle Ayr No. 2 Well is completed in the upper Tongue River aquifer; it is 1,100 feet deep and its perforations are at a depth of 613 – 671 ft. Plant #2 Well is completed in the Tullock aquifer; it is 1,210 feet deep and its perforations are at a depth of 1,023 – 1,150 ft. An aquifer test was conducted on Plant #2 well and the transmissivity was calculated to be approximately 54 ft^2/day. The locations of these mine supply wells are shown on Figure S1-3.

The water quality of the subcoal Fort Union Formation is generally good, meeting the standards for domestic use, as well as irrigation and livestock use (Ogle et al. 2004). 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 typically of the sodium-bicarbonate type. Belle Ayr No. 2 Well provides potable water for the mine and it is sampled periodically. The water quality meets WDEQ/WQD Class I standards (WDEQ/WQD 2005), the water type is sodium-bicarbonate, TDS concentrations are typically around 260 mg/L, and the pH is around 8.0 (FCW 2003 and 2007).

Lance Formation-Fox Hills Sandstone

Underlying the Fort Union Formation is the Lance Formation of Cretaceous age. The Lance Formation is comprised of an upper confining layer and a lower aquifer. Individual sandstone beds of the lower aquifer sequence are up to about 100 feet thick, are fine-grained, and contain variable amounts of interbedded clay and silt. The Fox Hills Sandstone underlies the Lance Formation and is usually difficult to distinguish from the Lance. The Fox Hills is described as a well-developed, fine- to medium-grained, marine sandstone that contains thin beds of sandy shale and probably averages around 250 feet thick beneath the Belle Ayr North LBA Tract. 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.

Two industrial water supply wells within Belle Ayr Mine's existing permit area are completed in the Lance/Fox Hills aquifer. Belle Ayr No. 4 Well was converted from an abandoned oil exploration well, and Belle Ayr No. 5 Well was completed in 2004. Belle Ayr No. 4 Well was drilled to 10,200 ft, cased to 4,262 ft, and its perforations are at a depth of 2,967 – 3,980 ft below ground level. Belle Ayr No. 5 was drilled to a depth of 4,070 ft below ground level. The locations of these mine supply wells are shown on Figure S1-3.

The quality of groundwater from the Lance/Fox Hills aquifer is generally good, but does not meet the standards for domestic use due to high concentrations of TDS and fluoride. Sodium and bicarbonate are typically the predominant ionic constituents. Belle Ayr No. 4 Well is sampled periodically and the water type is a sodium-bicarbonate with TDS concentrations consistently around 1,000 mg/L and a pH of 8.2 (FCW 2007).

S1-5.2 Surface Water

The Belle Ayr 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. Lying between the Powder River and Cheyenne River drainage basins is the Belle Fourche River drainage system, which 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.

The Belle Ayr Mine lies within the Caballo Creek watershed, which is a tributary of the Belle Fourche River. Caballo Creek flows from west to east through the mine's permit area and empties into the Belle Fourche River approximately 7 miles east-southeast of the Belle Ayr North LBA Tract in Section 3, T.47N., R.70W. (Figure S1-4). The total drainage area for Caballo Creek is approximately 260 square miles, and 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 Fourche River.

The Belle Ayr Mine disturbs several drainages within the Caballo Creek watershed and Caballo Creek is currently diverted by the mining operation. The Belle Ayr Mine is currently permitted to disturb approximately 7 percent of the Caballo Creek drainage basin. The entire undisturbed Caballo Creek drainage basin was extensively studied by the Belle Ayr Mine and the results of that study are included in the mine and reclamation permit (FCW 2003). A large portion of the Belle Ayr North LBA Tract is within the mine's existing permit area, and Duck Nest Creek, a southeast-flowing ephemeral tributary of Caballo Creek, drains the western portion of the LBA tract. Two smaller, first order tributaries of Caballo Creek (called Draw No. 1 and Draw No. 2 by the Belle Ayr Mine) and three playas formed by natural topographic depressions drain the eastern portion of the Belle Ayr North LBA Tract. The Belle Aye Mine permit area, the Belle Ayr North LBA Tract, and a portion of the undisturbed Caballo Creek watershed are shown on Figure S1-4.

The topography of the Belle Ayr North LBA Tract, like the area within the mine's existing permit area, is essentially flat to gently rolling, and internally-drained playas are common topographic and hydrologic features. Three areas on the LBA tract do not contribute runoff to any stream and playas have formed in the lowest portions of these non-contributing drainage basins. A roughly 180-acre playa exists at the border between Sections 18 and 19, T.48N., R.71W. and Section 13, T.48N., R71W., a roughly 24-acre playa exists in the SW¼ of Section 20, T.48N., R71W., and a roughly 34-acre playa exists in the NW¼ of Section 28, T.48N., R71W. These playas, being within the Caballo Creek watershed and the mine's permit area, were studied in the evaluation of the Caballo Creek drainage basin. The hydrologic characteristics of these non-contributing drainages were quantified and are included in Belle Ayr Mine's mine and reclamation permit (FCW 2003).

Near the headwaters of Duck Nest Creek, the stream channel elevation is about 4,920 ft. Total topographic relief in the stream's basin is 474 feet, the channel thalweg length is about 9.25 miles, and the average channel gradient is 0.0068. The channel elevation is about 4,535 ft where it enters the LBA tract and approximately 4,525 ft where it leaves the LBA tract, which is at the edge of the

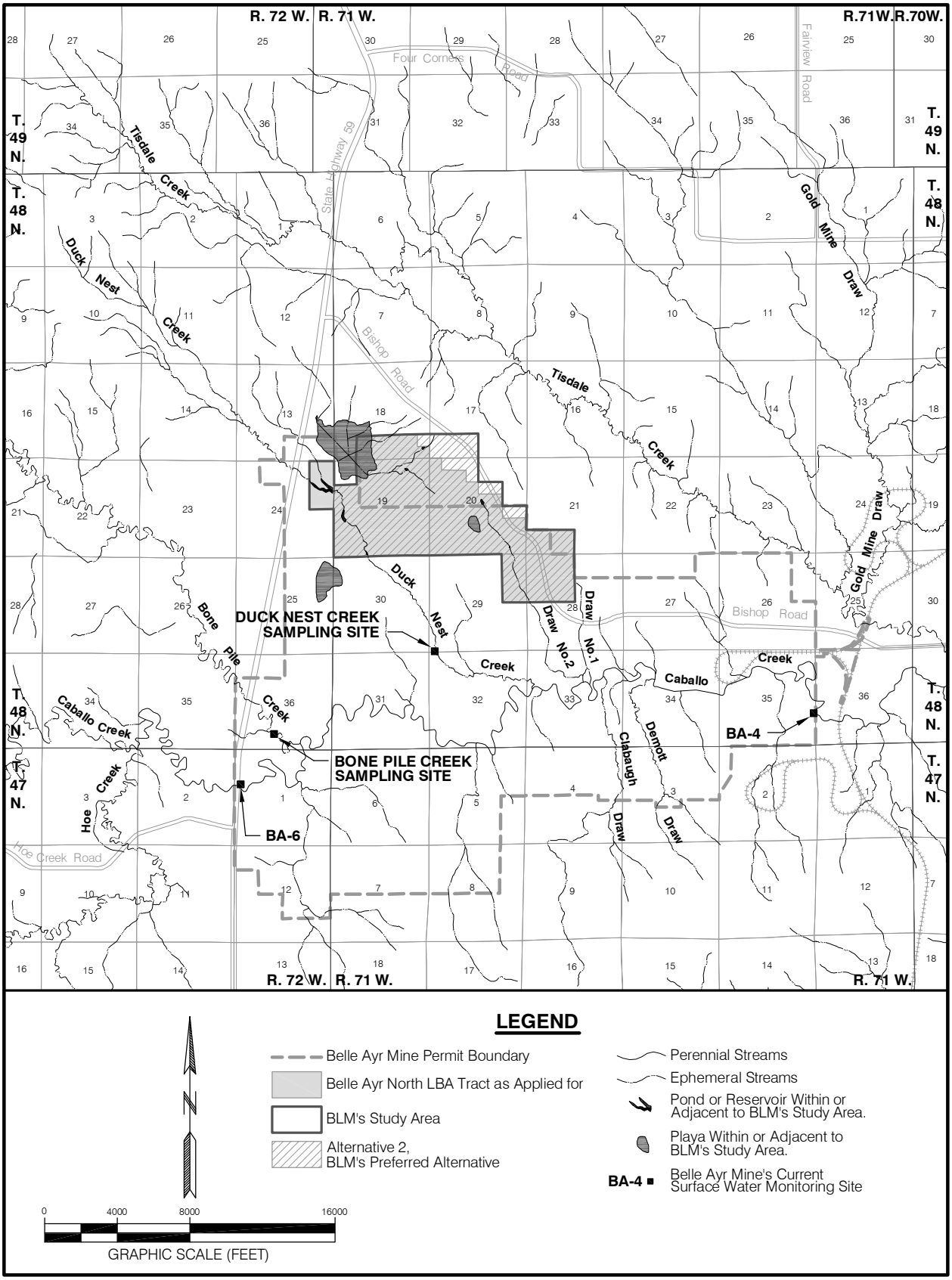

Figure S1-4. Surface Water Features Within and Adjacent to the Belle Ayr North LBA Tract.

current mining disturbance limit (FCW 2007). Between the point at which Duck Nest Creek enters Belle Ayr Mine's permit area to its mouth, the channel thalweg spans approximately 34,000 ft and drops in elevation about 85 ft; the channel gradient of this span is approximately 0.0025 (or 13. ft per mile). The stream's thalweg spans approximately 8,600 ft and drops in elevation about 21 feet, which is a gradient of 0.0025, across the LBA tract. Duck Nest Creek has a total drainage area of approximately 6.6 square miles. The drainage area upstream of where the stream leaves the LBA tract is about 4.6 square miles.

Duck Nest Creek drains about 23 percent of the Belle Ayr North LBA Tract, Draw No. 1 drains about 1 percent, and Draw No. 2 drains about 18 percent of the tract. The three non-contributing drainages and playas cover the balance (58 percent) of the LBA tract.

All streams 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 ephemeral 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 therefore the percentage of annual runoff volume can be considerable. During the spring, general storms (both rain and snow) are more frequent; hence increasing soil moisture and decreasing infiltration capacity, and subsequent rainstorms can result in higher runoff volumes and peak discharges.

Belle Ayr Mine has not monitored the streamflow of Duck Nest Creek; however, surface runoff flood estimates for the drainage were computed and are included in the mine permit. Flood peaks and runoff volumes were estimated using various runoff estimating methods. Using the mean unit runoff values from four U.S. Geological Survey gaging stations in the near vicinity (9.3 acre-feet/year/square mile), Duck Nest Creek's average annual runoff was estimated to be approximately 61 acre-feet. The Sedimot II Watershed Model, which was determined to be the most representative of the predictive methods, estimated the runoff volume and peak discharge from the 10-year, 24-hour precipitation event to be 250 acre-feet and 318 cubic feet per second, respectively (FCW 2003).

Prior to all mining disturbances, five in-channel stock reservoirs were located along Duck Nest Creek within Belle Ayr Mine's existing permit area. These impoundments served to capture most of the streamflow, causing pronounced stream channel aggradation to the point at which it is difficult in places to distinguish the active channel from abandoned channel scars. The channel floor and banks are vegetated, no active erosion is evident, and the channel profile is irregular indicating the reduced streamflow cannot maintain its former gradient prior to the construction of the stock ponds. Due to the relatively small drainage area and the storage capacity of the impoundments, streamflow events are limited and heavily regulated (FCW 2003).

Springs are uncommon in the vicinity of the LBA tract, although a marshy area occurs along a short reach of Duck Nest Creek, near the border between Sections 19 and 30, T.48N., R71W., where groundwater discharges from the overburden bedrock to the overlying alluvium. These seeps are persistent, but the seepage rate is insufficient to sustain a base flow in the channel and only enough to create a marshy area with some shallow pools of stagnant water. Patches of thick alkali crust is present around the edges of the pools and on the soil surface in this area.

Duck Nest Creek is listed in the WDEQ/WQD Surface Water Classification List as a Class 3B stream that is not known to support fish populations or drinking water supplies. Class 3B waters are intermittent or ephemeral streams with sufficient water present to normally support aquatic life including invertebrates, amphibians, or other flora and fauna at some stage of their life cycles. Class 3B waters are also characterized by frequent linear wetlands or impoundments, over its entire length (WDEQ/WQD 2007). Other streams within and near the Belle Ayr North general analysis area (e.g., Tisdale Creek, Bone Pile Creek, Draw No. 2, and Caballo Creek) are also categorized as Class 3B streams.

Due to the lack of natural streamflow in Duck Nest Creek, few flowing water quality samples have been collected from the stream. All surface water samples were collected from the Duck Nest Creek Sampling Site location, shown on Figure S1-4. The streamflow at the time of sampling was typically less than 0.25 cubic foot per second, or roughly 100 gallons per minute. Analyses indicate generally good quality water having a TDS concentration of about 200 mg/L, an average SAR of 0.98, and the water type was either a magnesium or potassium sulfate. Belle Ayr Mine no longer monitors the water quality in Duck Nest Creek because the stream at the sampling site location has been disturbed by the mining operation.

The streamflow and water quality in Caballo Creek are currently being monitored by the Belle Ayr Mine at Sites BA-4 and BA-6 (Figure S1-4), which are located downstream and upstream of the mine operation, respectively, and the data are being reported to the WDEQ in the mine's annual reports. Under current conditions, discharges from CBNG development in the Caballo Creek drainage basin have altered the frequency and duration of streamflow events and water quality in the main stream and some of its tributaries. The majority of Caballo Creek streamflow is currently from CBNG discharges that the Belle Ayr Mine does not control (FCW 2007).

S1-5.3 Water Rights

The Wyoming State Engineer's Office (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 Belle Ayr North LBA Tract. This information is required for WDEQ permitting. SEO data indicate that, as of June 28, 2007, there were 1,103 permitted water wells within 3 miles of the tract, of which, 717 wells are owned by coal mining companies. The other 386 non-coal mine related, permitted water wells, which include 315 wells permitted for uses related to CBNG development, are permitted for the following uses:

- 315 CBNG
- 31 livestock
- 21 domestic
- 11 monitoring
- 5 industrial
- 2 miscellaneous
- 1 irrigation

SEO records have been searched for surface water rights within a 3-mile radius of the BLM study area for the Belle Ayr North LBA Tract. Like the groundwater rights, this information is also required for WDEQ permitting. SEO records indicate that as of July 6, 2007, there were 186 permitted surface water rights within 3 miles of the tract, of which 95 are owned by coal mining companies. The other 91 non-coal mine related, permitted surface water rights are permitted for the following uses:

- 16 irrigation
- 13 livestock
- 4 irrigation and domestic
- 1 livestock and domestic
- 1 reservoir supply
- 56 not designated

A listing of the non-coal mine related groundwater and surface water rights as of June 28, 2007 is presented in Table S1-4.

S1-6 ALLUVIAL VALLEY FLOORS

The Belle Ayr North LBA Tract lies within the Caballo Creek watershed. Duck Nest Creek, a southeast-flowing ephemeral tributary of Caballo Creek, drains the western portion of the Belle Ayr North LBA Tract. Two smaller, unnamed ephemeral tributaries of Caballo Creek and three playas formed by natural topographic depressions drain the balance of the LBA tract. Those portions of Caballo Creek and its tributaries that lie within Belle Ayr Mine's existing permit area have been investigated for the presence of alluvial valley floors (AVFs). A large portion of the Belle Ayr North LBA Tract is within the mine's existing

Table S1-4. Groundwater Rights for Belle Ayr North LBA Tract.

Permit No.	Priority	TNP	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
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
P130329W	10/16/2000	47	71	7	SWNW	RMG I, LLC	DUNLAP 7-12-47-71-A	GST	CBM	25	415
P130330W	10/16/2000	47	71	7	SWSW	RMG I, LLC	DUNLAP 7-14-47-71-A	GST	CBM	25	366
P130331W	10/16/2000	47	71	7	NENW	RMG I, LLC	DUNLAP 7-21-47-71-A	GST	CBM	25	416
P130332W	10/16/2000	47	71	7	SENW	RMG I, LLC	DUNLAP 7-22-47-71-A	GST	CBM	25	439
P130333W	10/16/2000	47	71	7	SESW	RMG I, LLC	DUNLAP 7-24-47-71-A	GSI	CBM		
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
P130458W	10/25/2000	47	71	7	NENE	RMG I, LLC	DUNLAP 7-41-47-71-A	GST	CBM	25	344
P130459W	10/25/2000	47	71	7	NWNE	RMG I, LLC	DUNLAP 7-31-47-71-A	GST	CBM	25	390
P130691W	11/3/2000	47	71	6	SENW	RMG I, LLC	RAG 6- 22 - 47 -71 - A	GST	CBM	25	293
P131773W	12/29/2000	47	71	7	SWNE	RMG I, LLC	DUNLAP 7 - 32 - 47 - 71 - A	GST	CBM		424
P131774W	12/29/2000	47	71	7	NESW	RMG I, LLC	DUNLAP 7 - 23 - 47 - 71 - A	GST	CBM	100	386
P131775W	12/29/2000	47	71	6	NWNE	RMG I, LLC	DUNLAP 6 - 31 - 47 - 71 - A	GST	CBM	100	326
P131776W	12/29/2000	47	71	6	NESW	HI-PRO PRODUCTION L.L.C.	DUNLAP 6 - 23 - 47 - 71 - A	GST	CBM	100	321
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
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	SENW	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		
P132118W	12/29/2000	47	71	7	SWNW	RMG I, LLC	ENL DUNLAP 7-12-47-71--A	UNA	CBM		
P132119W	12/29/2000	47	71	7	SWSW	RMG I, LLC	ENL DUNLAP 7-14-47-71--A	GST	CBM	75	366
P132120W	12/29/2000	47	71	7	NENW	RMG I, LLC	ENL DUNLAP 7-21-47-71--A	UNA	CBM		
P132121W	12/29/2000	47	71	7	SENW	RMG I, LLC	ENL DUNLAP 7-22-47-71--A	UNA	CBM		
P132122W	12/29/2000	47	71	7	NWNE	RMG I, LLC	ENL DUNLAP 7-31-47-71--A	UNA	CBM		
P132123W	12/29/2000	47	71	7	NENE	RMG I, LLC	ENL DUNLAP 7-41-47-71--A	UNA	CBM		
P133807W	4/6/2001	47	71	7	SESW	RMG I, LLC	ENL. DUNLAP 7-24-47-71-A	GST	CBM	75	391
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
P134269W	4/19/2001	47	71	7	NWSW	RMG I, LLC	DUNLAP 7-13-47-71-A	GST	CBM	100	368
P136837W	7/3/2001	47	71	7	SWSW	RMG I, LLC	DUNLAP 7-14-B	GST	CBM	100	1258
P136839W	7/3/2001	47	71	7	NESW	RMG I, LLC	DUNLAP 7-23-B	GST	CBM	100	1192
P136840W	7/3/2001	47	71	7	SWNW	RMG I, LLC	DUNLAP 7-24-B	GST	CBM	100	1124
P5514P	5/8/1958	47	71	4	SWSW	LESLIE CLABAUGH	CLABAUGH #3	GST	STO	4	210
P5516P	7/14/1966	47	71	8	SESE	LESLIE CLABAUGH	CLABAUGH #5	GST	STO	5	120
P79080W	2/13/1989	47	71	4	NWSW	COMDISCO EXPLORATION	ROYAL DRAW UNIT #1		MIS	15	10500
P125371W	5/9/2000	47	72	3	NENE	NORTH FINN, LLC	OXBOW #41-3	GST	CBM	4	474
P125372W	5/9/2000	47	72	2	SENW	NORTH FINN, LLC	OXBOW #22-2	GST	CBM	0	422
P130321W	10/16/2000	47	72	1	NWSE	RMG I, LLC	DUNLAP 1-33-47-72A	GST	CBM	25	373

Table S1-4. Groundwater Rights for Belle Ayr North LBA Tract (Continued).

Permit No.	Priority	TNP	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
P130322W	10/16/2000	47	72	1	SWSE	RMG I, LLC	DUNLAP 1-34-47-72A	GST	CBM	25	366
P130323W	10/16/2000	47	72	1	NESE	RMG I, LLC	DUNLAP 1-43-47-72-A	GST	CBM	25	350
P130324W	10/16/2000	47	72	1	SESE	RMG I, LLC	DUNLAP 1-44-47-72-A	GST	CBM	25	368
P130689W	11/3/2000	47	72	1	SWSW	RMG I, LLC	RAG 1-14-47-72-A	GST	CBM	25	420
P130690W	11/3/2000	47	72	1	NENW	RMG I, LLC	RAG 1- 21 - 47 -72 - A	GST	CBM	25	347
P131128W	11/20/2000	47	72	3	SENW	CONOCO PHILLIPS COMPANY	FEDERAL 3-22-47-72	GST	CBM	20	463
P131129W	11/20/2000	47	72	3	NESE	CONOCO PHILLIPS COMPANY	FEDERAL 3-43-47-72	GST	CBM	20	439
P131145W	11/20/2000	47	72	3	SWSE	CONOCO PHILLIPS COMPANY	FEDERAL 3-34-47-72	GST	CBM	20	473
P131168W	11/20/2000	47	72	3	NENW	CONOCO PHILLIPS COMPANY	FEDERAL 3-21-47-72	GST	CBM	20	469
P131169W	11/20/2000	47	72	3	NWSE	CONOCO PHILLIPS COMPANY	FEDERAL 3-33R-47-72	GST	CBM	20	440
P132109W	12/29/2000	47	72	1	SWSW	HI-PRO PRODUCTION L.L.C.	ENL R.A.G. 1-14-47-72-A	UNA	CBM		
P132110W	12/29/2000	47	72	1	NENW	RMG I, LLC	ENL R.A.G. 1-21-47-72-A	UNA	CBM		
P132149W	12/29/2000	47	72	1	SWSE	RMG I, LLC	ENL DUNLAP 1-34-47-72 - A	UNA	CBM		
P132150W	12/29/2000	47	72	1	NWSE	RMG I, LLC	ENL DUNLAP 1-33-47-72 - A	UNA	CBM		
P133780W	4/6/2001	47	72	1	NESE	RMG I, LLC	ENL. DUNLAP 1-43-47-72-A	GST	CBM	75	350
P133781W	4/6/2001	47	72	1	SESE	RMG I, LLC	ENL. DUNLAP 1-44-47-72-A	GST	CBM		
P133804W	4/6/2001	47	72	1	NWSW	RMG I, LLC	ENL. MORGAN 1-13	GST	CBM	80	383
P133825W	4/6/2001	47	72	1	NESW	RMG I, LLC	RAG 1-23-47-72-A	GST	CBM	100	376
P81886W	2/27/1990	47	72	2	NENW	PRESIDIO EXPLORATION INC** LYNDE TRUST	LYNDE 1 2 WSW	UNA	IND	25	4570
P90656W	1/19/1993	47	72	2	NWNW	MARTENS & PECK OPERATING CO.	MON #2-11-C	GST	MON	0	410
P90657W	1/19/1993	47	72	2	NWNW	MARTENS & PECK OPERATING CO.	MON #2-11-S	GST	MON	0	310
P90658W	1/19/1993	47	72	2	NWNW	MARTENS & PECK OPERATING CO.	MON #22-42-C	GST	MON	0	515.5
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		
P102848W	6/28/1996	48	71	6	SWNW	KIRK & TERESA BLACKFORD	BLACKFORD #1	GST	DOM	18	10480
P10600P	12/31/1950	48	71	6	NWSW	PLACIDE ROBBINS	GUMBO FLAT #2	GST	STO	17	180
P106998W	8/6/1997	48	71	7	SWSW	KEN HALL	HALL #1	GST	DOM	22	756
P130089W	10/19/2000	48	71	7	NWNE	PAUL D. ROURKE	TISDALE #1	GST	STO	5	240
P131233W	11/30/2000	48	71	5	NESW	PENNACO ENERGY, INC.	ROURKE FEDERAL #11-5-48-71A	GST	CBM	60	312
P139416W	10/3/2001	48	71	7	SWSW	WALTER AND BRENDA SINCLAIR	SINCLAIR # 1	GSI	DOM		
P142205W	5/7/2001	48	71	8	SWNE	BLACKSTONE OPERATING, INC	SC 8-32	GSI	CBM		
P142206W	5/7/2001	48	71	4	SWNE	BLACKSTONE OPERATING, INC	SC 4-32	GSI	CBM		
P162715W	9/24/2004	48	71	7	SWSW	BOB AND CRYSTAL JOHNSON	SINCLAIR #1	GST	DOM	20	1022
P169457W	8/15/2005	48	71	7	SWNW	KENNETH & ANGELA BERTALOT	BERTALOT #2	GSI	DOM		
P16961P	12/31/1939	48	71	5	NESW	JAMES H. CASSIDY	CASSIDY #5	GST	STO	10	300
P18139P	12/31/1957	48	71	11	NWSW	MELVIN D. & ETHEL L. CLARK	HOUSE #1	GST	STO	5	170
P18140P	12/31/1956	48	71	11	NWSW	MELVIN D. & ETHEL L. CLARK	HOUSE #2	GST	DOM	10	170
P18141P	12/31/1920	48	71	11	SWSW	MELVIN D. & ETHEL L. CLARK	ORIGINAL #3	GST	STO	5	30
P28296W	10/3/1974	48	71	6	NWSE	W. A. MONCRIEF	ROURKE #9		IND	100	4480
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	ELSOUTH #2	GST	STO	15	260
P66663W	3/20/1984	48	71	7	SWNW	STEVEN E. & DEBORA R. JOHNSON	JOHNSON #1	GST	DOM	15	310
P67809W	6/27/1984	48	71	7	NWSW	KENNETH K. & ANGELA M. BERTALOT	BERTALOT #1	GST	DOM	10	200
P69168W	12/27/1984	48	71	4	NESW	ELMORE LIVESTOCK COMPANY	EL SOUTH #5	GST	STO	25	160
P70703W	7/24/1985	48	71	6	NWNW	GENE & DELORES ALBERY**LEE & LORI EDWARDS	EDWARDS #1 (DEEPENED)	GST	DOM	20	932
P88920W	7/27/1992	48	71	3	NWNW	BALLARD PETROLEUM HOLDINGS LLC	W.D. WATER WELL #1	UNA	IND	60	2070

Table S1-4. Groundwater Rights for Belle Ayr North LBA Tract (Continued).

Permit No.	Priority	TNP	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
P92050W	6/17/1993	48	71	7	NWSW	DAVID THOMPSON	DT #1	GST	DOM	4	320
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		
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
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
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
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
P130445W	10/25/2000	48	71	20	SENW	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
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
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
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
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	SENW	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

Table S1-4. Groundwater Rights for Belle Ayr North LBA Tract (Continued).

Permit No.	Priority	TNP	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
P131541W	12/13/2000	48	71	19	NWSE	RMG I, LLC	ENL. R.A.G. 19-33	GST	CBM	70	394
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
P131770W	12/29/2000	48	71	20	NWNW	RMG I, LLC	DUNLAP 20 - 11 - 48 - 71 - A	GST	CBM	100	418
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		
P132129W	12/29/2000	48	71	18	SWSW	HI-PRO PRODUCTION L.L.C.	ENL DUNLAP 18-14-48-71-A	UNA	CBM		
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		
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 ADDITIONAL 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		
P132138W	12/29/2000	48	71	19	SESE	HI-PRO PRODUCTION L.L.C.	ENL DUNLAP 19-44-48-71-A	UNA	CBM		
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	SENW	RMG I, LLC	ENL DUNLAP 20-22-48-71-A	UNA	CBM		
P132141W	12/29/2000	48	71	23	NESW	RMG I, LLC	ENL R.A.G. 23-23-A	UNA	CBM		
P133819W	4/6/2001	48	71	17	SWSW	RMG I, LLC	DUNLAP 17-14-48-71-A	GST	CBM	100	432
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
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
P142600W	1/31/2002	48	71	21	SWNE	BLACKSTONE OPERATING	CABALLO 21-32	GST	CBM	10	308
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
P142604W	1/31/2002	48	71	16	NESW	BLACKSTONE OPERATING, INC	CABALLO 16-23	GST	CBM	10	294

Table S1-4. Groundwater Rights for Belle Ayr North LBA Tract (Continued).

Permit No.	Priority	TNP	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
P142605W	1/31/2002	48	71	16	SWSW	BLACKSTONE OPERATING, INC** WY STATE BOARD OF LAND COMMISSIONERS	CABALLO 16-14	GST	CBM	10	334
P142606W	1/31/2002	48	71	16	NENW	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
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
P152718W	6/30/2003	48	71	21	SWNE	BLACKSTONE OPERATING	ENL. CABALLO 21-32	GST	CBM	1	308
P152768W	6/30/2003	48	71	21	NENW	BLACKSTONE OPERATING	ENL. CABALLO 21-21	GST	CBM	6	323
P16958P	3/31/1962	48	71	25	NWNW	JAMES H. CASSIDY	CASSIDY #2	GST	STO	7	105
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	SENW	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	SENW	ROCKY MOUNTAIN GAS INC.	MOYER PILOT 19-22S-48-71	GSI	CBM		
P172444W	12/9/2005	48	71	19	SENW	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		
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
P18773P	12/31/1945	48	71	15	NENE	MORRIS A. CLARK	CLARK #1	GST	STO	10	165
P39054W	7/11/1977	48	71	21	NENE	CARTER OIL COMPANY** CAMPBELL COUNTY CONRETE INC.	C C #2	GSM	MIS	60	108
P424G	1/18/1956	48	71	25	NWNW	JAMES H. CASSIDY	CASSIDY #1	UNA	IRR	350	47
P72993W	8/4/1986	48	71	13	NENE	U.S. GEOLOGICAL SURVEY	CA 2	UNA	MON		
P72994W	8/4/1986	48	71	24	SWSW	U.S. GEOLOGICAL SURVEY	CA 3	UNA	MON		
P78550W	11/23/1988	48	71	21	NWNE	CHUCK ROURKE	ROURKE STOCK WELL (NWNE SECTION 21)	GST	STO	5	325
P99057W	4/24/1995	48	71	36	NENE	PETROGULF CORPORATION	CLABAUGH #41-2 WSW	UNA	IND	30	3400
P10602P	12/31/1916	48	72	1	NENE	PLACIDE ROBBINS	RANCH #1	GST	DOM	10	60

Table S1-4. Groundwater Rights for Belle Ayr North LBA Tract (Continued).

Permit No.	Priority	TNP	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
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
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
P17457W	12/27/1972	48	72	3	NWNE	ROBERT P. MCCREERY	BUTTE #8	GST	STO	3	194
P108411W	12/15/1997	48	72	10	NWNW	BARRETT RESOURCES CORPORATION	AP #11-10	GST	CBM	26	845
P110249W	4/27/1998	48	72	12	NESE	MALCOLM P/LORALEI SHEPARD	SHEPARD #1	GST	DOM	10	490
P124263W	3/23/2000	48	72	12	NWSE	FOUNDATION COAL WEST, INC.AMAX LAND COMPANY** CABALLO COAL COMPANY** QUANTUM ENERGY	AMAX FEDERAL #33-12	GST	CBM	2	577
P124264W	3/23/2000	48	72	12	SWSW	FOUNDATION COAL WEST, INC.AMAX LAND COMPANY** CABALLO COAL COMPANY** QUANTUM ENERGY	HJORTH FEDERAL #44-12	GST	CBM	5	550
P128669W	9/5/2000	48	72	11	NWSW	J. M. HUBER CORPORATION	HUBER/RAG 11-13	GST	CBM	6	592
P128670W	9/5/2000	48	72	11	SWSW	J. M. HUBER CORPORATION	HUBER/RAG 11-14	GST	CBM	5	581
P128671W	9/5/2000	48	72	11	NESW	J. M. HUBER CORPORATION	HUBER/RAG 11-23	GST	CBM	5	590
P128672W	9/5/2000	48	72	11	SESW	J. M. HUBER CORPORATION	HUBER/RAG 11-24	GST	CBM	6	555
P128673W	9/5/2000	48	72	11	NWSE	J.M.HUBER CORPORATION	HUBER/RAG 11-33	GST	CBM	7	625
P128674W	9/5/2000	48	72	11	NENE	J.M. HUBER CORPORATION	HUBER/RAG 11-41	GST	CBM	1	520
P128675W	9/5/2000	48	72	11	SENE	J. M. HUBER CORPORATION	HUBER/RAG 11-42	GST	CBM	2	569
P128676W	9/5/2000	48	72	12	NWNW	J. M. HUBER CORPORATION	HUBER/RAG 12-11	GST	CBM	0	467
P128677W	9/5/2000	48	72	12	NENW	J. M. HUBER CORPORATION	HUBER/RAG 12-21	GST	CBM	15	457
P138929W	9/5/2001	48	72	11	SENW	J. M. HUBER CORPORATION	RAG FED 11-22 48-72	GST	CBM	7	665
P147716W	10/21/2002	48	72	11	SESW	J M HUBER CORPORATION	RAG 14E-11 48-72	GSI	CBM		
P150217W	3/31/2003	48	72	12	NENE	RUSSELL & MICHELLE SHAHAN	SHAHAN 1	GST	DOM	20	330
P18198P	12/31/1968	48	72	12	SESE	JAMES F. ROURKE**PAUL ROURKE**BERNARD ROURKE	LESTER #1	GST	STO	2	130
P70657W	7/16/1985	48	72	12	SENE	CAROLE S. COLEMAN**MARC C. COLEMAN	CC WW 1	GST	DOM	20	335
P70728W	7/1/1985	48	72	12	NESE	DAVID W. & JEAN M. WAGNER	WAGNER WELL #1	GST	DOM	20	647
P81938W	3/9/1990	48	72	12	SESE	CURTIS AND LORI HJORTH	HJORTH #1	GST	DOM	10	1016
P90502W	12/21/1992	48	72	12	NENE	JESS I. GRAY	GRAY #1	GST	STO	3	35
39/3/309W	9/26/2006	48	72	14	SWSW	WINDSOR ENERGY GROUP LLC	FEDERAL 14-14	UNA	CBM		
P128658W	9/5/2000	48	72	14	NENW	J. M. HUBER CORPORATION	HUBER/RAG 14-21	GST	CBM	13	547
P128659W	9/5/2000	48	72	14	SENW	J. M. HUBER CORPORATION	HUBER/RAG 14-22	GST	CBM	5	549
P128660W	9/5/2000	48	72	14	NESW	J.M. HUBER CORPORATION	HUBER/RAG 14-23	GST	CBM	12	604
P128661W	9/5/2000	48	72	14	SESW	J.M.HUBER CORPORATION	HUBER/RAG 14-24	GST	CBM	1	593
P128662W	9/5/2000	48	72	14	NWNE	J. M. HUBER CORPORATION	HUBER/RAG 14-31	GST	CBM	1	505
P128663W	9/5/2000	48	72	14	SWNE	J. M. HUBER CORPORATION	HUBER/RAG 14-32	GST	CBM	5	509
P128664W	9/5/2000	48	72	14	NWSE	J.M. HUBER CORPORATION	HUBER/RAG 14-33	GST	CBM	5	560
P128665W	9/5/2000	48	72	14	SWSE	J.M.HUBER CORPORATION	HUBER/RAG 14-34-48-72	GST	CBM	4	528
P128666W	9/5/2000	48	72	14	NENE	J. M. HUBER CORPORATION	HUBER/RAG 14-41	GST	CBM	2	506
P128667W	9/5/2000	48	72	14	SENE	J. M. HUBER CORPORATION	HUBER/RAG 14-42	GST	CBM	4	481
P128668W	9/5/2000	48	72	13	SENW	J.M. HUBER CORPORATION	HUBER/RAG 13-22-48-72	GST	CBM	2	445
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

Table S1-4. Groundwater Rights for Belle Ayr North LBA Tract (Continued).

Permit No.	Priority	TNP	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
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
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
P130457W	10/25/2000	48	72	13	SESE	RMG I, LLC	DUNLAP 13-44-48-72-A	GST	CBM	25	412
P131084W	11/24/2000	48	72	15	SWSE	J.M. HUBER CORPORATION	HUBER-RAG 15E-15 48-72	GSE	CBM		
P132128W	12/29/2000	48	72	13	SESE	RMG I, LLC	ENL DUNLAP 13-44-48-72---A	UNA	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		
P19222P	12/31/1903	48	72	16	NWNW	STATE OF WYOMING**LEONARD APPEL	APPEL STATE #1	GST	STO	5	15
P19223P	12/31/1958	48	72	16	SESE	STATE OF WYOMING**LEONARD APPEL	APPEL STATE #2	GST	STO	5	113
P54526W	11/5/1980	48	72	14	SWNW	LEONARD T. APPEL	APPEL #7	GST	STO	15	196
P71703W	5/16/1985	48	72	16	SWNE	WY BOARD OF LAND COMMISSIONERS**LEONARD T. APPEL	APPEL STATE #3	GST	STO	10	610
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
P128657W	9/5/2000	48	72	22	NESE	J. M. HUBER CORPORATION	HUBER/RAG 14-11	GST	CBM	9	600
P128678W	9/5/2000	48	72	23	SWNW	J.M. HUBER CORPORATION	HUBER/RAG 23-12	GST	CBM	0	465
P128679W	9/5/2000	48	72	23	SENW	J.M. HUBER CORPORATION	HUBER/RAG 23-22	GST	CBM	14	450
P128680W	9/5/2000	48	72	23	NWSE	J.M. HUBER CORPORATION	HUBER/RAG 23-33-48-72	GST	CBM	23	446
P128681W	9/5/2000	48	72	23	NENE	J.M.HUBER CORPORATION	HUBER/RAG 23-41	GST	CBM	11	535
P128682W	9/5/2000	48	72	23	NESE	J.M. HUBER CORPORATION	HUBER/RAG 23-43-48-72	GST	CBM	1	420
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
P130696W	11/3/2000	48	72	23	NESW	RMG I, LLC	RAG 23 - 23 - A	GST	CBM	25	489
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	SENW	RMG I, LLC	RAG 24 - 22 - A	GST	CBM	25	481
P130701W	11/3/2000	48	72	24	NESW	RMG I, LLC	RAG 24-23-48-72-A	GST	CBM	25	513
P131075W	11/24/2000	48	72	22	NENE	J.M. HUBER CORPORATION	HUBER-RAG 1E-22 48-72	GSE	CBM		
P131076W	11/24/2000	48	72	22	NWNE	J.M. HUBER CORPORATION	HUBER-RAG 2E-22 48-72	GSE	CBM		
P131077W	11/24/2000	48	72	22	NENW	J.M. HUBER CORPORATION	HUBER-RAG 3E-22 48-72	GSE	CBM		
P131078W	11/24/2000	48	72	22	SWNW	J.M. HUBER CORPORATION	HUBER-RAG 22-12 M	GSE	CBM		
P131079W	11/24/2000	48	72	22	SENW	J.M. HUBER CORPORATION	HUBER-RAG 22-22 M	GSE	CBM		
P131080W	11/24/2000	48	72	22	SWNE	J.M. HUBER CORPORATION	HUBER-RAG 7E-22 48-72	GSE	CBM		
P131081W	11/24/2000	48	72	22	NWSE	J.M. HUBER CORPORATION	HUBER-RAG 22-33 M	GSE	CBM		
P131082W	11/24/2000	48	72	22	SWSW	J.M. HUBER CORPORATION	HUBER-RAG 22-14 M	GSE	CBM		
P131083W	11/24/2000	48	72	22	SESW	J.M. HUBER CORPORATION	HUBER-RAG 22-24 M	GSE	CBM		
P131085W	11/24/2000	48	72	23	SWNW	J.M. HUBER CORPORATION	HUBER-RAG 23-12 M	GSE	CBM		

Table S1-4. Groundwater Rights for Belle Ayr North LBA Tract (Continued).

Permit No.	Priority	TNP	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
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
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		
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
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
P70169W	5/16/1985	48	72	21	NWNE	FIRST NATIONAL BANK OF BUFFALO	STONE #1	GST	STO	25	245
P84018W	11/13/1990	48	72	24	NENW	EP OPERATING COMPANY	RIDGEVIEW FIELD WATER SUPPLY #1	UNA	IND	80	2310
P90658W	1/19/1993	48	72	22	SENE	MARTENS & PECK OPERATING CO.	MON #22-42-C	GST	MON	0	515.5
P90659W	1/19/1993	48	72	22	SENE	MARTENS & PECK OPERATING CO.	MON #22-42-S	GST	MON	0	410
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
P131086W	11/24/2000	48	72	27	NENW	J.M. HUBER CORPORATION	HUBER-RAG 27-21 M	GSE	CBM		
P131087W	11/24/2000	48	72	27	NWNW	J.M. HUBER CORPORATION	HUBER-RAG 27-11 M	GSE	CBM		
P131088W	11/24/2000	48	72	28	NENE	J.M. HUBER CORPORATION	HUBER-RAG 28-41 M	GSE	CBM		
P131089W	11/24/2000	48	72	28	NWNE	J.M. HUBER CORPORATION	HUBER-RAG 28-31 M	GSE	CBM		
P131090W	11/24/2000	48	72	28	SENE	J.M. HUBER CORPORATION	HUBER-RAG 28-42 M	GSE	CBM		
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
P136826W	7/3/2001	48	72	26	NENE	RMG I, LLC	HIGH PLAINS 26-41	GST	CBM	100	416
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
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

Table S1-4. Groundwater Rights for Belle Ayr North LBA Tract (Continued).

Permit No.	Priority	TNP	RNG	SEC	QQ	Applicant	Facility Name	Status	Uses	Yld	TD
P125367W	5/9/2000	48	72	35	SWNW	NORTH FINN, LLC	OXBOW #12-35	GST	CBM	20	511
P125368W	5/9/2000	48	72	34	SESE	NORTH FINN, LLC	OXBOW #44-34	GST	CBM	2	456
P125369W	5/9/2000	48	72	34	NESE	NORTH FINN, LLC	OXBOW #43-34	GST	CBM	2	431
P125370W	5/9/2000	48	72	34	SENE	NORTH FINN, LLC	OXBOW #42-34	GST	CBM	2	511
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
P133803W	4/6/2001	48	72	36	SWNW	RMG I, LLC	2ND ENL. STATE 36-12	GST	CBM	55	337
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
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
P70776W	7/31/1985	48	72	35	NWSW	SABINE CORPORATION** I. W. LYNDE TRUST	LYNDE TRUST #1	GST	STO	25	720
P71739W	1/13/1986	48	72	36	SESW	WY BOARD OF LAND COMMISSIONERS**MARSHALL MORGAN	MORGAN #36	GST	STO	25	103
P93190W	10/22/1993	48	72	36	NWSW	COMMISSIONER OF PUBLIC LANDS** WYO STATE ENGINEERS OFFICE	ECH-1A	GST	MON	0	350
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		
P114497W	3/11/1999	49	71	31	NENW	LINDA K ROURKE	ROURKE #1	GST	DOM	15	680
P126244W	6/22/2000	49	71	31	SESW	TROY/KIM SCOTT	SCOTT #1	GST	DOM	10	795
P19816P	12/21/1945	49	71	31	SWNW	THELMA M. CHANEY	CHANEY #3	GST	STO	10	135
P19817P	6/30/1956	49	71	31	SENW	THELMA M. CHANEY	CHANEY #2	GST	DOM	3	65
P19818P	12/21/1934	49	71	31	SENW	THELMA M. CHANEY	CHANEY #1	GST	STO	1	85
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	YOCHEM #1	GST	STO	20	256
P160352W	8/6/2003	49	71	33	SESE	L & J OPERATING INC	ROURKE #33-44	GSI	CBM		
P160353W	8/6/2003	49	71	33	NENE	L & J OPERATING INC	ROURKE #33-41A	GST	CBM	5	380
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		
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
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

Notes for Non Mining-Related Groundwater Rights
Within Three Miles of the Belle Ayr North LBA Tract

Search Conducted June 28, 2007

Groundwater Right Search Area:

Township	Range	Sections
47N	71W	2-11
47N	72W	1-3
48N	71W	3-11, 13-36
48N	72W	1-3, 10-16, 21-28, 34-36
49N	71W	31-33
49N	72W	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

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
UNA Unadjudicated

Approximately 959 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	IRR	Irrigation
DEW	Dewatering	MIS	Miscellaneous
DOM	Domestic	MON	Monitoring
DRI	Drilling	RES	Reservoir Supply
IND	Industrial	TEM	Temporary Use
STO	Stock		

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 S1-4. Surface Water Rights for Belle Ayr North LBA Tract.

Permit No.	Priority	TNP	RNG	SEC	QQ	Applicant	Appropriation	Facility Name	Status	Source	Uses
CR10/466A		47	71	4	13		MOBIL MINERAL RESOURCES, INC.	PILLEY STOCK RESERVOIR	PU		STO
CR10/466A		47	71	4	14		MOBIL MINERAL RESOURCES, INC.	PILLEY STOCK RESERVOIR	PU		STO
CR10/466A		47	71	4	14		MOBIL MINERAL RESOURCES, INC.	PILLEY STOCK RESERVOIR	PUO		STO
CR3/347A		47	71	3	9		LESLIE CLABAUGH	CLAYBAUGH STOCKWATER RESERVOIR	PU		STO
CR3/347A		47	71	3	9		LESLIE CLABAUGH	CLAYBAUGH STOCKWATER RESERVOIR	PUO		STO
CR10/458A		47	72	2	2		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 4 STOCK RESERVOIR	PU		STO
CR10/458A		47	72	2	5		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 4 STOCK RESERVOIR	PU		STO
CR10/458A		47	72	2	5		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 4 STOCK RESERVOIR	PUO		STO
CR10/458A		47	72	2	8		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 4 STOCK RESERVOIR	PU		STO
C37/228A		47	72	3	1		DELILAH J. MCDONALD	CAVYO DITCH	ADJ		IRR
P12752D	9/17/1914	47	72	3	1	DELILAH J. MCDONALD			ADJ	FLAT CREEK	
P1366S	1/26/1956	47	72	2	2	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	CABALLO CREEK	
P1366S	1/26/1956	47	72	2	5	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	CABALLO CREEK	
P1366S	1/26/1956	47	72	2	5	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PUO	CABALLO CREEK	
P1366S	1/26/1956	47	72	2	8	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	CABALLO CREEK	
C23/077A		48	71	7	3		M. ELIZABETH SPAETH	WALBRIDGE RESERVOIR	PU		IRR
C23/077A		48	71	7	4		M. ELIZABETH SPAETH	WALBRIDGE RESERVOIR	PU		IRR
C23/077A		48	71	7	4		M. ELIZABETH SPAETH	WALBRIDGE RESERVOIR	PUO		IRR
C23/078A		48	71	8	9		M. ELIZABETH SPAETH	WALBRIDGE DITCH	ADJ		IRR
C23/078A		48	71	7	4		M. ELIZABETH SPAETH	WALBRIDGE DITCH	PUD		IRR
C23/078A		48	71	8	10		M. ELIZABETH SPAETH	WALBRIDGE DITCH	ADJ		IRR
C23/078A		48	71	8	7		M. ELIZABETH SPAETH	WALBRIDGE DITCH	ADJ		IRR
C23/078A		48	71	7	4		M. ELIZABETH SPAETH	WALBRIDGE DITCH	ADJ		IRR
C29/466A		48	71	7	2		MISS M. E. SPAETH	WALBRIDGE SUPPLY DITCH	PUD		RES
C29/466A		48	71	7	3		MISS M. E. SPAETH	WALBRIDGE SUPPLY DITCH	PU		RES
C29/466A		48	71	7	4		MISS M. E. SPAETH	WALBRIDGE SUPPLY DITCH	PU		RES
CR2/332A		48	71	7	3		J.M. ROBBINS	STEER PASTURE STOCK RESERVOIR	PU		STO
CR2/332A		48	71	7	3		J.M. ROBBINS	STEER PASTURE STOCK RESERVOIR	PUO		STO
P11767D	4/5/1913	48	71	6	1	MARY M. YOUNGER			UNA	YOUNGER DRAW	
P11768D	4/5/1913	48	71	6	1	MARY M. YOUNGER			UNA	YOUNGER DRAW	
P1731R	3/5/1910	48	71	3	1	GEORGE CASSIDY			PU	DRY DRAW/WILLIS DRAW	
P1731R	3/5/1910	48	71	3	1	GEORGE CASSIDY			PUO	DRY DRAW/WILLIS DRAW	

Table S1-4. Surface Water Rights for Belle Ayr North LBA Tract (Continued).

Permit No.	Priority	TNP	RNG	SEC	QQ	Applicant	Appropriation	Facility Name	Status	Source	Uses
P2697R	7/22/1914	48	71	10	2	NETTIE D. CASSIDY			PU	BUCK PASTURE DRAW	
P2697R	7/22/1914	48	71	10	2	NETTIE D. CASSIDY			PUO	BUCK PASTURE DRAW	
P2697R	7/22/1914	48	71	3	15	NETTIE D. CASSIDY			PU	BUCK PASTURE DRAW	
P5596S	1/28/1966	48	71	11	14	T. W. & HERMA CZAPLA			PU	CZAPALA DRAW	
P5596S	1/28/1966	48	71	11	14	T. W. & HERMA CZAPLA			PUO	CZAPALA DRAW	
P6465R	6/16/1958	48	71	6	1	BERNARD ROURKE			PU	NORTH FORK TISDALE CREEK	
P6465R	6/16/1958	48	71	6	2	BERNARD ROURKE			PU	NORTH FORK TISDALE CREEK	
P6465R	6/16/1958	48	71	6	2	BERNARD ROURKE			PUO	NORTH FORK TISDALE CREEK	
P668R	5/29/1905	48	71	7	3	LEONARD K. WALBRIDGE			PU	BONEPILE CREEK	
P668R	5/29/1905	48	71	7	4	LEONARD K. WALBRIDGE			PU	BONEPILE CREEK	
P668R	5/29/1905	48	71	7	4	LEONARD K. WALBRIDGE			PUO	BONEPILE CREEK	
P6694D	5/29/1905	48	71	7	4	LEONARD K. WALBRIDGE			ADJ	BONEPILE CREEK	
P6694D	5/29/1905	48	71	8	10	LEONARD K. WALBRIDGE			ADJ	BONEPILE CREEK	
P6694D	5/29/1905	48	71	8	7	LEONARD K. WALBRIDGE			ADJ	BONEPILE CREEK	
P6694D	5/29/1905	48	71	8	9	LEONARD K. WALBRIDGE			ADJ	BONEPILE CREEK	
P6732R	7/24/1959	48	71	11	3	T. W. CZAPLA			PU	TREE CREEK	
P6732R	7/24/1959	48	71	11	4	T. W. CZAPLA			PU	TREE CREEK	
P6732R	7/24/1959	48	71	11	13	T. W. CZAPLA			PU	TREE CREEK	
P6732R	7/24/1959	48	71	11	13	T. W. CZAPLA			PUO	TREE CREEK	
P6904D	10/12/1905	48	71	7	2	LEONARD K. WALBRIDGE			ADJ	BONEPILE CREEK	
P6904D	10/12/1905	48	71	7	3	LEONARD K. WALBRIDGE			ADJ	BONEPILE CREEK	
P6904D	10/12/1905	48	71	7	4	LEONARD K. WALBRIDGE			ADJ	BONEPILE CREEK	
C26/323A		48	71	19	12		JOHN MORTON SHEEP COMPANY	SULLIVAN RESERVOIR	ADJ		STO, DOM
C71/357A		48	71	13	3		T. W. AND HERMA L. CZAPLA	GOLD MINE DIKE SPREADER SYSTEM BLUE DRAW DIVERSION	ADJ		IRR
C71/357A		48	71	13	14		T. W. AND HERMA L. CZAPLA	GOLD MINE DIKE SPREADER SYSTEM BLUE DRAW DIVERSION	ADJ		IRR
C71/357A		48	71	13	3		T. W. AND HERMA L. CZAPLA	GOLD MINE DIKE SPREADER SYSTEM BLUE DRAW DIVERSION	PUD		IRR
C71/357A		48	71	13	9		T. W. AND HERMA L. CZAPLA	GOLD MINE DIKE SPREADER SYSTEM BLUE DRAW DIVERSION	ADJ		IRR
C71/363A		48	71	13	5		T. W. AND HERMA L. CZAPLA	GOLD MINE DIKE SPREADER SYSTEM	PUD		IRR
C71/363A		48	71	13	8		T. W. AND HERMA L. CZAPLA	GOLD MINE DIKE SPREADER SYSTEM	ADJ		IRR
C71/363A		48	71	13	9		T. W. AND HERMA L. CZAPLA	GOLD MINE DIKE SPREADER SYSTEM	ADJ		IRR

Table S1-4. Surface Water Rights for Belle Ayr North LBA Tract (Continued).

Permit No.	Priority	TNP	RNG	SEC	QQ	Applicant	Appropriation	Facility Name	Status	Source	Uses
C71/363A		48	71	13	5		T. W. AND HERMA L. CZAPLA	GOLD MINE DIKE SPREADER SYSTEM	ADJ		IRR
P23177D	4/14/1969	48	71	13	9	T. W. CZAPLA**HERMA L. CZAPLA			ADJ	BLUE DRAW	
P23177D	4/14/1969	48	71	13	3	T. W. CZAPLA**HERMA L. CZAPLA			ADJ	BLUE DRAW	
P23177D	4/14/1969	48	71	13	14	T. W. CZAPLA**HERMA L. CZAPLA			ADJ	BLUE DRAW	
P23178D	4/14/1969	48	71	13	9	T. W. CZAPLA**HERMA L. CZAPLA			ADJ	GOLD MINE GULCH	
P23178D	4/14/1969	48	71	13	8	T. W. CZAPLA**HERMA L. CZAPLA			ADJ	GOLD MINE GULCH	
P23178D	4/14/1969	48	71	13	5	T. W. CZAPLA**HERMA L. CZAPLA			ADJ	GOLD MINE GULCH	
P25012D	4/15/1976	48	71	36	5	JOHNSON BROS. CO.			PU	BONEPILE CREEK	
P25012D	4/15/1976	48	71	36	10	JOHNSON BROS. CO.			PU	BONEPILE CREEK	
P25012D	4/15/1976	48	71	36	9	JOHNSON BROS. CO.			PU	BONEPILE CREEK	
P25012D	4/15/1976	48	71	36	12	JOHNSON BROS. CO.			PU	BONEPILE CREEK	
P25012D	4/15/1976	48	71	36	11	JOHNSON BROS. CO.			PU	BONEPILE CREEK	
P25012D	4/15/1976	48	71	36	8	JOHNSON BROS. CO.			PU	BONEPILE CREEK	
P25014D	4/15/1976	48	71	36	5	JOHNSON BROS. CO.			PU	BELLE FOURCHE RIVER	
P25014D	4/15/1976	48	71	36	8	JOHNSON BROS. CO.			PU	BELLE FOURCHE RIVER	
P25014D	4/15/1976	48	71	36	9	JOHNSON BROS. CO.			PU	BELLE FOURCHE RIVER	
P25014D	4/15/1976	48	71	36	10	JOHNSON BROS. CO.			PU	BELLE FOURCHE RIVER	
P25014D	4/15/1976	48	71	36	11	JOHNSON BROS. CO.			PU	BELLE FOURCHE RIVER	
P25014D	4/15/1976	48	71	36	12	JOHNSON BROS. CO.			PU	BELLE FOURCHE RIVER	
P25015D	4/15/1976	48	71	36	10	JOHNSON BROS. CO.			PU	BELLE FOURCHE RIVER	
P25015D	4/15/1976	48	71	36	12	JOHNSON BROS. CO.			PU	BELLE FOURCHE RIVER	
P25015D	4/15/1976	48	71	36	9	JOHNSON BROS. CO.			PU	BELLE FOURCHE RIVER	
P25015D	4/15/1976	48	71	36	8	JOHNSON BROS. CO.			PU	BELLE FOURCHE RIVER	
P25015D	4/15/1976	48	71	36	5	JOHNSON BROS. CO.			PU	BELLE FOURCHE RIVER	
P25015D	4/15/1976	48	71	36	11	JOHNSON BROS. CO.			PU	BELLE FOURCHE RIVER	
P25460D	7/14/1977	48	71	35	4	MOBIL OIL PRODUCING, INC			PUD	CABALLO CREEK	
P27337D	10/7/1981	48	71	35	2	MAYCO EXPLORATION COMPANY			UNA	CABALLO CREEK	
P27337D	10/7/1981	48	71	35	5	MAYCO EXPLORATION COMPANY			UNA	CABALLO CREEK	
P28653D	9/24/1984	48	71	36	1	WESTERN ENERGY DEV. CO. BLACKHAWK RESOURCES**WYO BOARD OF LAND COMMISSIONERS			DSC	BELLE FOURCHE RIVER	
P28653D	9/24/1984	48	71	36	1	WESTERN ENERGY DEV. CO. BLACKHAWK RESOURCES**WYO BOARD OF LAND COMMISSIONERS			PU	BELLE FOURCHE RIVER	
P412S	10/5/1953	48	71	24	13	L. D. CHAMBERS			PU	GOLD MINE GULCH	
P412S	10/5/1953	48	71	24	13	L. D. CHAMBERS			PUO	GOLD MINE GULCH	

Table S1-4. Surface Water Rights for Belle Ayr North LBA Tract (Continued).

Permit No.	Priority	TNP	RNG	SEC	QQ	Applicant	Appropriation	Facility Name	Status	Source	Uses
P4784S	1/24/1963	48	71	13	4	T. W. CZAPLA			UNA	BLUE DRAW	
P9000R	5/28/1985	48	71	23	3				UNA	BUCK PASTURE DRAW	
C35/459A		48	72	1	9		BERT D. ROHAN	NEWELL DITCH NO. 1	PUD		IRR
C35/459A		48	72	1	9		BERT D. ROHAN	NEWELL DITCH NO. 1	ADJ		IRR
C35/459A		48	72	1	15		BERT D. ROHAN	NEWELL DITCH NO. 1	ADJ		IRR
C35/459A		48	72	1	14		BERT D. ROHAN	NEWELL DITCH NO. 1	ADJ		IRR
C35/460A		48	72	2	13		BERT D. ROHAN	NEWELL DITCH NO. 2	ADJ		IRR
C35/460A		48	72	2	3		BERT D. ROHAN	NEWELL DITCH NO. 2	PUD		IRR
C35/460A		48	72	2	16		BERT D. ROHAN	NEWELL DITCH NO. 2	ADJ		IRR
C35/460A		48	72	1	12		BERT D. ROHAN	NEWELL DITCH NO. 2	ADJ		IRR
C35/460A		48	72	1	15		BERT D. ROHAN	NEWELL DITCH NO. 2	ADJ		IRR
C35/460A		48	72	1	10		BERT D. ROHAN	NEWELL DITCH NO. 2	ADJ		IRR
C35/460A		48	72	1	11		BERT D. ROHAN	NEWELL DITCH NO. 2	ADJ		IRR
C38/090A		48	72	1	10		BERT D. ROHAN	ROHAN DITCH	ADJ		IRR
C38/090A		48	72	1	12		BERT D. ROHAN	ROHAN DITCH	ADJ		IRR
C38/090A		48	72	1	11		BERT D. ROHAN	ROHAN DITCH	ADJ		IRR
C38/090A		48	72	1	15		BERT D. ROHAN	ROHAN DITCH	ADJ		IRR
C38/090A		48	72	2	16		BERT D. ROHAN	ROHAN DITCH	ADJ		IRR
C38/090A		48	72	2	4		BERT D. ROHAN	ROHAN DITCH	PUD		IRR
C38/091A		48	72	2	16		BERT D. ROHAN	SUPPLEMENTAL DITCH	PUD		IRR
C38/091A		48	72	1	12		BERT D. ROHAN	SUPPLEMENTAL DITCH	ADJ		IRR
C38/091A		48	72	1	11		BERT D. ROHAN	SUPPLEMENTAL DITCH	ADJ		IRR
C38/091A		48	72	1	10		BERT D. ROHAN	SUPPLEMENTAL DITCH	ADJ		IRR
C38/091A		48	72	1	15		BERT D. ROHAN	SUPPLEMENTAL DITCH	ADJ		IRR
C38/092A		48	72	2	16		BERT D. ROHAN	SUPPLEMENTAL RESERVOIR	PU		IRR
C38/092A		48	72	2	16		BERT D. ROHAN	SUPPLEMENTAL RESERVOIR	PUO		IRR
P12237D	2/6/1914	48	72	1	11	BERT D. ROHAN			ADJ	SOUTH DRAW	
P12237D	2/6/1914	48	72	1	12	BERT D. ROHAN			ADJ	SOUTH DRAW	
P12237D	2/6/1914	48	72	1	15	BERT D. ROHAN			ADJ	SOUTH DRAW	
P12237D	2/6/1914	48	72	1	10	BERT D. ROHAN			ADJ	SOUTH DRAW	
P12237D	2/6/1914	48	72	2	16	BERT D. ROHAN			ADJ	SOUTH DRAW	
P12238D	2/6/1914	48	72	1	11	BERT D. ROHAN			ADJ	NORTH DRAW	
P12238D	2/6/1914	48	72	2	16	BERT D. ROHAN			ADJ	NORTH DRAW	
P12238D	2/6/1914	48	72	2	4	BERT D. ROHAN			PUD	NORTH DRAW	
P12238D	2/6/1914	48	72	1	12	BERT D. ROHAN			ADJ	NORTH DRAW	
P12238D	2/6/1914	48	72	1	15	BERT D. ROHAN			ADJ	NORTH DRAW	
P12238D	2/6/1914	48	72	1	10	BERT D. ROHAN			ADJ	NORTH DRAW	
P13966S	5/1/2000	48	72	2	1	COLEMAN OIL & GAS, INC.			UNA	BLUE DRAW	
P13966S	5/1/2000	48	72	2	2	COLEMAN OIL & GAS, INC.			UNA	BLUE DRAW	
P14094S	5/9/2000	48	72	2	16	ROBERT P. & MARIE R. MCCREERY, REVOCABLE TRUSTS			UNA	SOUTH DRAW	
P14095S	5/9/2000	48	72	2	0	ROBERT P. & MARIE R. MCCREERY REVOCABLE TRUSTS	ROBERT P. AND MARY R. MCCREERY REVOCABLE TRUSTS	ROBERT P. STOCK RESERVOIR	UNA	R.P. DRAW	STO
P2589R	2/6/1914	48	72	2	16	BERT D. ROHAN			PU	SOUTH DRAW	
P2589R	2/6/1914	48	72	2	16	BERT D. ROHAN			PUO	SOUTH DRAW	

Table S1-4. Surface Water Rights for Belle Ayr North LBA Tract (Continued).

Permit No.	Priority	TNP	RNG	SEC	QQ	Applicant	Appropriation	Facility Name	Status	Source	Uses
P4829S	10/23/1964	48	72	3	2	HELEN R. ROHAN			PU	KELLEY DRAW	
P4829S	10/23/1964	48	72	3	2	HELEN R. ROHAN			PUO	KELLEY DRAW	
P7461D	10/8/1906	48	72	1	9	EMMA NEWELL			PUD	BONEPILE CREEK	
P7461D	10/8/1906	48	72	1	15	EMMA NEWELL			ADJ	BONEPILE CREEK	
P7461D	10/8/1906	48	72	1	9	EMMA NEWELL			ADJ	BONEPILE CREEK	
P7461D	10/8/1906	48	72	1	14	EMMA NEWELL			ADJ	BONEPILE CREEK	
P7462D	10/8/1906	48	72	2	16	BERT D. ROHAN			ADJ	BONEPILE CREEK	
P7462D	10/8/1906	48	72	1	11	BERT D. ROHAN			ADJ	BONEPILE CREEK	
P7462D	10/8/1906	48	72	2	3	BERT D. ROHAN			PUD	BONEPILE CREEK	
P7462D	10/8/1906	48	72	1	10	BERT D. ROHAN			ADJ	BONEPILE CREEK	
P7462D	10/8/1906	48	72	2	13	BERT D. ROHAN			ADJ	BONEPILE CREEK	
P7462D	10/8/1906	48	72	1	15	BERT D. ROHAN			ADJ	BONEPILE CREEK	
P7462D	10/8/1906	48	72	1	12	BERT D. ROHAN			ADJ	BONEPILE CREEK	
C38/092A		48	72	11	1		BERT D. ROHAN	SUPPLEMENTAL RESERVOIR	PU		IRR
C41/519A		48	72	11	7		HARRY L. ZOLK	ZOLK RESERVOIR	ADJ		IRR, DOM
C41/519A		48	72	11	10		HARRY L. ZOLK	ZOLK RESERVOIR	ADJ		IRR, DOM
C41/520A		48	72	11	7		HARRY L. ZOLK	ZOLK STORAGE RESERVOIR	ADJ		IRR, DOM
C41/521A		48	72	11	11		HARRY L. ZOLK	ZOLK DITCH	ADJ		IRR
C41/521A		48	72	11	10		HARRY L. ZOLK	ZOLK DITCH	ADJ		IRR
C41/521A		48	72	14	6		HARRY L. ZOLK	ZOLK DITCH	ADJ		IRR
C41/522A		48	72	11	9		HARRY L. ZOLK	ZOLK NO. 1 DITCH	ADJ		IRR
C41/522A		48	72	11	10		HARRY L. ZOLK	ZOLK NO. 1 DITCH	ADJ		IRR
C41/522A		48	72	11	12		HARRY L. ZOLK	ZOLK NO. 1 DITCH	ADJ		IRR
P14234S	10/16/2000	48	72	10	11	NICHOLSON, KATHLEEN E. APPEL**MARY ELLEN APPEL ROSSMILLER			UNA	JAMBALAYA DRAW	
P2589R	2/6/1914	48	72	11	1	BERT D. ROHAN			PU	SOUTH DRAW	
P3728S	4/13/1961	48	72	10	5	LEONARD APPEL			UNA	CABALLO CREEK	
C29/451A		48	72	22	3		G. M. HUDDLESON AND EMMA M. STONE	STONE NO. 1 RESERVOIR	PUO		IRR, DOM
C29/451A		48	72	22	8		G. M. HUDDLESON AND EMMA M. STONE	STONE NO. 1 RESERVOIR	PU		IRR, DOM
C29/451A		48	72	22	9		G. M. HUDDLESON AND EMMA M. STONE	STONE NO. 1 RESERVOIR	PU		IRR, DOM
C29/451A		48	72	22	14		G. M. HUDDLESON AND EMMA M. STONE	STONE NO. 1 RESERVOIR	PU		IRR, DOM
C29/451A		48	72	22	3		G. M. HUDDLESON AND EMMA M. STONE	STONE NO. 1 RESERVOIR	PU		IRR, DOM
C29/452A		48	72	22	3		G. M. HUDDLESON	STONE NO. 1	PUD		IRR, DOM
C29/452A		48	72	23	11		G. M. HUDDLESON	STONE NO. 1	ADJ		IRR, DOM
C29/452A		48	72	23	10		G. M. HUDDLESON	STONE NO. 1	ADJ		IRR, DOM
C29/452A		48	72	22	13		G. M. HUDDLESON	STONE NO. 1	ADJ		IRR, DOM

Table S1-4. Surface Water Rights for Belle Ayr North LBA Tract (Continued).

Permit No.	Priority	TNP	RNG	SEC	QQ	Applicant	Appropriation	Facility Name	Status	Source	Uses
C29/452A		48	72	22	14		G. M. HUDDLESON	STONE NO. 1	ADJ		IRR, DOM
C36/235A		48	72	26	2		MRS. E. M. STONE	STONE NO. 1	ADJ		IRR
C36/235A		48	72	26	3		MRS. E. M. STONE	STONE NO. 1	ADJ		IRR
C36/235A		48	72	26	5		MRS. E. M. STONE	STONE NO. 1	ADJ		IRR
C36/235A		48	72	22	3		MRS. E. M. STONE	STONE NO. 1	PUD		IRR
C36/235A		48	72	23	12		MRS. E. M. STONE	STONE NO. 1	ADJ		IRR
C43/549A		48	72	21	3		GEORGE W. STONE	SOUTH DITCH	ADJ		IRR
C43/549A		48	72	21	8		GEORGE W. STONE	SOUTH DITCH	ADJ		IRR
C43/549A		48	72	21	5		GEORGE W. STONE	SOUTH DITCH	ADJ		IRR
C43/549A		48	72	21	2		GEORGE W. STONE	SOUTH DITCH	ADJ		IRR
C43/551A		48	72	21	12		ALTA M. TULLY	SOUTH DITCH	ADJ		IRR
C43/551A		48	72	21	11		ALTA M. TULLY	SOUTH DITCH	ADJ		IRR
C43/551A		48	72	21	10		ALTA M. TULLY	SOUTH DITCH	ADJ		IRR
C43/551A		48	72	21	9		ALTA M. TULLY	SOUTH DITCH	ADJ		IRR
P1221R	2/17/1908	48	72	22	3	EMMA M. STONE**GEORGE M. HUDDLESON			ADJ	BONEPILE CREEK	
P1221R	2/17/1908	48	72	22	8	EMMA M. STONE**GEORGE M. HUDDLESON			ADJ	BONEPILE CREEK	
P1221R	2/17/1908	48	72	22	9	EMMA M. STONE**GEORGE M. HUDDLESON			ADJ	BONEPILE CREEK	
P1221R	2/17/1908	48	72	22	14	EMMA M. STONE**GEORGE M. HUDDLESON			ADJ	BONEPILE CREEK	
P13987D	2/14/1914	48	72	21	9	ALTA M. HARRIS			ADJ	BONEPILE CREEK	
P13987D	2/14/1914	48	72	21	12	ALTA M. HARRIS			ADJ	BONEPILE CREEK	
P13987D	2/14/1914	48	72	21	2	ALTA M. HARRIS			ADJ	BONEPILE CREEK	
P13987D	2/14/1914	48	72	21	11	ALTA M. HARRIS			ADJ	BONEPILE CREEK	
P13987D	2/14/1914	48	72	21	3	ALTA M. HARRIS			ADJ	BONEPILE CREEK	
P13987D	2/14/1914	48	72	21	8	ALTA M. HARRIS			ADJ	BONEPILE CREEK	
P13987D	2/14/1914	48	72	21	10	ALTA M. HARRIS			ADJ	BONEPILE CREEK	
P13987D	2/14/1914	48	72	21	5	ALTA M. HARRIS			ADJ	BONEPILE CREEK	
P5500R	3/1/1943	48	72	21	11	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			ADJ	BRANCH BONEPILE CREEK	
P8257D	2/13/1908	48	72	26	2	EMMA M. STONE**GEORGE M. HUDDLESTON			ADJ	BONEPILE CREEK	
P8257D	2/13/1908	48	72	22	3	EMMA M. STONE**GEORGE M. HUDDLESTON			ADJ	BONEPILE CREEK	
P8257D	2/13/1908	48	72	23	10	EMMA M. STONE**GEORGE M. HUDDLESTON			ADJ	BONEPILE CREEK	
P8257D	2/13/1908	48	72	23	12	EMMA M. STONE**GEORGE M. HUDDLESTON			ADJ	BONEPILE CREEK	
P8257D	2/13/1908	48	72	26	5	EMMA M. STONE**GEORGE M. HUDDLESTON			ADJ	BONEPILE CREEK	
P8257D	2/13/1908	48	72	22	14	EMMA M. STONE**GEORGE M. HUDDLESTON			ADJ	BONEPILE CREEK	
P8257D	2/13/1908	48	72	22	13	EMMA M. STONE**GEORGE M. HUDDLESTON			ADJ	BONEPILE CREEK	

Table S1-4. Surface Water Rights for Belle Ayr North LBA Tract (Continued).

Permit No.	Priority	TNP	RNG	SEC	QQ	Applicant	Appropriation	Facility Name	Status	Source	Uses
P8257D	2/13/1908	48	72	23	11	EMMA M. STONE**GEORGE M. HUDDLESTON			ADJ	BONEPILE CREEK	
P8257D	2/13/1908	48	72	26	3	EMMA M. STONE**GEORGE M. HUDDLESTON			ADJ	BONEPILE CREEK	
C37/228A		48	72	34	12		DELILAH J. MCDONALD	CAVYO DITCH	ADJ		IRR
C37/228A		48	72	35	10		DELILAH J. MCDONALD	CAVYO DITCH	ADJ		IRR
C37/228A		48	72	34	11		DELILAH J. MCDONALD	CAVYO DITCH	ADJ		IRR
C37/228A		48	72	34	15		DELILAH J. MCDONALD	CAVYO DITCH	ADJ		IRR
C37/228A		48	72	35	11		DELILAH J. MCDONALD	CAVYO DITCH	ADJ		IRR
C37/228A		48	72	34	16		DELILAH J. MCDONALD	CAVYO DITCH	ADJ		IRR
C37/228A		48	72	34	10		DELILAH J. MCDONALD	CAVYO DITCH	ADJ		IRR
CR10/455A		48	72	34	16		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 1 STOCK RESERVOIR	PU		STO
CR10/455A		48	72	35	11		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 1 STOCK RESERVOIR	PU		STO
CR10/455A		48	72	35	11		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 1 STOCK RESERVOIR	PUO		STO
CR10/456A		48	72	35	11		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 2 STOCK RESERVOIR	PU		STO
CR10/456A		48	72	35	11		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 2 STOCK RESERVOIR	PUO		STO
CR10/457A		48	72	35	12		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 3 STOCK RESERVOIR	PU		STO
CR10/457A		48	72	35	12		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 3 STOCK RESERVOIR	PUO		STO
CR10/457A		48	72	35	13		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 3 STOCK RESERVOIR	PU		STO
CR10/459A		48	72	34	11		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 5 STOCK RESERVOIR	PU		STO
CR10/459A		48	72	34	12		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 5 STOCK RESERVOIR	PU		STO
CR10/459A		48	72	34	12		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 5 STOCK RESERVOIR	PUO		STO
CR10/459A		48	72	34	9		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 5 STOCK RESERVOIR	PU		STO
CR10/459A		48	72	34	10		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 5 STOCK RESERVOIR	PU		STO
CR10/460A		48	72	34	9		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 7 STOCK RESERVOIR	PU		STO
CR10/460A		48	72	34	9		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 7 STOCK RESERVOIR	PUO		STO
CR10/460A		48	72	34	10		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 7 STOCK RESERVOIR	PU		STO
CR10/461A		48	72	35	11		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 8 STOCK RESERVOIR	PU		STO
CR10/461A		48	72	35	12		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 8 STOCK RESERVOIR	PU		STO
CR10/461A		48	72	35	12		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 8 STOCK RESERVOIR	PUO		STO

Table S1-4. Surface Water Rights for Belle Ayr North LBA Tract (Continued).

Permit No.	Priority	TNP	RNG	SEC	QQ	Applicant	Appropriation	Facility Name	Status	Source	Uses
CR10/461A		48	72	35	9		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 8 STOCK RESERVOIR	PU		STO
CR10/461A		48	72	35	10		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 8 STOCK RESERVOIR	PU		STO
CR10/462A		48	72	34	12		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 6 STOCK RESERVOIR	PU		STO
CR10/462A		48	72	34	15		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 6 STOCK RESERVOIR	PU		STO
CR10/462A		48	72	34	15		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 6 STOCK RESERVOIR	PUO		STO
CR10/463A		48	72	35	10		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 9 STOCK RESERVOIR	PUO		STO
CR10/463A		48	72	35	11		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 9 STOCK RESERVOIR	PU		STO
CR10/463A		48	72	35	10		I. W. AND WINNIE E. LYNDE MEMORIAL TRUST	LYNDE NO. 9 STOCK RESERVOIR	PU		STO
P12752D	9/17/1914	48	72	35	10	DELILAH J. MCDONALD			ADJ	FLAT CREEK	
P12752D	9/17/1914	48	72	34	15	DELILAH J. MCDONALD			ADJ	FLAT CREEK	
P12752D	9/17/1914	48	72	34	11	DELILAH J. MCDONALD			ADJ	FLAT CREEK	
P12752D	9/17/1914	48	72	35	11	DELILAH J. MCDONALD			ADJ	FLAT CREEK	
P12752D	9/17/1914	48	72	34	12	DELILAH J. MCDONALD			ADJ	FLAT CREEK	
P12752D	9/17/1914	48	72	34	10	DELILAH J. MCDONALD			ADJ	FLAT CREEK	
P12752D	9/17/1914	48	72	34	16	DELILAH J. MCDONALD			ADJ	FLAT CREEK	
P1363S	1/26/1956	48	72	34	16	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	CABALLO CREEK	
P1363S	1/26/1956	48	72	35	11	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	CABALLO CREEK	
P1363S	1/26/1956	48	72	35	11	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PUO	CABALLO CREEK	
P1364S	1/26/1956	48	72	35	11	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	CABALLO CREEK	
P1364S	1/26/1956	48	72	35	11	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PUO	CABALLO CREEK	
P1365S	1/26/1956	48	72	35	11	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	CABALLO CREEK	
P1365S	1/26/1956	48	72	35	12	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	CABALLO CREEK	
P1365S	1/26/1956	48	72	35	12	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PUO	CABALLO CREEK	
P1367S	1/26/1956	48	72	34	11	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	CABALLO CREEK	
P1367S	1/26/1956	48	72	34	12	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	CABALLO CREEK	
P1367S	1/26/1956	48	72	34	12	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PUO	CABALLO CREEK	
P1367S	1/26/1956	48	72	34	9	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	CABALLO CREEK	
P1367S	1/26/1956	48	72	34	10	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	CABALLO CREEK	

Table S1-4. Surface Water Rights for Belle Ayr North LBA Tract (Continued).

Permit No.	Priority	TNP	RNG	SEC	QQ	Applicant	Appropriation	Facility Name	Status	Source	Uses
P1368S	1/26/1956	48	72	34	9	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	CABALLO CREEK	
P1368S	1/26/1956	48	72	34	9	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PUO	CABALLO CREEK	
P1368S	1/26/1956	48	72	34	10	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	CABALLO CREEK	
P1369S	1/26/1956	48	72	35	12	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PUO	CABALLO CREEK	
P1369S	1/26/1956	48	72	35	9	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	CABALLO CREEK	
P1369S	1/26/1956	48	72	35	10	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	CABALLO CREEK	
P1369S	1/26/1956	48	72	35	11	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	CABALLO CREEK	
P1369S	1/26/1956	48	72	35	12	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	CABALLO CREEK	
P1370S	2/1/1956	48	72	34	12	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	BONEPILE CREEK	
P1370S	2/1/1956	48	72	34	15	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	BONEPILE CREEK	
P1370S	2/1/1956	48	72	34	15	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PUO	BONEPILE CREEK	
P1371S	4/10/1956	48	72	35	10	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	CABALLO CREEK	
P1371S	4/10/1956	48	72	35	10	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PUO	CABALLO CREEK	
P1371S	4/10/1956	48	72	35	11	I.W. & WINNIE E. LYNDE MEMORIAL TRUST			PU	CABALLO CREEK	
P25794D	6/8/1978	48	72	36	5	WYOMING STATE HIGHWAY DEPARTMENT			PU	CABALLO CREEK	
P25794D	6/8/1978	48	72	36	6	WYOMING STATE HIGHWAY DEPARTMENT			PU	CABALLO CREEK	
P25794D	6/8/1978	48	72	36	7	WYOMING STATE HIGHWAY DEPARTMENT			PU	CABALLO CREEK	
P3293D	6/27/1901	48	72	35	11	GEORGE A. KEELINE			PUD	CABALLO CREEK	
P13962S	4/25/2000	49	71	31	6	JON BARTOW			UNA	KASSI DRAW	
P3017S	12/7/1959	49	71	32	4	CHARLES T. ROURKE, II			PU	HALLIE DRAW	
P3017S	12/7/1959	49	71	32	4	CHARLES T. ROURKE, II			PUO	HALLIE DRAW	
P6465R	6/16/1958	49	71	31	16	BERNARD ROURKE			PU	NORTH FORK TISDALE CREEK	
P13363S	12/17/1999	49	72	36	3	COLEMAN OIL & GAS, INC.			UNA	TWEETY DRAW	
P13363S	12/17/1999	49	72	36	2	COLEMAN OIL & GAS, INC.			UNA	TWEETY DRAW	
P13485S	11/22/1999	49	72	36	15	JON BARTOW			UNA	SYLVESTER DRAW	
P13485S	11/22/1999	49	72	36	12	JON BARTOW			UNA	SYLVESTER DRAW	
P13487S	11/22/1999	49	72	36	9	JON BARTOW			UNA	CAGE DRAW	

Notes for Non Mining-Related Surface Water Rights
Within Three Miles of the Belle Ayr North LBA Tract

Search Conducted July 6, 2007

Surface Water Right Search Area:

Township	Range	Sections
47N	71W	2-11
47N	72W	1-3
48N	71W	3-11, 13-36
48N	72W	1-3, 10-16, 21-28, 34-36
49N	71W	31-33
49N	72W	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.

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	PU	Point of use non-irrigation (not actual status)
A&C	Abandoned and Cancelled	PUD	Point of diversion (not actual status)
ADJ	Adjudicated	PUO	Point of reservoir outlet (not actual status)
AME	Amended (moved)	TEM	Temporary
CAN	Cancelled	TRA	Transferred
DSC	Description	REJ	Rejected
ELI	Eliminated	UNA	Unadjudicated
EXP	Expired		
GST	Good standing		

Use Codes

DOM	Domestic	IRR	Irrigation
RES	Reservoir supply	STO	Stock

Approximately 314 separate water rights with a status code of ABA, A&C, AME, CAN, ELI, EXP, REJ, or TRA have been eliminated from the search area listing provided above (including those belonging to the mining companies), as none of these use codes represent a valid current right.

The following quarter-quarters are designated by the "QQ" field:

1	NE¼NE¼	9	NE¼SW¼
2	NW¼NE¼	10	NW¼ SW¼
3	SW¼NE¼	11	SW¼ SW¼
4	SE¼NE¼	12	SE¼ SW¼
5	NE¼NW¼	13	NE¼SE¼
6	NW¼NW¼	14	NW¼SE¼
7	SW¼NW¼	15	SW¼SE¼
8	SE¼NW¼	16	SE¼SE¼

permit area (Figure S1-5), and the segment of Duck Nest Creek that lies within the LBA tract has therefore been investigated for the presence of an AVF. The unnamed tributaries of Caballo Creek (Draw No. 1 and Draw No. 2, as named by the Belle Ayr Mine) that also drain the LBA tract are almost completely within the mine's existing permit area, but they were not investigated for the presence of an AVF because no streamlaid deposits were found to be present along those drainages.

The Belle Ayr Mine conducted AVF studies along the reach of Duck Nest Creek that is located within and adjacent to the Belle Ayr North LBA Tract in 1986 and 1987. These studies were combined into a comprehensive AVF assessment in 1991 (WWC 1992), which was part of the WDEQ mine permitting process for the purpose of recovering coal in the Belle Ayr Mine's existing federal leases that are located in the western portion of the mine's current permit area. The AVF assessment was referred to as the Duck Nest Tracts or Duck Nest Amendment Area AVF Study, which was done for the Permit 214-T4 Extension Area. Drainages within that study area included Caballo Creek, Bone Pile Creek, and Duck Nest Creek. Prior to completion of the Duck Nest Amendment Area AVF Study, WDEQ made a determination "that the portions of Caballo, Bone Pile, and Duck Nest Creeks located in the Duck Nest Amendment Area are not significant to farming" (WDEQ/LQD 1988), based on the original (1980) AVF study for the Belle Ayr Mine.

Within a letter dated July 21, 1987 from the Soil Conservation Service that described the soil units in the Duck Nest Amendment Area, it was noted that surface water supplies were inadequate for irrigating any soil units that could qualify as prime farmlands because of the size of the drainage areas, and that there is no evidence of existing or former irrigation systems. It was further stated that groundwater was not of suitable quality, quantity, or depth to be used for irrigation (FCW 2003).

A portion of Duck Nest Creek and its alluvial valley lie within the southwestern portion of the Belle Ayr North LBA Tract. The same segment of the stream is also inside of Belle Ayr Mine's existing permit area. Therefore, the entire reach of Duck Nest Creek within the BLM study area for the LBA tract has been studied for the presence of an AVF. Following the submittal of the AVF study for Duck Nest Creek to the WDEQ, a field visit by the WDEQ on May 15, 1996, and a subsequent consultation with the WDEQ staff, a total of approximately 24.3 acres of AVF on Duck Nest Creek were formally declared by the WDEQ within the Duck Nest Amendment Area AVF study area (Figure S1-5). Approximately 14.9 acres of that total declared acreage on Duck Nest Creek are located within the Belle Ayr North LBA Tract.

The following discussions were taken from Belle Ayr Mine Permit No. 214-T6 (FCW 2003) and WWC's AVF study (WWC 1992).

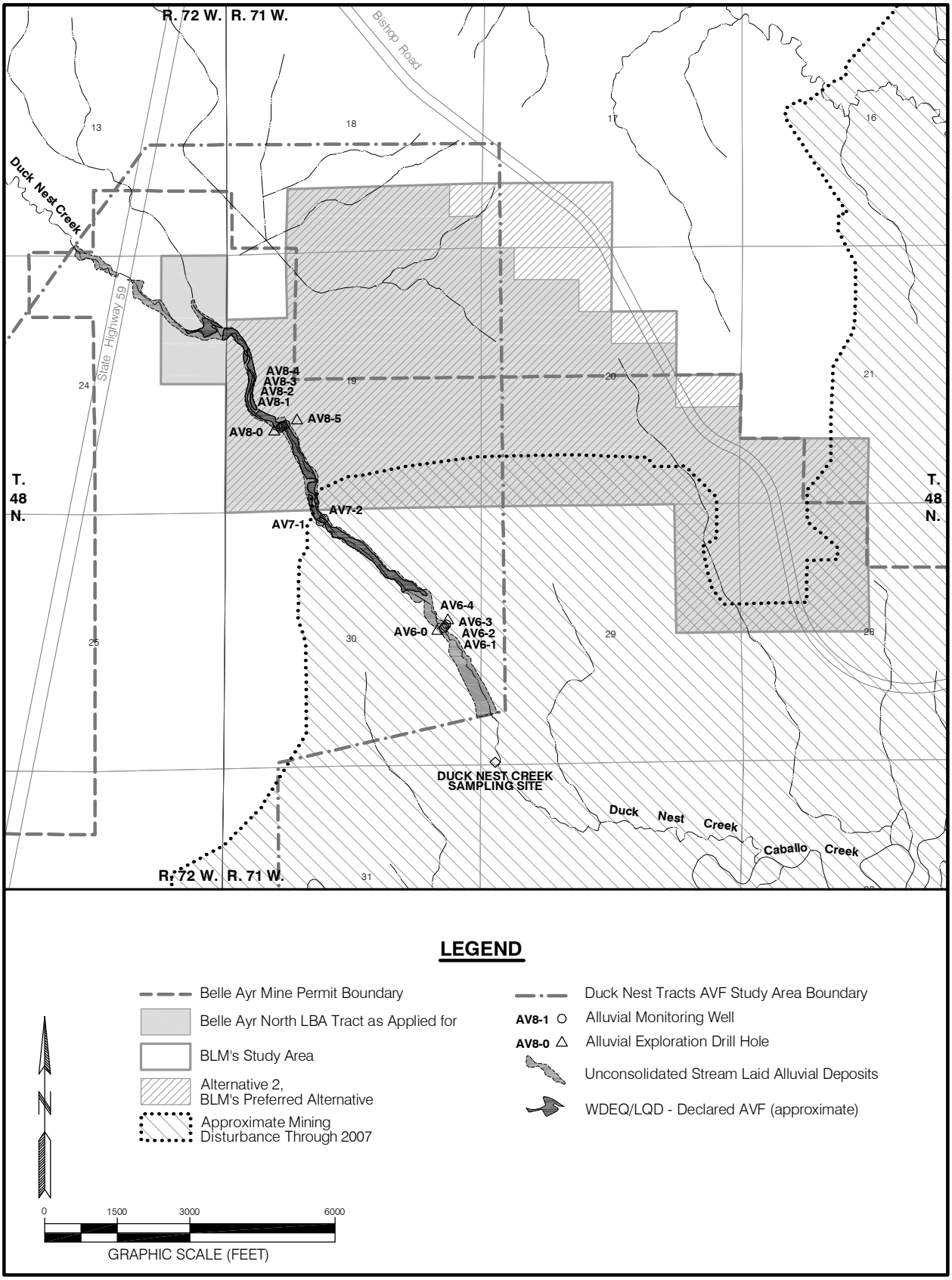

Figure S1-5. Stream Laid Alluvial Deposits and Declared Alluvial Valley Floors Within and Adjacent to the Belle Ayr North LBA Tract.

Streamlaid Deposits and Geomorphology

The extent of streamlaid deposits and configuration of stream terraces were determined by surficial geologic and geomorphic mapping in the field and verified with color infrared aerial photographs. Nine groundwater monitoring wells and four alluvial exploration drill holes were completed in three transects across Duck Nest Creek valley, the locations of which are shown on Figure S1-5. The alluvial deposits consist of intermixed fine-grained sands, silts, and clays. The surficial deposits adjacent to the alluvium consist of fan and sheetwash materials where the terrain is nearly flat. The textures of these deposits are similar, making the outer edge of alluvial deposits difficult to distinguish.

Approximately 64 acres of streamlaid deposits on two distinct terraces were mapped in the Duck Nest Creek valley within the study area. Width of the active floodplain below the lowest terrace averaged 10 – 20 ft. The lowest terrace is 1 – 2 ft above the channel and it is comprised of silty clay with very little sand. Alkali deposits are common on the surface, especially adjacent to ponded water areas in the channel, and are associated with evaporation from the ponds and a fluctuating water table. The second terrace forms the majority of the valley floor and is 2 – 4 ft above the first terrace. Its texture is primarily silt and clay with very little sand and no gravel-sized materials are present. The majority of alluvium in the Duck Nest Creek valley is very fine-grained due to the small drainage area (6.6 square miles total) and limited streamflow energy that deposited the sediments.

Four impoundments exist along Duck Nest Creek within the Duck Nest Amendment Area AVF study area. The stream channel is aggrading due to the effects of the impoundments that capture bed load sediments; therefore, the stream has not been able to maintain an active channel in some areas. There are no erosional features in the stream channel and the channel bed is composed of silts and clays.

The lands directly adjacent to and within the limits of the unconsolidated streamlaid deposits of Duck Nest Creek have not been used for any agricultural purpose other than unimproved grazing.

Extent of Subirrigation

Vegetation mapping information and color infrared aerial photography were used to delineate subirrigated areas. Areas perennially flooded and ponded are unsuitable for agricultural activities so they were excluded from further consideration.

Subirrigation is enhanced in localized areas surrounding the impoundments due to increased infiltration and availability for alluvial groundwater recharge.

Following these preliminary screening steps, the potential AVF areas were delineated as separate study units or segments. There were 12 such individual units (D1 through D12) on Duck Nest Creek. These study segments represent potential areas that were not ponded or perennially flooded, had some indication of water availability either through flood or subirrigation, and were within the mapped extent of the unconsolidated streamlaid deposits. Finally, potential areas located within certain unsuitable soil types were also eliminated from consideration. Those soils considered unsuitable exhibited characteristics limiting their potential for artificial irrigation, such as low permeability, high erosion potential, or high salinity.

Extent of Natural and Artificial Flood Irrigation

The total drainage area of Duck Nest Creek is 6.6 square miles, with approximately 2 square miles located within the study area. Duck Nest drainage originates about 3 miles northwest of the Belle Ayr North LBA Tract at an elevation of 4,920 ft. Total relief in the stream's basin is 474 ft, the channel length is about 11.9 miles, and the average channel slope is 36 feet per mile, most of which is in the first mile. Duck Nest Creek is an ephemeral stream that flows in the spring and summer in response to snowmelt and precipitation events.

The four impoundments in the study area along Duck Nest Creek serve to capture most of the streamflow and cause pronounced channel aggradation to the point at which it is difficult in places to distinguish the active channel from abandoned channel scars. The channel floor and banks are vegetated, no active erosion is evident, and the channel profile is irregular indicating the reduced streamflow cannot maintain its former channel gradient prior to the impoundments. This indicates that surface water sources for irrigation may be unreliable.

Using the mean unit runoff values for the four U.S. Geological Survey gaging stations in the near vicinity (9.3 acre-feet/year/square mile), the average annual runoff for Duck Nest Creek prior to all mining disturbances was estimated to be approximately 61 acre-feet.

There is no evidence of existing or historical use of flood irrigation along Duck Nest Creek. The quantity of water available for flood irrigation is not expected to be adequate due to the small drainage area and the storage capacity of the impoundments, which heavily regulate and limit streamflows.

Surface Water Quality

Due to the lack of regular natural streamflow in Duck Nest Creek, few flowing water samples have been collected from the stream. All surface water samples have been collected at the location shown on Figure S1-4, and the streamflow at the time of sampling has been less than 0.25 cubic foot per second (cfs), or roughly 100 gpm. Analyses results indicate generally good quality water

suitable for irrigation under most circumstances. The water was either a magnesium or potassium sulfate type with an average TDS concentration of about 200 mg/L, average SAR of 0.98, and specific conductance of approximately 800 μmhos per centimeter.

Historically, the difficulty in obtaining a sufficient number of surface water samples from this small drainage basin indicates the lack of a reliable surface water supply, making the apparently good water quality academic.

Groundwater Quantity

Groundwater yields from the monitoring wells (Figure S1-3) were very low, ranging from 0 – 3 gallons per minute (gpm). Two aquifer pumping tests and one bailing test on select monitoring wells were conducted to determine the alluvial aquifer's hydraulic characteristics. These tests yield transmissivity values ranging from 4 – 26 gpd/ft or 0.5 – 3.5 ft^2/day. The alluvium's saturated thickness averages about 10 feet, and the hydraulic conductivity values range from 0.4 – 2.5 gpd/ft^2, or 0.05 – 0.35 ft/day. These test results demonstrate the low permeability of the fine-grained alluvial sediments.

A flow net analysis was used to estimate the alluvial groundwater underflow rate. Due to the low water table gradient and limited saturated thickness, the groundwater flow rate through the alluvium at the lower end of the study area was estimated to be only 29 gallons per day.

Several saline seeps and small springs are found along the middle reach of the Duck Nest Amendment Area AVF study area, near the border between Sections 19 and 30, T.48N., R.71W. Monitoring wells AV7-1 and AV7-2 are located within the marshy area (Figure S1-5) where groundwater seepage from overburden bedrock provides minimal recharge to the overlying alluvium. The seepage rate is insufficient to sustain a base flow in the channel and only enough to create a marshy area with some small shallow pools of stagnant water. Patches of thick alkali crust is present around the edges of the pools and on the soil surface in this area.

The alluvium of Duck Nest Creek is recharged by streamflow, water in the impoundments, and groundwater from a bedrock source in the area near the AV7 monitoring wells. Groundwater discharge from the alluvial aquifer is primarily by evapotranspiration.

Groundwater Quality

Alluvial groundwater sampling data indicate that the water quality is best in the spring and deteriorates throughout the summer and fall. In the middle portion of the AVF study area at the AV7 series monitoring wells, the alluvial water quality is very poor. Groundwater quality at the AV8 series wells located about 2,000 feet upstream of the AV7 wells is somewhat better but still poor.

The alluvial water quality in the lower portion of the AVF study area, at the AV6 series wells, improves but also remains poor.

At the overburden groundwater discharge area near the AV7 monitoring wells, TDS concentrations of the alluvial groundwater averaged over 30,000 mg/L, with a range of from about 20,000 mg/L to 51,000 mg/L. The water is a magnesium or sodium sulfate type with the sulfate concentrations averaging over 25,000 mg/L and ranging up to almost 33,000 mg/L. Both TDS and sulfate values are well over the maximum allowed in any use classification. The saline seeps from overburden units in this area that recharge the alluvial aquifer system contribute to the poor alluvial water quality.

Alluvial groundwater upstream at the AV8 monitoring wells had TDS concentrations around 20,000 mg/L to 25,000 mg/L. The sulfate concentrations ranged from approximately 12,500 mg/L to over 15,000 mg/L. The SAR values were also high, ranging from 17.6 to 19.8. The alluvial water quality in the upper reach of the AVF study area is also considerably above the recommended limits for any use classification.

The alluvial water sampled from the lower portion of the AVF study area at the AV6 monitoring wells is considerably better. The average TDS concentration was roughly 3,800 mg/L, and ranged from about 2,650 mg/L to 6,300 mg/L. The predominant constituents are magnesium and sulfate. The sulfate concentrations averaged around 1,900 mg/L and ranged from approximately 1,500 mg/L to 4,000 mg/L. Based on WDEQ Water Quality Division standards, this water would be classified as Class III, which is suitable for livestock consumption only.

Essential Hydrologic Functions

The erosional state of Duck Nest Creek within the AVF study area is dominated by the presence of the four impoundments. The impoundments capture most of the streamflow resulting in pronounced channel aggradation. With its reduced flow, the stream is no longer capable of maintaining it former geomorphologic characteristics. The channel profile is highly irregular and the channel floor and banks show no evidence of active erosion.

The hydrologic balance of Duck Nest Creek is dominated by the impoundments and partially sustained by groundwater recharge from bedrock sources. Enhanced by the channel impoundments, total consumptive losses via evapotranspiration was estimated to be 41 acre-feet per year within the AVF study area, which exceeds the incremental runoff over the study area reach (estimated to be 18 acre-feet per year) plus the volume of groundwater recharge from bedrock overburden within the study area reach (estimated to be 0.07 acre-feet per year). Therefore, the hydrologic balance of the study area reach constitutes a net deficit. Infiltration of streamflow and water stored in the impoundments replenishes the alluvial groundwater removed by evapotranspiration and accounts for the water balance deficit.

Overburden bedrock groundwater discharge provides subirrigation for salt tolerant vegetation. The impoundments also enhance groundwater recharge in support of subirrigation, as well as broaden the area for natural flood irrigation.

Summary

There is no evidence of Duck Nest Creek valley ever having been farmed (tilled) or artificially irrigated and the WDEQ has made a determination "that the portions of Caballo, Bone Pile, and Duck Nest Creeks located in the Duck Nest Amendment Area are not significant to farming". The entire segment of Duck Nest Creek that lies within the Belle Ayr North LBA Tract was included within the Duck Nest Amendment Area AVF Study.

The AVF characteristics of Duck Nest Creek within the Belle Ayr North LBA Tract have been formally documented and the total acreage of AVF within the Belle Ayr Mine's existing permit area has been formally declared by the WDEQ.

Following submittal of the Duck Nest Amendment Area AVF Study to the WDEQ for Belle Ayr Mine's Permit 214-T4 Extension Area, the regulatory agency evaluated each of the 12 individual study segments (D1 through D12) as potential AVF areas. As a result, a total of approximately 24.3 acres of AVF on Duck Nest Creek were formally declared by the WDEQ within the Duck Nest Amendment Area AVF study area (Figure S1-5). Approximately 14.9 acres of that total declared acreage on Duck Nest Creek are located within the Belle Ayr North LBA Tract.

S1-7 WETLANDS

Duck Nest Creek, a southeast-flowing ephemeral tributary of Caballo Creek, drains the western portion of the Belle Ayr North LBA Tract. Two smaller, unnamed ephemeral tributaries of Caballo Creek and three playas formed by natural topographic depressions drain the balance of the LBA tract.

Wetland inventories have been completed on those portions of Caballo Creek and its tributaries that lie within Belle Ayr Mine's existing permit area. A large portion of the Belle Ayr North LBA Tract is within the mine's existing permit area (Figure S1-6); therefore, a wetland inventory on Duck Nest Creek, including the entire stream segment that lies within the BLM study area for the LBA tract, has been conducted and is included in the mine's approved mine permit.

There have been numerous correspondences between the U.S. Army Corps of Engineers (COE) and Belle Ayr Mine on wetland inventories and determinations related to mine permit revisions. Most recently, on September 29, 1999, the COE conducted a site visit of wetland areas within the Belle Ayr Mine's permit area. Following that visit, a revised premining wetland delineation and discussion of wetlands to be impacted for the entire permit area was presented

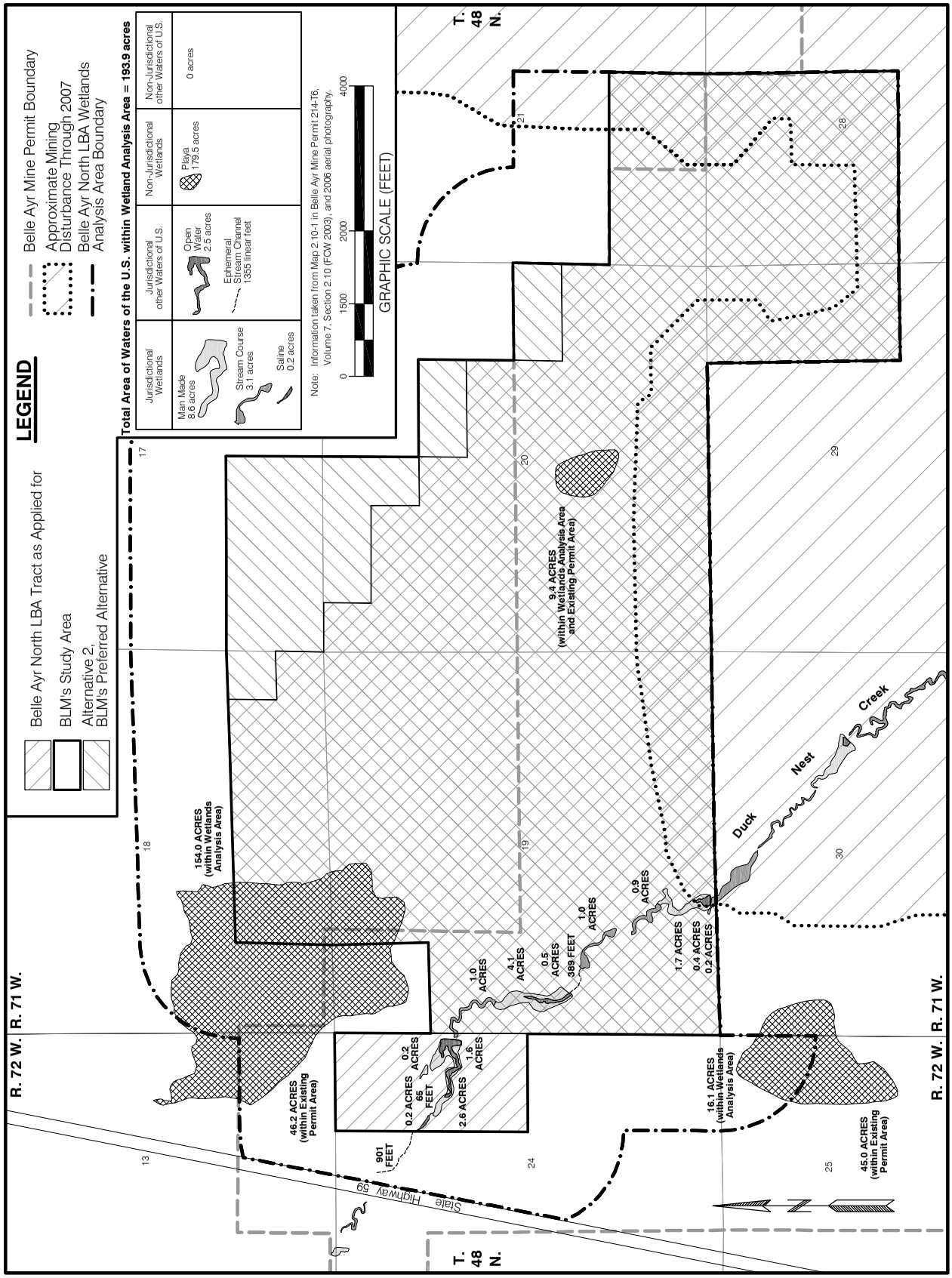

Figure S1-6. Wetlands and Other Waters Within the Belle Ayr North LBA Wetlands Analysis Area.

to COE in a letter from the mine, dated September 30, 1999. A response letter from COE to the mine, dated October 1, 1999, authorized the revised delineation and impact determination (FCW 2003). These premining wetland areas that occur within and adjacent to the Belle Ayr North LBA Tract are shown on Figure S1-6.

Figure S1-6 depicts the wetlands analysis area for the Belle Ayr North 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 Belle Ayr Mine operation (approximately 2,610 acres). A formal wetland delineation has been confirmed by the COE for the portion of the wetlands analysis area that is within the current Belle Ayr Mine permit area (approximately 1,362 acres). A formal wetland survey for the portion of the wetlands analysis area that is outside of the current Belle Ayr Mine permit area has not yet been completed; however, a portion of the large playa located in Sections 18 and 19, T.48N., R.71W. and Section 13, T.48N., R.72W. is the only Water of the U.S. within the wetlands analysis area that has not yet had a determination made by the COE.

Belle Ayr Mine's most recent delineation of wetlands and other Waters of the U.S. over the existing permit area identified these four types of wetlands: Man Made, Stream Channel, Saline, and Playa (FCW 2003). The man-made wetlands are found in association with small reservoirs and stock ponds. Stream channel wetlands are primarily moist to wet grassy meadows, usually less than 20 feet wide, and restricted to the stream channel and areas immediately adjacent to the stream bank. Saline wetlands occur only along the upper section of Duck Nest Creek and are characterized by saturated soils that commonly have salt deposits on the surface. Playa wetlands occur on areas with internal drainage that are intermittently flooded in response to spring runoff or runoff from intense thunderstorms. These individual wetland units and their respective areas (in acres) are shown within the Belle Aye North LBA Tract wetlands analysis area on Figure S1-6. Accordingly, a total of approximately 193.9 acres of Waters of the U.S., including a total of 14.4 acres of jurisdictional Waters of the U.S. occur within the wetlands analysis area for the Belle Ayr North LBA Tract. Approximately 11.9 of those acres are jurisdictional wetlands that occur along the watercourse of Duck Nest Creek. The 2.5 acres of jurisdictional other Waters of the U.S. that did not qualify as jurisdictional wetlands consist primarily of open water that is held within the in-channel impoundments and intermittent pools along Duck Nest Creek. The non-jurisdictional Waters of the U.S. contained in the wetlands analysis area (approximately 179.5 acres) consists of the internally drained playas.

As a result of recent court directives, playas are no longer identified as jurisdictional Waters of the U.S. under Section 404 of the Clean Water Act (CWA). These non-jurisdictional wetland features can however have significant biological and hydrological features.

A formal jurisdictional wetland delineation survey of the lands proposed for mining disturbance would be conducted and submitted to the COE for verification as part of the mining and reclamation permit process, if the Belle Ayr North LBA Tract is leased and proposed for mining.

S1-8 SOILS

The Belle Ayr North LBA Tract soils analysis area consists of 1,947 acres, which is divided into 1,578.74 acres for the LBA Tract as applied for and an additional 368.26 acres added for the BLM Study Area and soils report area. Approximately 59 percent of the soils study area (1,148.7 acres) is included in the existing soils baseline assessment for the Belle Ayr Mine which is part of the current Wyoming Department of Environmental Quality/Land Quality Division (WDEQ/LQD) Mine Permit 214 (FCW 2003). Approximately 748.22 of these permitted acres have native soils and the remaining 400.48 acres are a combination of currently disturbed land, constructed ponds, or reclaimed land. A small portion of the reclaimed land lies within the Caballo Coal Company permit boundary.

The soils study area has been subjected to three separate soil surveys in the recent past. The entire area was mapped to the less detailed Order 3 level during the recently completed "Soil Survey of Campbell County, Wyoming, Southern Part" (Westermann and Prink 2004). A detailed Order 1-2 soil survey has been previously completed on currently permitted Belle Ayr Mine portion of the soils study area. The remaining 41 percent of the area (798.3 acres) is included in the ongoing Order 1-2 Belle Ayr North soil survey (Nyenhuis 2007). Preliminary results of this survey have been added to the previously completed surveys for overall project evaluation. Within the soils analysis area to date, twenty-two soil series have been mapped in thirty soil map units, and nine soil series have been fully described and sampled for laboratory analysis at representative sites.

All detailed soil surveys were completed to the Order 1-2 resolution in accordance with WDEQ/LQD Guideline No.1 (Topsoil and Overburden), which outlines required soils information necessary for a coal mining operation. The inventories included field sampling, profile observation and description at the requisite number of individual sites, soil sampling and laboratory analysis of representative samples, soil suitability evaluation, and recommended salvage depth determination. 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 types and depths on the Belle Ayr North soils study area are similar to soils currently being salvaged and utilized for reclamation at the adjacent Belle Ayr Mine and other mines in the eastern PRB. Thirty soil map units and four miscellaneous units (Disturbed Land, Pond, Topsoil Stockpile, and Reclaimed Land) were delineated on the Belle Ayr North LBA Tract soils analysis area

(Figure S1-7). Four well developed, deep, nonsaline and nonsodic soils (Ulm, Bidman; Decolney; and Hiland, formerly Olney) comprise about 48 percent of the soils analysis area. Ulm and Bidman are "fine-textured" with dominantly clay, clay loam, and silty clay loam textures. Decolney and Hiland are "fine-loamy" with dominant loam, clay loam, and sandy clay loam textures. An additional 7 percent of the soils analysis area consists of deep, "fine-textured" Felix, Absted, Bone, and Aeric Haplaquepts soils located on nearly level flats, playas, and adjacent areas.

The soils series encountered within the survey area were grouped according to the primary soil formation processes and are listed as follows:

Soils (very shallow, shallow, or moderately deep) developing predominantly in thin residuum from sandstone or shale on upland ridges (26.8 acres, 1.7% of total soil area)

- Samsil (now Samday) clay, 0 to 6% slopes (80AB), and 3 to 15% slopes (80BD)
- Shingle- Thedalund (now Theedle) Complex, 6 to 30% slopes (347CD)

Soils (moderately deep, deep, or very deep) developing predominantly in slopewash, colluvium, or alluvial fan deposits from mixed sources on gently sloping uplands (846.8 acres, 54.8% of total soil area)

- Maysdorf sandy clay loam, 0 to 6% slopes (43AB)
- Bowbac sandy loam, 3 to 6% slopes (66B), and 3 to 9% slopes (66BC)
- Decolney sandy loam, 0 to 6% slopes (A66AB)
- Pugsley sandy loam, 3 to 6% slopes (B66B)
- Renohill sandy loam, 3 to 6% slopes (B76B)
- Briggsdale (now Parmleed) sandy clay loam, 0 to 6% slopes (A79AB), and 3 to 9% slopes (A79BC)
- Ulm sandy loam, 0 to 6% slopes (A85AB)
- Thedalund (now Theedle) sandy loam, 3 to 6% slopes (96B)
- Maysdorf-Pugsley Complex, 0 to 6% slopes (319AB), and 3 to 6% slopes (319B)
- Renohill-Shingle Complex (335)
- Bidman-Briggsdale (now Parmleed) Complex, 0 to 6% slopes (365AB)
- Decolney-Pugsley Complex (374)
- Decolney-Olney (now Hiland) Complex, 0 to 6% slopes (392AB), and 6 to 30% slopes (392CD)

Soils (very shallow, shallow, moderately deep, deep, or very deep) developing predominantly in coarse-textured alluvium and sandy eolian deposits on rolling uplands (85.6 acres, 5.5% of total soil area)

- Olney (now Hiland) loamy sand, 0 to 6% slopes (A62AB)
- Pugsley-Lessett Complex, 6 to 30% slopes (367CD)

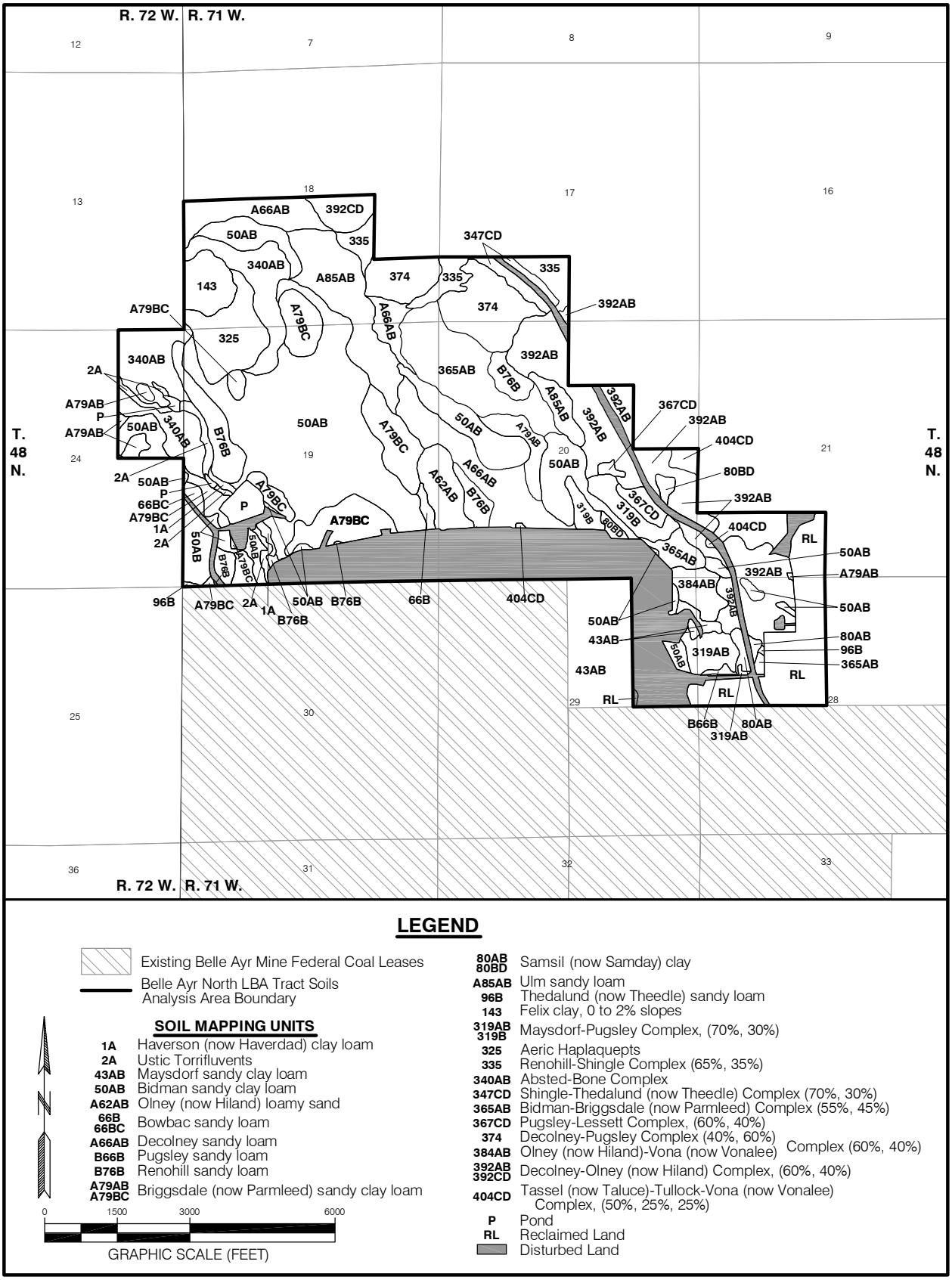

Figure S1-7. Soil Mapping Units Within the Belle Ayr North LBA Tract Analysis Area.

- Olney (now Hiland)-Vona (now Vonalee) Complex, 0 to 6% slopes (384AB)
- Tassel (now Taluce)-Tullock-Vona (now Vonalee) Complex, 6 to 30% slopes (404CD)

Drainage and low-lying soils (deep or very deep) developing in mixed stream laid alluvium on terraces and channels and in fine-textured deposits in playas, depressions, closed basins, and flats (587.3 acres, 38.0% of total soil area)

- Haverson (now Haverdad) clay loam, 0 to 3% slopes (1A)
- Ustic Torrifluvents, 0 to 3% slopes (2A)
- Bidman clay loam, 0 to 6% slopes (50AB)
- Felix clay, 0 to 2% slopes (143)
- Aeric Haplaquepts, 0 to 3% slopes (325)
- Absted-Bone Complex, 0 to 3% slopes (340AB)

The Belle Ayr North LBA soils analysis indicates that the amount of suitable topsoil that would be available for salvage, assuming all native acres would be disturbed during mining, equals an average depth of 26.8 inches (2.24 feet). Areas of unsuitable soils include sites with high salinity, alkalinity, or clay content. The tract is expected to have adequate quantity and quality of soil for reclamation. The site-specific soil surveys have located hydric soils and/or inclusions of hydric soils, which are one component used in identifying wetlands

Table S1-5 provides the extent of six depth classes of suitable topsoil within the soils analysis area.

Table S1-5. Acres of Topsoil Available for Reclamation Within the Belle Ayr North LBA Soils Study Area (excludes 400.48 acres already salvaged and/or reclaimed).

Thickness of Suitable Topsoil (inches)	Acres	Percent
0	0	0
0 – 12	211.9	13.7
12 – 30	576.3	37.3
30 – 48	758.3	49.0
48 – 60	0	0
> 60	0	0
Unknown	0	0
Total	**1,546.5**	**100.0**

S1-9 VEGETATION

The vegetation analysis area (1947 total acres) includes the BLM study area (the LBA as applied for under the Proposed Action) plus the BLM's Study Area

and an additional ¼ mile buffer added along portions of the west boundary of the LBA. The Belle Ayr North LBA Tract vegetation analysis area is partially located within and north of the current Belle Ayr Mine permit boundary. Consequently, portions of the analysis area were previously mapped and sampled in accordance with the current WDEQ/LQD mine permitting requirements. The balance of the vegetation assessment was completed by ESCO Associates, Inc. of Boulder, Colorado in 2006. The vegetation communities in this area were appraised and mapped to provide a preliminary assessment.

A total of five vegetation types have been preliminarily identified and mapped within the Belle Ayr North LBA Tract vegetation analysis area. Disturbed areas and topsoil stockpiles were also mapped. Table S1-6 presents the acreage and percent of the analysis area encompassed by each vegetation type. Figure S1-8 depicts the five vegetation communities, previously disturbed areas, and topsoil stockpile areas within the analysis area. The vegetation types include sagebrush grassland, crested wheatgrass pasture, playa, saline grassland, and reclamation. These vegetation types are described as follows:

Table S1-6. Vegetation Types Identified and Mapped Within the Belle Ayr North LBA Tract Vegetation Analysis Area.

Vegetation Type	**Acres**	**Percent of Area**
Sagebrush Grassland	462.68	23.76
Crested Wheatgrass Pasture	715.06	36.73
Playa	94.83	4.87
Saline Grassland	136.47	7.01
Reclamation	73.41	3.77
Disturbed Area	374.53	19.24
Topsoil Stockpiles	90.00	4.62
Total	**1946.98**	**100.00**

Source: ESCO 2007

The predominant vegetation types, in terms of total acres of occurrence in the vegetation analysis area are the crested wheatgrass pasture (36.73 percent) and sagebrush grassland (23.76 percent) types. The sagebrush grassland vegetation type is characterized by Wyoming big sagebrush and upland grasses of the region. Crested wheatgrass pasture was probably formerly sagebrush grassland but subsequently was cleared and planted to a monoculture of crested wheatgrass for purposes of establishing improved pasture conditions. On wetter than ordinary years, these pastures have been cut for hay. Minor vegetation types on approximately 16 percent of the vegetation analysis area include the playa grassland, saline grasslands, and reclamation. Playa Grassland occurs on mostly very heavy soils of interior drainages, with western wheatgrass as by far the most abundant species. Saline grassland occurs on salt-affected soils that are seasonally moist and are dominated by inland

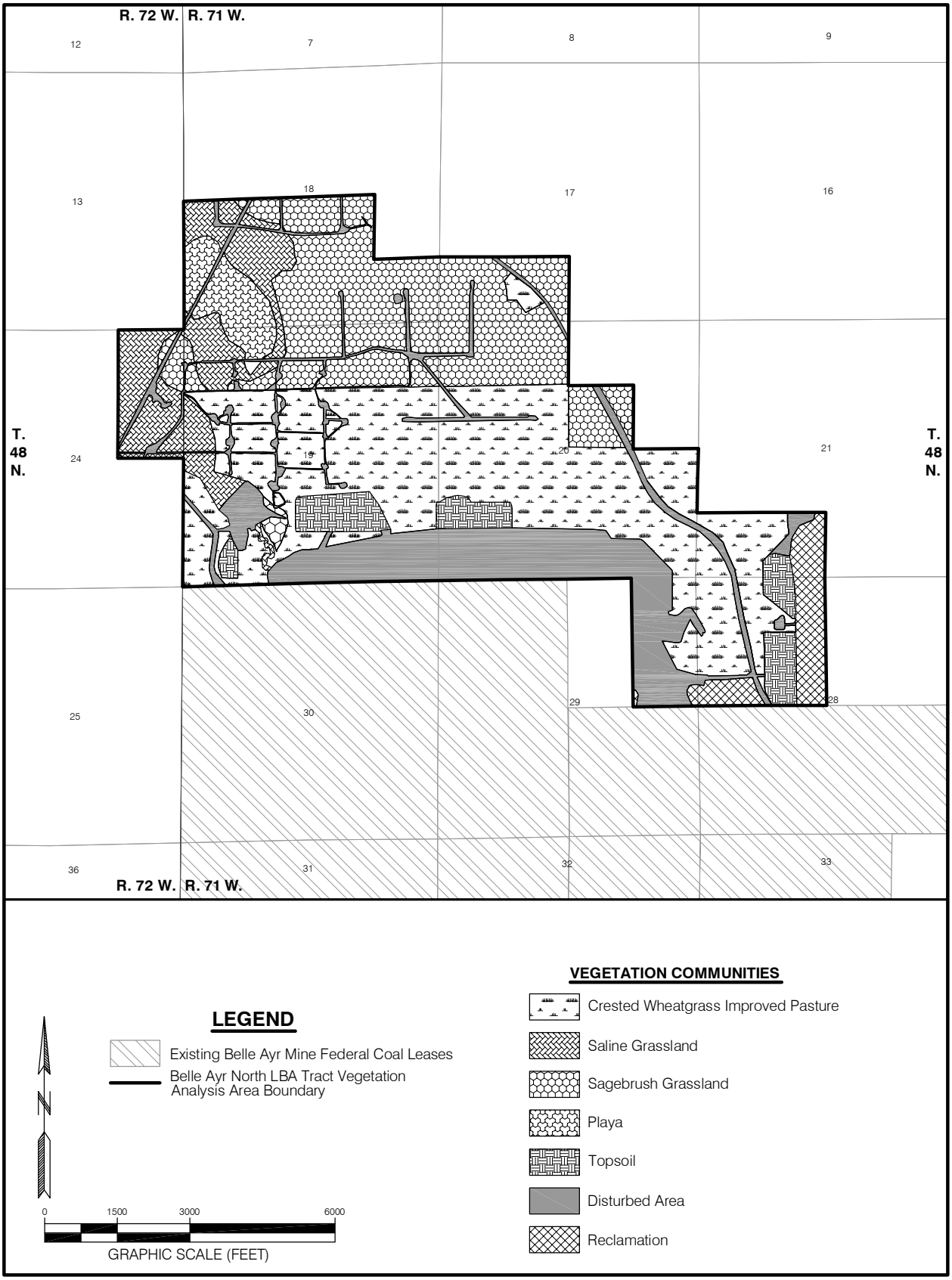

Figure S1-8. Vegetation Mapping Units Within the Belle Ayr North LBA Tract Analysis Area.

saltgrass and alkali sacaton. The LBA study area includes some areas previously disturbed by mining that have been reclaimed. These lie within the Caballo Mine permit area.

Sagebrush Grassland is a native plant community that is dominated by native perennial cool season grasses in conjunction, periodically, with the non-native annual grasses cheatgrass (*Bromus tectorum*, aka *Anisantha tectorum*) and Japanese brome (*Bromus japonicus*). The cool season native perennial grass species that are dominant include needle and thread (*Hesperostipa comata*) and western wheatgrass (*Pascopyrum smithii*) along with lesser amounts of the two upland sedges threadleaf sedge (*Carex filifolia*) and needleleaf sedge (*Carex stenophylla*). In dry years, the lone prominent native perennial warm season grass blue grama (*Bouteloua gracilis,* aka *Chondrosum gracile*) may be of an abundance similar to either of the sedges. In years when moisture is more favorable, it may be twice as much, but not as abundant as needle and thread or western wheatgrass. The domesticated forage plant crested wheatgrass (*Agropyron cristatum* var. *desertorum*) occurs as a minor component in about a third of the stands of sagebrush grassland in this area. More prominent visually than the grasses, but with modest average cover, is Wyoming big sagebrush (*Seriphidium tridentatum*, aka *Artemisia tridentata* ssp. *wyomingensis*). During periods of wetter years, shrub cover can increase by a factor of two or somewhat more as can perennial grass cover (see ESCO 1997 to 2006, data from annual monitoring of Belle Ayr Mine Sagebrush Grassland Extended Reference Area). Although local pockets of higher big sagebrush density may be associated with relative cover by this species as high as 20%, the average relative cover is about 5 to 8%.

The most commonly present native perennial forb in this vegetation is scarlet globemallow (*Sphaeralcea coccinea*). Moderately common forbs are cockscomb hiddenflower (*Cryptantha celosioides*), puccoon (*Lithospermum incisum*), silvery lupine (*Lupinus argenteus*), rush skeletonweed (*Lygodesmia juncea*), ironplant goldenweed (*Machaeranthera pinnatifida*), silverleaf scurfpea (*Pediomelum argophyllum*), Hood's phlox (*Phlox hoodii*), American vetch (*Vicia americana*), and death camas (*Zygadenus venenosum*). During periods of years with better moisture availability, such forbs as pussytoes (*Antennaria* spp.), spreading fleabane (*Erigeron divergens*), scarlet gaura (*Gaura coccinea*), silky goldenweed (*Heterotheca fulcrata*), breadroot scurfpea (*Pediomelum esculentum*), and white penstemon (*Penstemon albidus*) may also be similarly common.

Besides big sagebrush, the only shrub species occurring even moderately often is rubber rabbitbrush (*Ericameria nauseosa*, aka *Chrysothamnus nauseosus*). While providing extremely little cover, the subshrub fringed sage (*Artemisia frigida*) is almost always present; the only other subshrubs even moderately likely to be present are Gardner saltbush (*Atriplex gardneri*) and winterfat (*Krascheninnikovia lanata*, aka *Eurotia lanata* or *Ceratoides lanata*). Periods of years of better moisture availability accompany more frequent occurrence of the subshrub prickly phlox (*Leptodactylon pungens*).

Annual and biennial plants, though providing little in the way of cover, are often common. The environmental conditions of a given year sometimes allow vigorous establishment of annual / biennial species. Among the natives included are Indian plantain (*Plantago patagonica*), Richardson tansymustard (*Descurainia incana*), pinnate tansymustard (*Descurainia pinnata*), stickseed (*Lappula redowskii*), and denseflower pepperweed (*Lepidium densiflorum*). The lone native annual grass of any significance is sixweeks fescue (*Vulpia octoflora*). Non-native annual/biennial forbs present commonly include desert allysum (*Alyssum desertorum*) and fluffweed (*Filago arvense*).

Two other species that are almost always present, although not of significance to livestock forage use, are the manyspine pricklypear cactus (*Opuntia polyacantha*) and the vagrant lichen (*Xanthoparmelia chlorochroa*, aka *Parmelia chlorochroa*).

The presence of sagebrush is related to several environmental factors that in one way or another enhance shallow soil moisture in the early part of the growing season. These are concave surface topography, protection from wind (by virtue of sheltering high ground located up-wind), and somewhat finer-textured soils. The first two reduce the exposure to drying wind and enhance the accumulation of snow in winter. The third tends to allow higher retention of soil moisture that makes its way into the soil (slowly) during winter and spring periods.

The **Crested Wheatgrass Pasture** vegetation type is man-made, consisting of areas from which original natural vegetation has been removed and replaced with plantings of the domesticated forage grass known as crested wheatgrass. Most of that present is standard crested wheatgrass (*Agropyron cristatum* var. *desertorum*), while small amounts are of the "Fairway" variety (*A. c.* var. *cristatum*). In some small localities, intermediate wheatgrass (*Elymus hispidus*, aka *Agropyron intermedium* and *A. trichophorum*) was sown rather than crested wheat and the intermediate has also moved around and invaded into the crested plantings. To limited degrees the improved pasture plantings are also invaded by native species; most of these areas in the Belle Ayr North LBA Tract are relatively little invaded by either native grasses or shrubs. Cool season perennial grasses most likely to reestablish themselves in these improved pastures include are Junegrass (*Koeleria macrantha*), and Sandberg bluegrass (*Poa sandbergii*, incl *P. juncifolia*). Blue grama, the warm season native perennial grass is also about equally active in invasion.

Native perennial forbs are common occurrences, though in small amounts. Only American vetch and scarlet globemallow are typically found in most stands Annual and biennial forbs are more frequently encountered and typically are more abundant in the improved pastures than in the sagebrush grasslands that they usually replaced. There are typically over twice as many species of annual / biennial forbs in the improved pasture as in the sagebrush grassland (ESCO 2007b). The most frequently present annual / biennial forbs are the native Richardson tansymustard, and the introduced desert alyssum,

littlepod falseflax, and fluffweed. Less frequent but not uncommon species include the natives stickseed, denseflower pepperweed, and Indian plantain and the non-natives perfoliate pepperweed (*Lepidum perfoliatum*), yellow sweetclover (*Melilotus officinalis*), and Russian thistle (*Salsola tragus*). Cheatgrass and Japanese bromegrass both occur but less frequently and in lower abundance than in sagebrush grassland. The presence of shrubs, subshrubs, and succulents is negligible.

The term Playa is applied, as is the custom in the Northern Great Plains, to relatively small interior draining sites in which runoff from adjacent gentle slopes accumulates along with transported clay-size soil particles. The **Playa Grassland** vegetation type occurs on these sites of interior drainage (Echeta series soils) and supports, on a nearly level surface, a grassland typically dominated by a near-monoculture of western wheatgrass, a grass particularly well-adapted to heavy clay soil. Other grasses, especially the native annuals shortawn foxtail (*Alopecurus aequalis*) and sixweeks fescue and the non-natives Carolina foxtail (*Alopecurus carolinianus*), cheatgrass, and Japanese brome may be present depending on the moisture conditions of the winter and spring. Present in scant amounts often are foxtail barley (*Critesion jubatum*, aka *Hordeum jubatum*), Junegrass, and Sandberg bluegrass. Native perennial forbs are very sparsely represented in this type, as are shrubs and subshrubs. Dandelion (non-native perennial forb) however is moderately common.

The **Saline Grassland** vegetation type occurs on sites underlain by soils of the Arvada, Heldt-saline and Bidman-saline series (NRCS 2004). The dominant plants are the warm season native perennial grasses inland saltgrass (*Distichlis stricta*) and alkali sacaton (*Sporobolus airoides*) along with somewhat lesser amounts of the two rhizomatous native wheatgrass, western wheatgrass and streambank wheatgrass (*Elymus lanceolatus* ssp. var. *riparius*). Though salt-affected, these sites are within the ecological amplitude of both cheatgrass and Japanese brome, and both may contribute sub-dominant amounts of cover in years with adequate moisture in the late summer/fall preceding. Other grasses commonly present include needle and thread, Junegrass (*Koeleria macrantha*), and Sandberg bluegrass (*Poa sandbergii*, incl *P. juncifolia*). Native perennial forbs offer a small amount of cover, typically less than 1.5%. The most commonly encountered include textile onion (*Allium textile*), pussytoes, Hooker sandwort (*Eremogone hookeri*), scarlet globemallow, and American vetch. The introduced perennial forb dandelion (*Taraxacum officinale*) is commonly present.

Among annual / biennial species, the natives pinnate tansy mustard and stickseed along with the non-native desert alyssum, littlepod falseflax (*Camelina microcarpa*), and fluffweed are commonly present. Less common but of note are western rockjasmine (*Androsace occidentalis*), narrowleaf goosefoot (*Chenopdium leptophyllum*), linearleaf collomia (*Collomia linearis*), denseflower pepperweed, Richardson tansymustard, and suckleya (*Suckleya suckleyana*).

Shrubs and subshrubs are an extremely minor component of this vegetation type, and both manyspine pricklypear cactus and vagrant lichen are much less extensive than in the sagebrush grassland type.

At the extreme eastern edge of the area is a narrow band of land that was disturbed as part of the backslopes associated with earlier mining. This **Reclaimed Area** has since been revegetated as part of another mining operation. Details of this young vegetation are not known, but it would be likely to be a cover of mostly perennial grasses and some alfalfa along with a fairly substantial cover of annual / biennial forbs.

Topsoil Stockpiles. Included in the Belle Ayr North LBA Tract are some piles of topsoil stored for use in future reclamation at the Belle Ayr Mine. These piles are evenly sloped and symmetric and are planted to a mix of wheatgrasses (western, thickspike (*Elymus lanceolatus* var. *lanceolatus*) and slender (*Elymus trachycaulus*)) toward the end of controlling erosion and preventing, through plant competition, the excessive invasion of the piles by undesirable weedy species.

Areas mapped as **Disturbed** are of four main types. The largest portion is included in the advancing excavation associated with the backslopes of mine pits extending to the south. Also included is an area recently excavated and contoured as part of construction of a flood control pond in the southwest corner of the LBA area. The latter structure may from time to time contain open water, but in general will be operated with little confined water in order to be ready to accept flood flows. Areas associated with recent coal-bed methane drill pad and pipeline construction were also mapped as Disturbed as was the right-of-way for Bishop Road where in is included in the LBA area.

Comparison to Other Vegetation of the Powder River Basin

The most extensive vegetation mapping unit of the Belle Ayr North LBA Tract is the Crested Wheatgrass Improved Pasture. Compared to other such vegetation in the area, it is in relatively good condition, comparatively devoid of invading native species. From the standpoint of its intended use, it is functional as improved pasture. Sagebrush Grassland of the site is typical of that found on the finer-textured soils of much of southern Campbell County. To the south and west of the study area, sandstone – derived soils typically support more open grassland with little sagebrush. Sagebrush grassland on finer soils, during dry periods such as the period from 2000 to 2006 tend to have lower ground cover and biomass production than the grasslands of the coarser soils. The Playa Grassland of the Belle Ayr North LBA Tract is thought to be representative of the general composition of this type through southern Campbell County. Saline Grassland of the Southern Campbell County area is rather variable, the specific soil and geologic circumstances related to excess salinity varying. The Belle Ayr North LBA Tract is possessed of the saline soils mentioned in the description. These relatively low slope areas tend to support

growth of saltgrass and alkali sacaton in hummocks which is fairly typical of Saline Grassland in the general area.

S1-9.1 Threatened, Endangered, Proposed, and Candidate Plant Species

Potential habitat for T&E species and their occurrence on the Belle Ayr North LBA Tract are discussed in Appendices E and I of the SGAC EIS document.

S1-10 WILDLIFE

S1-10.1 Wildlife Resources

Background information on wildlife in the vicinity of the Belle Ayr North LBA Tract was drawn from several sources, including the South Powder River Basin Coal FEIS, Wyoming Game and Fish Department (WGFD) and U.S. Fish and Wildlife Service (USFWS) records, and personal contacts with WGFD and USFWS biologists. Site-specific data for the Belle Ayr North 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. FCW initiated baseline investigations in 2006 and 2007 expressly for the Belle Ayr North LBA Tract. Thunderbird-Jones & Stokes (TJS), formerly Thunderbird Wildlife Consulting, Inc. (TWC), formulated the Belle Ayr North 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 baseline and annual wildlife monitoring surveys for the adjacent Belle Ayr Mine since 1974. Baseline and annual wildlife surveys cover a large perimeter around mine permit areas; consequently, a majority of the proposed lease area and adjacent lands have been surveyed for wildlife species as part of the required monitoring surveys for the Cordero Rojo, Belle Ayr, and Caballo Mines. The results of site-specific surveys for the entire leased area and appropriate perimeter 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 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 seeded grassland and sagebrush grassland. Networks of road and well pad disturbance areas overlay much of the crested wheatgrass pasture and sagebrush grassland. There are also numerous tank batteries and miles of pipeline disturbance with varying degrees of recovering vegetation cover. No designated critical, crucial, or unique wildlife habitats are present in the area.

The predominant natural habitat is crested wheatgrass pasture, and sagebrush grassland is the next largest habitat type. The Crested wheatgrass pasture areas were probably formerly sagebrush grassland but subsequently were cleared and planted to a monoculture of crested wheatgrass for purposes of establishing improved pasture conditions. On wetter than ordinary years, these pastures have been cut for hay. Upland grasses of the region and Wyoming big sagebrush characterize the sagebrush grassland vegetation type. Wyoming big sagebrush is more prominent visually, but with modest coverage. Playa grassland occurs on mostly very heavy soils of interior drainages, with western wheatgrass as by far the most abundant species. Saline grassland occurs on salt-affected soils that are seasonally moist and are dominated by inland saltgrass and alkali sacaton. The LBA study area includes some areas previously disturbed by mining that have been reclaimed. Trees are limited on the Belle Ayr LBA Tract, limited to a small group of willow (*Salix sp.*) in the southeastern corner.

No perennial streams or other permanent water bodies exist within the proposed Belle Ayr North LBA Tract, though a large playa overlaps the northwestern portion of the area. The nearest bottomland (native and reclaimed) habitats occur along Caballo Creek as it flows west to east through the southern portion of the larger survey area.

S1-10.2 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 five 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 six 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 onto 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).

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.

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). Mule deer are frequently observed on Belle Ayr Mine reclaimed lands. 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 Belle Ayr North 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 Belle Ayr North LBA Tract or in the wildlife 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 20,980, which is slightly above the current objective of 20,000 (WGFD 2008).

The 2007 postseason mule deer population was estimated at 20,980, 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 70 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 Belle Ayr North LBA Tract 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 south 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 Belle Ayr North 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 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 25 miles south of the Belle Ayr 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. Limited observations have also been documented in and near the Belle Ayr Mine permit area in the last few years.

S1-10.3 Other Mammals

A variety of small and medium-sized mammal species occur in the vicinity of the general analysis area, although not all have been observed on the 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*]) also have 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 prairie dog towns were found within the wildlife general analysis area or within 2 miles of the analysis area.

S1-10.4 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*), prairie falcon (*Falco mexicanus*), 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. Those species that commonly nest in the general analysis area are the ferruginous hawk, golden eagle, red-tailed hawk, Swainson's hawk, northern harrier, burrowing owl, and great horned owl. The short-eared owl occasionally nests 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 Belle Ayr Mine.

Through 2008, surveys conducted by Thunderbird-Jones & Stokes had documented eight raptor species (golden eagle, ferruginous hawk, northern harrier, red-tailed hawk, Swainson's hawk, great horned owl, burrowing owl, and short-eared owl) nesting at least once within the Belle Ayr North LBA Tract raptor survey area. That raptor survey area is defined as a 2-mile radius around the Belle Ayr North wildlife general analysis area (Figure 3-25 in the SGAC EIS document).

In 2008, 43 intact raptor nests were present within the Belle Ayr North raptor survey area, 17 of these nests were active (eggs laid), and one nest was tended (new material added, no eggs laid). Only two (a Swainson's hawk nest and a multi-species nest) of the 38 active nests in 2008 is located on the Belle Ayr North LBA Tract as applied for under the Proposed Action. Two additional intact nest sites are present within the Belle Ayr North wildlife general analysis area: a burrowing owl nest site and a platform nest used by ferruginous hawks and golden eagles in the past (Figure 3-25 in the SGAC EIS document). All intact raptor nests except the burrowing owl nest site are already encompassed by the existing Belle Ayr Mine permit area.

S1-10.5 Upland Game Birds

Four upland game bird species are known to occur in suitable habitats on or near the general analysis area. 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 (FCW 2005b).

Gray (or Hungarian) partridge, an introduced species, have been infrequently observed on reclaimed areas, sagebrush shrublands, upland grassland, 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. The Hungarian partridge were not observed on the survey area in 2004 and 2005 (FCW 2005b).

Sharp-tailed grouse were observed in 2004 approximately one mile southeast of the LBA tract, but these sightings were infrequent, occurring during the winter. The nearest sharp-tailed grouse lek is over six miles northeast of the survey area.

Sage-grouse are a large upland game bird considered a "landscape species", annually using widespread areas of sagebrush habitats. The sagebrush grassland vegetation type comprises only approximately 24 percent of the vegetation analysis area. At the present time, sage-grouse do not appear to be abundant or common in the area.

No greater sage-grouse leks occur within the Belle Ayr North LBA Tract as applied for, or within lands added under Alternative 2. Only one sage-grouse lek (Lynde) has been documented within 2 miles of the Belle Ayr North wildlife general analysis area during previous wildlife surveys conducted for the adjacent Belle Ayr and Caballo Mines (Figure 3-25). The Lynde lek was last active in 1999. Three additional sage-grouse leks are present approximately 2.5 miles south of the Belle Ayr North wildlife general analysis area: Belle Ayr I, Belle Ayr II, and Stowe. Due to their proximity to one another, the WGFD considers all three to be within the Belle Ayr Complex. All three leks have essentially been inactive since 2004. Although the Belle Ayr Complex leks themselves are beyond the 2-mile wildlife survey perimeter for the wildlife general analysis area, the 3-mile radius of concern for each lek overlaps the southern portion of the Belle Ayr North LBA Tract as applied for. That radius represents the area in which two-thirds of the hens that were bred at those leks would be expected to nest.

S1-10.6 Migratory Bird Species of Management Concern in Wyoming

USFWS uses a list entitled *Migratory Bird Species of Management Concern in Wyoming*, specifically the *Coal Mine List of 40 Migratory Bird Species of Management Concern in Wyoming,* for reviews related to existing and proposed coal mine leased land (USFWS 2002). This list was taken directly from the Wyoming Bird Conservation Plan (Cerovski, et al. 2000). The regional status and expected occurrence, historical observations, and breeding records on or near the Belle Ayr North LBA Tract for each listed species are included in Table S1-7. The *Migratory Bird Species of Management Concern in Wyoming* replaced

the *Migratory Birds of High Federal Interest* (MBHFI) list. The Belle Ayr Mine previously conducted annual surveys for the species included on the MBHFI list and now conducts annual surveys for the species included on the coal mine list. The surveys, which are conducted in the winter through summer, include the permit area and a one-half to one-mile perimeter.

Twenty-three of the 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*), and the vesper sparrow (*Pooecetes gramineus*). Other species observed in the area include the long-billed curlew (*Numenius americanus*), peregrine falcon (*Falcon peregrinus*), bald eagle, bobolink (*Dolichonyx oryzivorus*), common loon (*Gavia immer*), red-headed woodpecker (*Melanerpes erthrocephalus*), Merlin (*Falco coumbarius*), upland sandpiper (*Bartramia longicauda*), and sage sparrow (*Amphispiza belli*). The bald eagle is only observed in the winter or as a migrant and the long-billed curlew, peregrine falcon, bobolink, loon, red-headed woodpecker, and merlin have only been observed as migrants.

The mountain plover (*Charadrius montanus)* 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 October 2001. USFWS subsequently published a withdrawal of the proposed rule to list the mountain plover as threatened on September 9, 2003, (USFWS 2008). Mountain plovers have not been recorded within the Belle Ayr North LBA Tract or in adjacent areas.

The bald eagle is seasonally common and most frequently observed during the winter months. Bald eagles are relatively common winter residents and migrants in northeastern Wyoming's PRB. No bald eagle winter roost sites have been documented on or within one mile of the Belle Ayr North 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 5 miles south of the Belle Ayr North 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 were observed at this roost site on February 16 of 2005 with maximums of 20 and 15 recorded in 2005-2006 and 2006-2007, respectively. Very few birds had been observed at the roost through late 2007. This roost site is within ¼ mile of active mining operations and bald eagles were commonly observed around mining activities. No unique, concentrated, or predictable sources of prey or carrion occur in the study area, so foraging bald eagles would not be attracted to the location in great numbers.

Table S1-7. Migratory Bird Species of Management Concern in Wyoming: Their Regional Status, and Expected and Actual Occurrence on or Near the Belle Ayr North LBA Tract.

Species[1]	Seasonal Status/Breeding Records in Northeastern WY[1]	Historical Occurrence in the Vicinity of the BAN LBA[2]	Occurrence and Status in the BAN LBA in 2006
LEVEL I (species need conservation action)			
Mountain plover	Summer/Observed	Never Recorded	---
Greater sage-grouse*	Resident/Breeder	Common Breeder	---
McCown's longspur*	Summer/Breeder	Common Breeder	---
Baird's sparrow	Never Recorded	Never Recorded	---
Ferruginous hawk*	Resident/Breeder	Common Breeder	Breeder
Brewer's sparrow*	Summer/Breeder	Common Breeder	Presumed Breeder
Sage sparrow	Summer/ Observed	Rare Visitor	---
Swainson's hawk*	Summer/Breeder	Common Breeder	Breeder
Long-billed curlew*	Summer/Breeder	Infrequent Migrant	---
Short-eared owl*	Resident/Breeder	Infrequent Breeder	Observed
Peregrine falcon*	Resident/Observed	Occasional Migrant	---
Burrowing owl*	Summer/Breeder	Historic Breeder	---
Bald eagle*	Resident/ Observed	Common in Winter	Winter Resident
Upland sandpiper*	Summer/Breeder	Uncommon	---
LEVEL II (species need monitoring)			
Cassin's kingbird	Summer/ Observed	Never Recorded	---
Lark bunting*	Summer/Breeder	Common Breeder	Presumed Breeder
Dickcissel*	Summer/Observed	Never Recorded	---
Chestnut-collared longspur*	Summer/Breeder	Common Breeder	---
Black-chinned hummingbird	Never Recorded	Never Recorded	---
Pygmy nuthatch	Resident/Observed	Never Recorded	---
Marsh wren	Summer/ Observed	Never Recorded	---
Western bluebird	Summer/ Observed	Never Recorded	---
Sage thrasher*	Summer/Breeder	Rare Breeder	---
Grasshopper sparrow*	Summer/Breeder	Common Breeder	Potential Breeder
Bobolink*	Summer/Observed	Uncommon Migrant	---
Common loon*	Summer/Observed	Observed Twice	---
Black-billed cuckoo	Summer/ Observed	Never Recorded	---
Red-headed woodpecker*	Summer/ Observed	Observed Once	---
Yellow-billed cuckoo	Never Recorded	Never Recorded	---
Eastern screech-owl	Never Recorded	Never Recorded	---
Western screech-owl	Never Recorded	Never Recorded	---
Western scrub-jay	Never Recorded	Never Recorded	---
Loggerhead shrike*	Summer/Breeder	Uncommon Breeder	---
Vesper sparrow*	Summer/Breeder	Common Breeder	---
Lark sparrow*	Summer/Breeder	Uncommon Breeder	---
Ash-throated flycatcher	Never Recorded	Never Recorded	---
Bushtit	Never Recorded	Never Recorded	---
Merlin*	Resident/Breeder	Occasional Migrant	---
Sprague's pipit*	Migrant/Observed	Never Recorded	---
Barn owl	Summer/Breeder	Never Recorded	---

[1] Compiled from Cerovski et al. (2004), Jones et al. (1983), and Clark and Stromberg (1987).
[2] Historical Occurrence/Status in the Belle Ayr North LBA survey area is based on records from annual monitoring conducted at the Belle Ayr Mine from 1984 through 2006.
[3] Sighting records were derived from actual occurrence on or within one-half mile of the LBA tract and the Alternative 2 tract configuration area or from observations related to Belle Ayr Mine baseline and annual monitoring.
* Species marked with an asterisk regularly breed in the Powder River Basin of northeast Wyoming.

Burrowing owls have nested in the vicinity of the Belle Ayr North 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 owls nested during three of the past five years. Burrowing owls were discovered nesting in an old badger (*Taxidea taxus*) burrow in the southern portion of the two-mile perimeter in 2003 and fledged young in three consecutive years (2003-2005). No active burrowing owl nests were recorded in 2006.

Sage-grouse, recently added to the Level 1 list, 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.

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.

S1-10.7 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 Belle Ayr North LBA Tract provides limited waterfowl and shorebird habitat. Those counts occurred on native and diverted reaches of Caballo Creek, as well as at two National Pollution Discharge Elimination System (NPDES) reservoirs within the current Belle Ayr 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. During 2006, several fish were documented in stretches of Caballo Creek, including the sand shiner (*Notropis stramineus*), fathead minnow (*Pimephales promelas*), green sunfish (*Lepomis cyanellus*), and bluegill (*Lepomis macrochirus*). These species were recorded during fish sampling surveys conducted in a new diversion for the adjacent Belle Ayr Mine.

The only herptiles that have been encountered within the Belle Ayr North LBA survey area (LBA and two-mile perimeter) are the great plains toad (*Bufo cognatus*), boreal chorus frog (*Pseudacris triseriata*), and northern leopard frog (*Rana pipiens*). The tiger salamander (*Ambystoma tigrinum*), western painted turtle (*Chrysemys picta*), and common snapping turtle (*Chelydra serpentina*) have been recorded in Caballo Creek south of the LBA area. The scarcity of mesic habitat throughout the majority of the study area reduces the potential

of the area to attract numerous species, particularly amphibians and aquatic reptiles. Although they were not observed, dry land species such as the eastern shorthorned lizard (*Phrynosoma douglassi*), bullsnake (*Pituophis melanoleucas*), and prairie rattlesnake (*Crotalus viridis*) could occur on the proposed extension area.

S1-10.8 Threatened, Endangered, Proposed, and Candidate Animal Species

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

S1-11 LAND USE AND RECREATION

All of the surface estate on the Belle Ayr North LBA Tract as applied for and the area added under Alternative 2 is privately owned. FCW is the major private surface owner, but there is one other private surface owner in the northern portion of the area added by Alternative 2. The ownership of the surface estate is shown in detail in Figure 3-31 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 the private lands.

Areas of disturbance within the general analysis area include 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, and surface mine-related facilities. U.S. Highway 59 is located approximately one-half miles west of the LBA tract. The Bishop Road (a paved county road) is located along the northern limits of the study area sand runs east and west and connects to Highway 59 northwest of the LBA tract. Several unnamed two-track roads traverse and provide public and private access within and near the proposed lease area and BLM study area.

The oil and gas estate within the Belle Ayr North LBA Tract as applied for and the area added under Alternative 2 is federally and privately owned, with the majority (approximately 98 percent) being privately owned. The ownership of the oil and gas estate is shown in Figure 3-35 in the SGAC EIS document. A list of the current federal oil and gas lessees of record is included as Table 3-13 in the SGAC EIS document.

According to the Wyoming Oil and Gas Conservation Commission (WOGCC) records as of December 13, 2007, there were no conventional oil and gas wells on lands included in the Belle Ayr North LBA Tract as proposed and the lands added under Alternative 2 that were producing or capable of producing (refer to Figure 3-35 in the SGAC EIS document). The seven conventional oil wells that were drilled on private leases were unproductive and subsequently plugged and abandoned. Records suggest that the seven conventional wells were designed to test production from the Minnelusa Formation. The most recent

conventional test well in the general analysis area was drilled in 1983 (WOGCC 2009). Conventional oil and gas wells capable of production within the Belle Ayr North 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 18 CBNG wells that were producing, nine plugged and abandoned, 23 were shut-in, and one is temporarily abandoned within the lands encompassed by the Belle Ayr North LBA Tract as applied for and the lands added under Alternative 2 (refer to Figure 3-35 in the SGAC EIS document). Extensive CBNG development has occurred north, south, and west of the tract. CBNG wells capable of production on or in sections adjacent to the Belle Ayr North 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). The Belle Ayr North, West Coal Creek, Caballo West, and Maysdorf II LBA Tracts being evaluated in the SGAC EIS lease application are in this group of mines (Tables 1-1 and 1-2 in the SGAC EIS document). 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 Belle Ayr North 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 Belle Ayr North LBA Tract as applied for and the area added by Alternative 2 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 20,980, 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.

A resident elk herd resides in the Rochelle Hills south of the Belle Ayr North LBA Tract wildlife general analysis area. Elk do wander from the protection of the Rochelle Hills to forage in native and reclaimed grasslands in the vicinity of the general south Gillette analysis area. None of the Belle Ayr North LBA Tract 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 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). 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 Belle Ayr Mine. Limited observations have been documented in and near the Belle Ayr Mine permit area in the last few years.

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 Belle Ayr North LBA Tract wildlife general analysis area due to the lack of that particular habitat. The WGFD classifies the entire general south Gillette analysis area as out of the normal white-tailed deer use range. A narrow corridor along the Belle Fourche River east of the Belle Ayr North LBA Tract wildlife general analysis area 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 south Gillette analysis area.

Under natural conditions, aquatic habitat is limited by the ephemeral nature of surface waters in the general analysis area. No perennial streams or persistent sizeable reservoirs occur on the area. The lack of deep-water habitat and extensive and persistent water sources limits the presence and diversity of fish and other aquatic species. During 2006, several species of game and non-game fish were documented in stretches of Caballo Creek. These species were recorded during fish sampling surveys conducted in a new diversion for the adjacent Belle Ayr Mine. Caballo Creek is listed in the WDEQ/LQD Surface Water Classification List as a Class 3B stream that is protected for aquatic life, recreation, wildlife, agriculture, industry, and scenic value (WDEQ 2001). Duck Nest Creek, also classified as 3B, is the only other ephemeral stream draining the general analysis area categorized by the WDEQ.

S1-12 CULTURAL RESOURCES

Much of the LBA survey area had already been intensively surveyed at a Class III level by numerous inventories that were associated with oil and gas field development and surface mining operations. In 2006, FCW contracted with TRC Mariah Associates, Inc., of Laramie, Wyoming to perform a Class III survey of previously unsurveyed areas within the Belle Ayr North LBA Tract survey area. The cultural resources survey area included approximately 1,947 acres within the LBA tract as applied for under the Proposed Action and the area added under Alternative 2.

S1-12.1 Previous Investigations

The Belle Ayr North LBA Tract cultural resource analysis area has been entirely surveyed for cultural resources at a Class I level. The Class I review of previous survey records identified 11 archeological sites, of which seven are prehistoric, two are historic, and two are multi-component. Prehistoric sites consist primarily of open camps and lithic scatters. All prehistoric sites are considered not eligible. Historic sites consist primarily of homesteads and historic trails. The two sites are not considered eligible to the NRHP. The two

multi-component sites consist mostly of lithic and historic debris and are considered not eligible. No isolated occurrences were identified during the Class I records search.

S1-12.2 Current Investigations

A majority of the remainder of the Belle Ayr North cultural resources general analysis area was surveyed at a Class III level in 2006. One archaeological site and five isolated occurrences were identified and recorded during this recent Class III inventory. The five isolates consist of prehistoric flakes and projectile points. The one newly recorded cultural site consists of a prehistoric open campsite and is considered not eligible for the National Register of Historic Places (NRHP). Two previously recorded sites (48CA1918 and 48CA3222) located within the analysis area were to be reassessed during the 2006 inventory. Site 48CA1918 consisted of a historic homestead and ranch was recommended as not eligible for the NRHP. The 2006 reassessment found the site to be in similar condition to that described in 1999. Site 48CA3222 consisted of prehistoric lithic scatter and was originally considered not eligible for the NRHP. The site could not be relocated in 2006 due to the dense ground cover in the area.

S1-12.3 Summary

To summarize the identified cultural properties, a total of 12 archaeological sites are located in the Belle Ayr North LBA Tract cultural survey area (Table S1-8). Of these 12 sites, eight are prehistoric, two are historic, and two are multi-component. None of the 12 sites are considered eligible to the NRHP by the cultural site recorder. Five prehistoric isolated occurrences were also recorded. Approximately 54 acres of the 1,947 acre Belle Ayr North cultural resources general analysis area had not been surveyed at a Class III level. Some areas previously surveyed at a Class III level were surveyed prior to 1980 and may be considered substandard in terms of current methodology. These areas were resurveyed in 2008.

Table S1-8. Sites and Isolated Finds in the Class III Cultural Resources Inventory of the Belle Ayr North LBA Tract Survey Area.

Prehistoric sites:	
Open Camp:	48CA2393, 48CA2394, 48CA2395, 48CA2397, 48CA2398, 48CA6381
Lithic Scatter	48CA3222, 48CA317
Isolate Finds	5 Items
Historic sites:	
Homestead	48CA2807, 48CA1918
Multi-component sites:	
Debris/Lithic Scatter-Open Camp	48CA1917, 48CA1919