Chapter 3
AFFECTED ENVIRONMENT

3.0 INTRODUCTION

This chapter describes the affected environment, including the cultural, historical, social and economic conditions that could be affected by implementation of the alternatives described in Chapter 2. Aspects of the affected environments described in this chapter focus on the relevant major issues presented in Chapter 2. Certain critical environmental components must be considered in all Environmental Assessments under BLM policy. These items are presented below in Table 3.0-1.

Table 3.0-1 Critical Elements Requiring Mandatory Evaluation

Mandatory Item	Not Present	No Impact	Potentially Impacted
Threatened and Endangered Species			X
Floodplains			X
Wilderness Values	X		
ACECs	X		
Water Resources			X
Air Quality			X
Cultural or Historical Values			X
Prime or Unique Farmlands	X		
Wild & Scenic Rivers	X		
Wetland/Riparian			X
Native American Religious Concerns			X
Hazardous Wastes or Solids			X
Invasive, Nonnative Species			X
Environmental Justice		X	

The following non-critical environmental components are either not present or not affected by the proposed project or alternatives and not discussed any further: fire, forestry, lands/realty, recreation, and visual resources.

3.1 AIR QUALITY

Under the Clean Air Act of 1970, EPA developed primary and secondary National Ambient Air Quality Standards (NAAQS) for each of the six criteria pollutants: carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide. These standards establish pollution levels in the United States that cannot legally be exceeded during a specified time period.

Primary standards are designed to protect human health, including "sensitive" populations, such as people with asthma and emphysema, children, and senior citizens. Primary standards are designed for the immediate protection of public health, with an adequate margin of safety.

Secondary standards are designed to protect public welfare, including soils, water, crops, vegetation, buildings, property, animals, wildlife, weather, visibility and other economic, aesthetic, and ecological values, as well as personal comfort and well-being. Secondary standards were established to protect the public from known or anticipated effects of air pollution.

Montana has adopted additional state air quality standards that are at least as stringent as the NAAQS. These Montana Ambient Air Quality Standards (MAAQS) establish statewide targets for acceptable amounts of ambient air pollutants to protect human health. NAAQS and MAAQS establish upper limits for concentrations of specific air pollutants. Table 3.1-1 summarizes the NAAQS and MAAQS.

Table 3.1-1 National and Montana Ambient Air Quality Standards

Pollutant	Time Period	Federal (NAAQS)	Montana (MAAQS)
Carbon Monoxide	Hourly Average	35 ppm [a]	23 ppm [a]
	8-Hour Average	9 ppm [a]	9 ppm [a]
Fluoride in Forage	Monthly Average		50 µg/g [b]
	Grazing Season		35 µg/g [b]
Hydrogen Sulfide	Hourly Average		0.05 ppm [a]
Lead	90-Day Average		1.5 µg/m^3 [b] (rolling)
	Quarterly Average	1.5 µg/m^3 [b] (calendar)	
Nitrogen Dioxide	Hourly Average		0.30 ppm [a]
	Annual Average	0.053 µg/m^3	0.05 ppm [b]
Ozone	Hourly Average	0.12 ppm [c]	0.10 ppm [a]
PM-10 (existing)	24-Hour Average	150 µg/m^3 [d,j]	150 µg/m^3 [d,j]
	Annual Average	50 µg/m^3 [e]	50 µg/m^3 [e]
PM-10 (revised	24-Hour Average	150 µg/m^3 [f,j]	
	Annual Average	50 µg/m^3 [e]	
PM-2.5	24-Hour Average	65 µg/m^3 [g,j]	
	Annual Average	15 µg/m^3 [h]	
Settleable Particulate	30-Day Average		10 g/m^2 [b]
Sulfur Dioxide	Hourly Average		0.50 ppm
	3-Hour Average	0.50 ppm [k]	
	24-Hour Average	0.14 ppm [j,k]	0.10 ppm [a,j]
	Annual Average	0.03 ppm [k]	0.02 ppm [k]
Visibility	Annual Average		3 X 10 -5/m [k]

Source: http://www.deq.state.mt.us/AirQuality/Planning/Air_Standards/AIR_STANDARDS.pdf

a. Federal violation when exceeded more than once per calendar year.
b. Not to be exceeded (ever) for the averaging time period as described in the regulation.
c. Not to be exceeded more than once per year averaged over 3-years.
d. Violation occurs when the expected number of days per calendar year with a 24-hour average above this concentration is more than one.
e. Violation occurs when the expected annual arithmetic mean concentration is above this concentration.
f. To attain this standard, the 99th percentile of the distribution of the 24-hour concentrations for one year, averaged over three years, must not exceed this concentration at each monitor within an area.
g. To attain this standard, the 98th percentile of the distribution of the 24-hour concentrations for one year, averaged over three years, must not exceed this concentration at each monitor within an area.
h. To attain this standard, the 3-year average of the annual arithmetic mean of the 24-hour concentrations from a single or multiple population oriented monitors must not exceed this concentration.
i. State violation when exceeded more than eighteen times in any 12 consecutive months.
j. The standard is based upon a calendar day (midnight to midnight).

The MDEQ under their EPA approved State Implementation Plan, is the primary air quality regulatory agency responsible for determining potential impacts from detailed development plans that exceed MAQP thresholds. The preferred alternative (alternative C), as well as Alternative A and Alternative B, are below the 25 ton per year MAQP threshold, except for NO_x emissions from the drill rig stationary engine. However, ARM 17.8.744(1)(i) exempts drill rigs that have the potential to emit less than 100 tons per year and that do not operate in the same location for more than 12 months from the need to obtain a MAQP. Therefore, a MAQP permit would not be required. Further development of the proposed project (compressor stations, etc.) that exceeds the MAQP threshold would be subject to applicable air quality laws, regulations, standards, control measures and management practices. Therefore, MDEQ has the ultimate responsibility for reviewing and permitting the project prior to further development if the future project exceeds MAQP thresholds. Any MDEQ air quality permitting would be based on site-specific, detailed engineering values, which would be assessed in the permit application review.

Incremental increases in the ambient concentration of criteria pollutants are regulated under the New Source Review - Prevention of Significant Deterioration (PSD) program. The program is designed to limit the incremental increase

of specific air pollutants from major sources of air pollution above a legally defined baseline level, depending on the classification of a location. Incremental increases in PSD Class I areas are strictly limited, while increases allowed in Class II areas are less strict. The project area and surrounding areas are classified as PSD Class II. The closest PSD Class I area, the Northern Cheyenne Indian Reservation, lies approximately 12.5 miles north of the project. The project area and adjacent areas are identified as PSD Class II, where incremental increases are not as restrictive when compared with the incremental increases allowed in PSD Class I areas.

The proposed project's potential to emit any regulated air pollutant is well below the PSD threshold of 250 tons per year for non-listed sources and the proposed project is not a listed source. Therefore, PSD does not apply to the proposed project. In addition, the PSD minor source baseline data has not been triggered for any regulated pollutant for the area that the proposed project would take place because there are no PSD sources that significantly impact the proposed project area. Therefore, a PSD increment consumption analysis is not required for the proposed project because the proposed project would not consume increment. Furthermore, ARM 17.8.807 exempts concentrations of oxides of sulfur (SO_x), particulate matter (TSP), or NO_x emitted from stationary sources attributable to the temporary increase in emissions from consuming increment if the time period for the temporary increase in emissions does not exceed 2 years, does not impact a Class I area or an area where an applicable increment is known to be violated, and does not contribute to a violation of the NAAQS.

The proposed project does not require a MAQP and ambient air quality modeling would not be required. Emissions from the proposed project would be minor and temporary and not add to cumulative effects. The air quality portions of the EA have been revised to include emissions from each of the alternatives considered. If future development (installation of compressor engines, generators, etc.) is proposed and required a MAQP, ambient air quality modeling would be required, including a NO_x PSD Class I and Class II increment analysis

3.2 CULTURAL RESOURCES

BLM's 8100 Manual defines cultural resources as "a definite location of human activity, occupation, or use identifiable through field inventory (survey), historical documentation or oral evidence. This includes archaeological, historic, or architectural sites, structures, or places with important public and scientific uses, and may include definite locations (sites or places) of traditional cultural or religious importance to specified social and/or cultural groups. Based on previous cultural resource investigations in the Tongue River Valley, several classes of cultural resources may be present. These are prehistoric sites, historic sites (sites, structures, and objects), traditional cultural properties and cultural landscapes.

The Powder River POD was part of a block inventory and linear survey of 695 acres (Cooper and Drucker 2003). The block areas included wells, pipelines, powerlines, roads and outfall locations. The inventory located one prehistoric site and five isolated finds. An additional isolated historic cultural resource was recorded as a result of a BLM on-site inspection. The one site recorded is a prehistoric lithic scatter. The lithic scatter contained debris from making and using stone tools and six stone tools including one projectile point, and five biface fragments. The tools included a projectile point fragment that appears to date from the Late Archaic Period and five biface fragments. Isolates consist of prehistoric lithics (one point fragment, a biface, and three pieces of debitage) and one historic abandoned circa 1930's car body. The site was tested and recommended to be not eligible for listing on the National Register of Historic Places. None of the isolated finds were considered eligible to the National Register of Historic Places. The sites and isolates would be avoided by the proposed wells and associated infrastructure, except the historic isolate, which is adjacent to an infrastructure corridor.

During an on-site inspection on August 4, 2004, a second site was located in the vicinity of the site described above. This site was recorded in August, 2004 (Gerber and LaBelle 2004). The site is a prehistoric campsite with stone tools, debitage, and a fire cracked rock feature. The site was recommended as not eligible for listing on the National Register of Historic Places due to a lack of potential for intact buried cultural deposits and no dateable materials from a secure context. Additional inventory was also done in the SW¼NW¼ of Section 7, T. 8 S., R. 40 E. to address changes in the proposed configuration of the water delivery system to the treatment area. The area was noted as being heavily disturbed by existing development and no cultural resources were located (Gerber and LaBelle 2004).

The third site in the POD Area is a feature (Lee Irrigation Ditch) associated with the Lee Homestead (24BH2349), which is listed on the National Register of Historic Places. The feature extends into Section 7. This was feature 7,

an irrigation ditch that was recommended as a contributing feature to the site. According to the report, the ditch has been abandoned since the 1930's, but was still discernable in the 1990's. It appears that the some impact to the integrity of the ditch has already occurred since the report noted there is no outlet or diversion due to erosion and the ditch disappears near the base of the hill at the southeast corner of the POD boundary (Peterson et. al. 1995:5:241). The ditch is outside the area inventoried for the PRG project.

The location of the feature does not appear in either the SHPO CRABS or CRIS Databases, nor is the Section listed in the CRABS form prepared for the report. It is shown on the project map showing site locations. The site form also does not list Section 7 in the legal description. As part of the Lee Homestead complex, it would be eligible under Criteria A of 36 CFR 60.4. The outlet along the Tongue River is along the south side of the river within the southeast corner of the POD boundary. The Proposed POD would not have an adverse effect on the feature. The feature is outside the area of any direct impact and its setting has already been impacted by other development.

BLM has reviewed the recorded properties listed on the National Register of Historic Places. The closest listed properties are the Wolf Mountain Battlefield, Rosebud Battlefield, and the Lee Homestead. The Wolf Mountain Battlefield is located approximately 7 miles north of the POD, the Rosebud Battlefield is located over 10 miles northwest of the POD, and the Lee Homestead is approximately 1 miles south. None of the listed locations would be impacted by this project. The Tongue River Dam (24BH2589) has been determined to be eligible for listing on the National Register of Historic Places under Criterion A. The dam is visible from portions of the PRG project area; however, the development in the POD would not affect those characteristics which make the dam eligible for listing on the National Register.

Impacts to the setting of the Lee Irrigation Ditch would be minimal. The outfall for the water treatment facility would be buried in the river and pipelines to the outlet would also be buried and not visible. The tanks associated with the Higgins Loop Facility would be visible and represent visual impacts to the setting. Existing visual impacts include powerlines, improved roads, and the changes made to the Tongue River Dam.

In addition to the inventories listed above, BLM consulted other relevant documents to determine the presence or absence of historic properties. A reconnaissance inventory of historic architecture along Tongue River Road between Birney and the dam did not identify any buildings in the POD area. (Hufstetler et. al. 1999). The National Park Service has been researching the battles of the Great Sioux War of 1876-1877 as part of their "Clash of Cultures Trails Projects". A review of the "Clash of Cultures" report (NPS 2002) shows that none of the Great Sioux War Trails used by the military qualified as National Historic Trails (NPS 2002:77). None of the areas identified as individual listed sites, proposed National Historic Landmarks, or sites proposed for individual listing occur within or near the POD. It is likely that the Sioux and Cheyenne moved through the area on their way to and from the Wolf Mountains Battle from their camp at Deer Creek, but the area as a battle related TCP was not raised during the August 4, 2004 on-site inspection with the Northern Cheyenne THPO.

The Ethnographic Overview of Southeast Montana (Peterson and Deaver 2002) identifies water, wildlife, and a number of site types as culturally sensitive. It does not include lithic scatters specifically, but earlier work at the Tongue River Reservoir found them to be sensitive to the Crow and Northern Cheyenne Tribes. Input into the Ethnographic Overview by various Tribal Groups urged avoidance of all sites where feasible. The Northern Cheyenne Tribal Document (NCT 2002) also identified a number of site types as being culturally sensitive to the Tribe. This includes wildlife, plants, large ring sites, isolated fasting beds, rock art sites and large diameter fasting structures, such as medicine wheels. The cultural resource inventory did not identify any such sites. One potentially sensitive area is a spring located near Well 11-6. The Ethnographic Overview, Crow and Northern Cheyenne Tribal Documents show that such areas are culturally sensitive. Subsequent field review found that the spring had been developed for livestock use and was not a TCP. Areas where important plants have been collected may also be TCPs. Lists of culturally sensitive plants to the Northern Cheyenne and Crow Tribes are found in the documents the Tribes produced for the Coal Bed Methane EIS (both are available on the Miles City CBM Website). No plant collecting areas were noted during the on-site investigation with the Northern Cheyenne THPO. The THPO stated that the area was likely to have been used for plant collecting, but likely had ended when the surface transferred to private ownership.

Additionally, the Southeast Montana Ethnographic Overview shows a number of culturally sensitive areas in the Tongue River Canyon, but does not identify specific areas to a legal location. The areas identified in the report

include ceremonial areas, a Crow/Sioux Battle, and a Northern Cheyenne plant collecting area. These require locating the areas on the ground and assessing effects of the POD to their National Register Eligibility. No known plant collecting areas were identified in the August 4, 2004, field visit. Attempts were made to contact the Crow Tribe and Sioux Tribes about the battle location, but no reply was received from either Tribe.

The BLM hosted a meeting with the Northern Cheyenne Tribe on October 15, 2003. The Tribe expressed interest in the area, but did not comment on whether there were any Traditional Cultural Properties or culturally sensitive resources in the project area. BLM also provided a copy of the report to the Tribal Historic Preservation Officer (THPO). The THPO did not feel the report was adequate since it lacked Northern Cheyenne input. The Northern Cheyenne THPO, BLM, and representatives from Western Land Services (WLS) conducted an on-site inspection of the POD area on August 4, 2004. The group specifically examined the spring location, the recorded site, the location of the proposed water treatment plant and outfall, and two of the four proposed well locations and found a second prehistoric site not recorded in the first inventory. Two well locations on Federal minerals were visible from the water treatment plant and along the Tongue River Canyon Road, so were not visited. No traditional cultural properties were identified during the field visit. The spring has been developed for livestock use and the plant collecting area did not appear to be present in the POD boundaries. The Northern Cheyenne THPO did make the recommendation for a tribal monitor (Brady 2004).

The Secretary of the Interior's Guidelines for the Treatment of Cultural Landscapes lists several types of landscapes. These are historic sites, historic designed landscapes, ethnographic landscapes, and historic vernacular landscapes. BLM does not believe that there is a historic designed landscape present. A feature related to a historic site is present in the POD boundaries but away from any development areas. As shown in the preceding paragraphs and Appendix D of the Ethnographic Overview, the Tongue River Valley contains important ethnographic locations, which represents an ethnographic landscape. Based on the on-site review with the Northern Cheyenne THPO, BLM believes there would not be an adverse effect to the ethnographic landscape. Historic use of the Tongue River Valley has centered on ranching, with large ranch complexes and hay fields in the river valley and along larger streams and seasonal grazing in the uplands and valley bottoms. This pattern becomes established in the late 19th Century and continues today. This may represent a historic vernacular landscape. The Powder River Gas POD would not have a remarkable effect on the landscape. This is due to the low level of overall impacts from the wells, the infrastructure being buried, and the lack of historic structures in the POD area.

BLM has determined that the project would have no adverse effects to historic properties. The prehistoric sites and seven isolates were located in the formal POD boundaries. Both sites and all of the isolates were determined to be not eligible for the National Register. Additionally, both of the prehistoric sites are over 1000 feet from any proposed well or other surface disturbance. Sites previously recorded as part of the Tongue River Dam were reviewed. BLM has determined there would be no direct or indirect effects to these sites. An on-site visit was conducted with the Northern Cheyenne THPO and no TCPs were identified. One feature associated with a historic property is within the POD boundaries but would not be directly impacted by it. There would be some impact to the overall landscape, including the feature which represents a change in its setting. The Higgins Loop Facility is several stories tall and would be visually dominant in the immediate vicinity of the POD. However, due to bends in the Tongue River Canyon, it would not be visible for any great distance above or below the POD area. Other areas would be less visible. Powerlines and pipelines to the wells would be buried. One new two-track road is proposed. It would not be visible from the Tongue River Road or canyon bottom due to its location on the backside of the ridge leading to the 5-6 well. This information has been transmitted to the Montana SHPO who concurred with BLM's determinations of project effect on November 5, 2004.

3.3 GEOLOGY AND MINERALS

3.3.1 Coal Bed Natural Gas

Coal bed natural gas is held in the coal beds by hydrostatic pressure. A reduction in the pressure as the result of pumping water from the coal bed causes the gas to move to the lower pressure in the well bore.

3.3.2 Methane Migration

The objective in pumping the water from the CBNG wells is to reduce the pressure and cause the gas to desorb from the coal matrix and migrate to the CBNG well. In reservoir dynamics, as in hydrology, the flow is from areas of high pressure to areas of lower pressure. For this reason the gas flows towards wells that are pumping water from the coals seam and reducing the pressure enough to cause the gas to be desorbed. Thus, the only direct or indirect

impact from the testing of these wells would be to cause the gas to flow towards the CBNG wells.

The cumulative effect is more complicated. The pumping of CBNG wells would cause the areas near the wells to desorb the gas and have it flow towards them; however a reduction in hydrostatic head (pressure) would extend beyond that area over which the gas is desorbed in what's called a "cone of depression". For this reason, water wells that are finished in a CBNG producing coal seam(s) could produce gas from the water wells at pumping rates that are less than those that would have been required in the past. The water wells would be causing a localized "cone of depression" around the well, which would cause the gas to desorb, and therefore the gas flows towards them. This desorption of gas is caused by lower pumping rates than would have been required prior to CBNG production. The cumulative effect of gas migration is also affected by the local Geology of the coal, gas content of the coal and faulting in the area.

The BLM has determined that the potential for methane migration and the potential impacts from the Powder River Gas Project are similar to the impacts described in the Wyoming Final EIS and Proposed Amendment for the Powder River Basin Oil and Gas Project and the Montana FEIS. These could include migration of methane gas to water wells or to the surface.

Drainage of Federal and Indian Minerals

Drainage of Indian Mineral resources: The nearest Crow Indian minerals are more than 12 miles to the west of the POD project area. Because of the small pressure drawdown mentioned below, there would be no drainage of Crow mineral resources from the PRG exploration project.

The nearest Northern Cheyenne lands are approximately 2.4 miles away (NW¼SW¼, Section 24, T. 8 S., R. 40 E.). A study completed by the Reservoir Management Group of the Casper BLM office indicated that the pressure would have to decline between 10 to 40 percent before gas would begin to desorb from the coals in the Powder River Basin. The initial pressure in the Wall coal (the shallowest being tested) is approximately 124 psi to 275 psi. This means that the pressure in the Wall would have to be reduced by at least 12.4 psi and possibly as much as 27.5 psi before gas might begin to desorb. The Flowers/Goodale formation would have an initial pressure of 480psi to approximately 630 psi. This formation would have to be drawn down at least 48psi and as much as 63psi before gas might desorb. The 20 foot drawdown radius within the beds being tested would extend approximately 1.11 miles. This would result in a pressure decline of approximately 8.7 psi at 1.11 miles. This would not be enough reduction to cause gas to desorb from the coals being tested. Because the nearest Northern Cheyenne lands are over 2 miles away, there would not be any drainage of methane from them. Existing monitoring wells would be used to verify water drawdown and methane migration. If necessary, mitigation found in the MT FEIS would be implemented.

Methane Migration to Water Wells and Springs

Methane migration to water wells, springs or monitoring wells: Based on the water drawdown analysis for the project, the 20 foot drawdown for the testing period would extend up to 1.11 miles. A drawdown of 20 feet would be equivalent to a pressure reduction of 8.7 psi in each coal. Because the gas in the coal requires 10 to 40 percent in pressure reduction before desorbtion begins, the radius of pressure reduction sufficient to cause gas to desorb is much smaller that the 20 foot drawdown radius. The pressure in the Wall coal is estimated at 124psi to 275psi. To enable gas to desorb from this coal would require a reduction of at least 12.4psi. This would translate to a water drawdown of at least 28.6 feet. In the Flowers/Goodale coal, the formation pressure is estimated to be from 480psi to 630psi. This coal would require a minimum of 48psi reduction of pressure before gas would begin to desorb. This translates to a water drawdown of 110.8 feet.

The following estimates are based on the absolute minimum pressure reduction necessary to desorb gas, at 1 year of pumping of the coals (instead of 6 months), and calculating of the drawdown from the exterior boundary of the POD instead of the distance from each well. These factors change the pressure drawdown from 1.11 miles to a somewhat larger and more optimistic area. Approximately a 28.6 foot drawdown area for the Wall coal could extend less than 1.5 miles from the exterior boundary of the POD. Also, approximately a 110.8 foot drawdown radius for the Flowers/Goodale coal could extend less than 1 mile from the exterior boundary of the POD.

Based on the water drawdrown report, there are no monitoring wells, water wells or springs within this area (1.5 miles for the Wall coal and 1 mile for the Flowers/Goodale coal) that would be affected by methane migration.

3) Methane migration to conventional wells in the area: There are no abandoned conventional oil wells within the project area. The nearest plugged conventional well is located in the NW¼SE¼ of Section 18, T. 8 S., R. 41 E., over 1 mile away from any proposed CBNG well. This well was plugged in 1960 with cement plugs, including a plug at the base of the surface casing from 160 to 220 feet and one inside the surface casing at the surface. Because the casing that was set in the well has been plugged with cement and the 20 foot pressure drawdown would reach only 1.11 miles from the proposed wells, there would be no migration of methane up this plugged well.

3.3.3 Coal

The project area lies in the northern portion of the Powder River Basin. The Powder River Basin is an asymmetrical, northward plunging, sedimentary basin; its structural axis is located closer to the west flank of the basin than the east side.

The project area is also near the basin axis with the rock strata dipping gently to the south, southwest about 1º to 2º although localized structures such as faulting and folding can cause steeper dips or changes in dip direction.

Numerous faults occur in the area in a fault zone just north of the Montana-Wyoming state line. These faults are typically down dropped to the south and may have displacements of up to 150 feet as in the Spring Creek and Carbone faults located at the Spring Creek Coal Mine. Two possible faults have been mapped in the area. One is about 1.5 miles southeast of the project area and another about 2.5 miles north of the project area.

Outcropping bedrock in the area consists of Tertiary-age Fort Union Formation. The Fort Union Formation is underlain by Cretaceous-age Hell Creek Formation and is overlain by the Wasatch Formation. The Fort Union Formation is locally broken into three members (from youngest to oldest): Tongue River, Lebo, and Tullock. The oldest member, Tullock, is composed of light-colored sandstone, sandy shale, carbonaceous shale, clay, and locally thin, non-continuous coal beds. The middle Lebo Member consists of dark shale, mudstone, carbonaceous shale, siltstone, argillaceous sandstone, and coal.

The Tongue River Member contains mineable coal units within the Fort Union Formation and consists of sandstone, interbedded siltstone, shale, and thick coal beds. Local depositional environments of the coal seams resulted in formation of several distinct coal beds within the Tongue River Member.

The Tongue River Member of the Fort Union Formation was deposited in a low-lying coastal or near-coastal area, mainly as fluvial and over-bank mud, and back-swamp peat. This depositional setting formed rock types that change markedly over short distances, making it difficult to characterize the nature of overburden or inter-burden intervals.

Where sufficient thickness of coal was deposited and conditions were right, the coal burned. The resulting heat baked and fused the overlying material into a brittle resistant reddish rock, locally called "clinker" or "scoria" deposits (Cole, 1980).

Following coal deposition, the general area was faulted, resulting in displacement of coal seams. Faults in the area are generally oriented northwest and northeast (USDI, 2000).

The target coal seams are the Flowers-Goodale from 1,109 feet to 1,462 feet and the Wall at 201 feet to 551 feet. Four federal and four private wells are planned for the Flowers-Goodale coal and four federal and four private wells are planned for the Wall coal. One private well in each of the two coal seams has been drilled and located in the SW¼NW¼, Section 7, location 5-7 of the Coal Creek POD.

3.4 HYDROLOGY

To supplement the information contained in this EA, a hydrology technical report was prepared on PRG's proposed exploration POD area. The report is cited in the EA as the PRG-Coal Creek–Hydrology Technical Report. The report is available on the BLM's CBNG internet site (http://www.mt.blm.gov/mcfo/cbng/EAEIS.html) or upon request from the BLM's Miles City Field Office.

3.4.1 Surface Water

All of the proposed well sites are located in the Upper Tongue River 4th Order Watershed (Hydrologic Unit Code

(HUC) 10090101; water body number MT42B001-2). This reach of the Tongue River is classified as "B-2" water according to the Montana Surface Water Use Classification [ARM 17.30.611(1)(c)(vii)]. Waters classified B-2 are suitable for drinking, culinary and food processing purposes, after conventional treatment; bathing, swimming and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply. Discharges to B-2 waters must comply with the specific water quality standards in ARM 17.30.624, as well as numeric water quality standards in Department Circular WQB-7 (DEQ). The Tongue River is considered high quality water pursuant to Montana's Non-degradation Policy and degradation of high quality water is not allowed unless authorized by the Department under 75-5-303(3), MCA.

This reach of the Tongue River was listed as impaired for aquatic life support, and cold-water fishery for trout on the 1996 303(d) list. The identified probable cause of impairment was flow alteration. The identified probable sources were agriculture, flow regulation and/or modification and irrigated crop production. This reach of the Tongue River has been removed from the 2000, 2002, and the 2004 303(d) lists based on reassessment of the water quality.

The portion of the Tongue River from the diversion dam just above Pumpkin Creek (12-mile diversion dam for the TY irrigation ditch) to the mouth is currently listed on the 303(d) list, and has been listed since 1996. The MDEQ has identified flow alteration as the probable cause of the impairment, and dam construction and flow regulation/modification as the probable sources of impairment along this downstream reach.

The entire length of the Tongue River below the Tongue River Dam, including the reach below Pumpkin Creek, is affected by the presence of the Tongue River Dam. The presence of this dam causes sediment to be trapped behind the dam, and causes the magnitude of peak flows to be reduced, thereby altering the riparian environment (Collier, et al., 1996). The flow along the reach below Pumpkin Creek is also substantially reduced during the irrigation season by the diversion of water into the TY irrigation ditch. During low flows, the majority of the water in the Tongue River is diverted at this point, and any measurements taken below this point are more representative of Pumpkin Creek and other minor tributaries than they are of the Tongue River.

Flow along this portion of the Tongue River is regulated by the Tongue River dam, which is owned by the Montana Department of Natural Resources and Conservation (DNRC). The dam is operated and maintained by the Tongue River Water Users Association (TRWUA) for the purpose of fulfilling water use contracts to all downstream users. In 1978, a flood damaged the spillway resulting in conservative operation of the reservoir until 1999 when the spillway and other improvements were made to the dam. The improvements at the dam included raising the height of the embankment by 4 feet to increase the storage capacity. Water is released from the reservoir to satisfy irrigation demand with a minimum of 175 cfs or inflow maintained for fish and wildlife through the winter (DNRC, 1996). According to the Operating Plan for the Tongue River Reservoir, flow may drop below this level for essential maintenance, dam inspections, drought conditions or other emergency purposes. According to recent flow measurements, releases from the reservoir are routinely below 175 cfs. The minimum observed flow for the last five years at the USGS station has been 70 cfs. Following the rational laid out in the MDEQ Statement of Basis (SOB) for the MPDES permit associated with this project (MT0030660), 70 cfs will be used as the 7Q10 flow for this analysis.

The Tongue River is the only perennial river in the project area. None of the ephemeral tributaries to the Tongue River in this area have been listed as impaired. The TMDL process for the Tongue River watershed (4th Order HUCs 10090101 and 10090102) is currently underway. The completion of the TMDL process may require reassessment of permits. This reassessment may require changes in the quality or quantity of water to be discharged under the subject permits.

The proposed action for the PRG Coal Creek Project includes one discharge into the Tongue River downstream from the Tongue River Reservoir Dam. There is a USGS Gaging Station located just upstream of this discharge point and below the Tongue River Dam. Data from this station should be representative of this reach of the Tongue River. Electrical Conductivity (EC) and Sodium Adsorption Ratio (SAR) are the parameters most likely to be affected by CBNG development (MDEQ, 2003), therefore, the analysis focuses on these parameters. The primary parameters of concern (POC) identified in the SOB for the MPDES permit for this project (Hydrology Technical Report, Appendix B) are elevated sodium and incidental metals such as arsenic, selenium, and zinc, ammonia, nutrients (nitrogen and phosphorous) and organic constituents present in the coal formation. A full analysis for all pollutants of concern (POCs), and an analysis of the potential for exceedence of all surface water quality criteria is included in the

SOB (Hydrology Technical Report, Appendix B).

There is currently 1 existing and 2 proposed CBNG discharge permits to the Tongue River. These permits are summarized on Table 3.4.1-1. The one existing permit (MT0030457) is for untreated discharge, while the draft permit for this project (MT0030660) and the pending application (MT0030724) are both for treated discharges. The Draft permit MT0030660 will become final upon completion of this EA. The existing and proposed Fidelity discharges are, or are proposed to be, located upstream of the Tongue River Reservoir.

Table 3.4.1-1: CBNG Tongue River Discharge Permits

Permit Number	Owner/Operator	Permit Status	Volume (gpm)	Treated (Y/N)
MT0030660	Powder River Gas, LLC	Draft	1,120	Y
MT0030457	Fidelity Exploration & Production Company	Issued, in review	1,600	N
MT0030724	Fidelity Exploration & Production Company	Application Pending	1,700	Y

The historical Pre-CBNG (Pre-1998) water quality, as measured by EC and SAR, at the Tongue River station below the dam, and at Birney Day School are shown in Table 3.4.1-2. It should be noted that this information is based upon the empirical relationship between EC, Na, Ca, and Mg (which are used to calculate SAR) vs. Flow from monitoring data for each of the stations. This historical water quality data was determined based upon historical USGS data (up to 1998) and the analysis contained in the MDEQ's Statement of Basis for the MPDES permit (see Appendix B of the PRG-Coal Creek–Hydrology Technical Report). These Pre-CBNG data do not accurately represent the existing conditions, however, since an existing untreated CBNG discharge (MT0030457) is occurring upstream from the reservoir and would not be included in this Pre-1998 data. For this reason, the effects of this discharge are modeled as described in the PRG-Coal Creek–Hydrology Technical Report, to depict existing conditions. A comparison of historical conditions to modeled existing conditions is provided in the table below. It should be noted that a noticeable increase in either EC or SAR have not been observed in USGS monitoring data since the start of CBNG production when values are plotted vs. flow. These data for the State Line station (where most CBNG discharge is up stream of the station) and the Miles City station are shown on Charts 3.4.1-1, 3.4.1-2, 3.4.1-3, and 3.4.1-4 below. Baseline data for all parameters for which surface water criteria exist are included in the SOB in Appendix B of the Hydrology Technical Report for this project.

Table 3.4.1-2: Comparison of Historical Surface Water Conditions to Modeled Existing Conditions

		Historical Conditions+			**Modeled Existing Conditions***		
	Flow Conditions	Discharge (cfs)	EC (µS/cm)	SAR	Discharge (cfs)	EC (µS/cm)	SAR
Tongue River Below Dam	7Q10	70.0	809	0.97	73.6	832	1.27
	LMM	179.0	646	0.78	182.6	664	0.98
	HMM	1429.0	392	0.49	1432.6	398	0.55
Tongue River at Birney Day School	7Q10	49.0	1134	1.56	52.6	1157	1.87
	LMM	173.0	719	1.02	176.6	737	1.23
	HMM	1119.0	377	0.56	1122.6	383	0.62

+ The historical conditions for the station Below the Dam were determined from USGS data collected from 1975-1998. Birney Day School historical conditions were determined from USGS data collected from 1978-1998.

* The modeled existing conditions include historical values, plus modeled effects from the existing 3.57 cfs discharge of untreated CBNG water upstream from the Tongue River Reservoir.

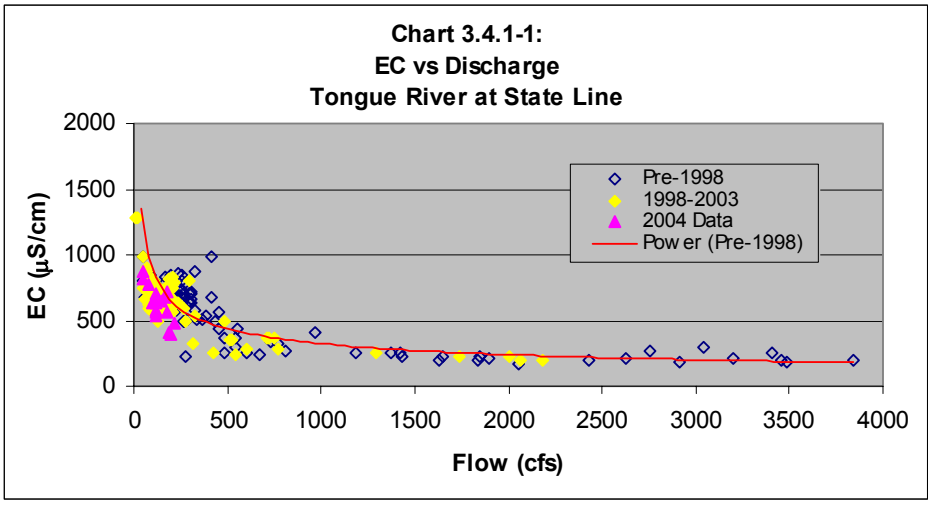


Chart 3.4.1-1:
EC vs Discharge
Tongue River at State Line
EC (µS/cm)
2000
1500
1000
500
0
0
500
1000
1500
2000
2500
3000
3500
4000
Flow (cfs)
Pre-1998
1998-2003
2004 Data
Pow er (Pre-1998)

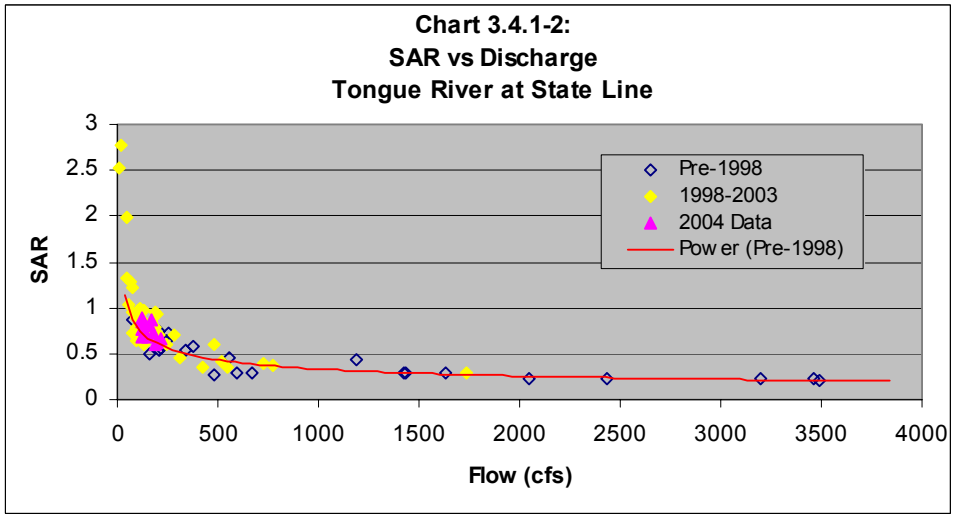


Chart 3.4.1-2:
SAR vs Discharge
Tongue River at State Line
SAR
3
2.5
2
1.5
1
0.5
0
0
500
1000
1500
2000
2500
3000
3500
4000
Flow (cfs)
Pre-1998
1998-2003
2004 Data
Pow er (Pre-1998)

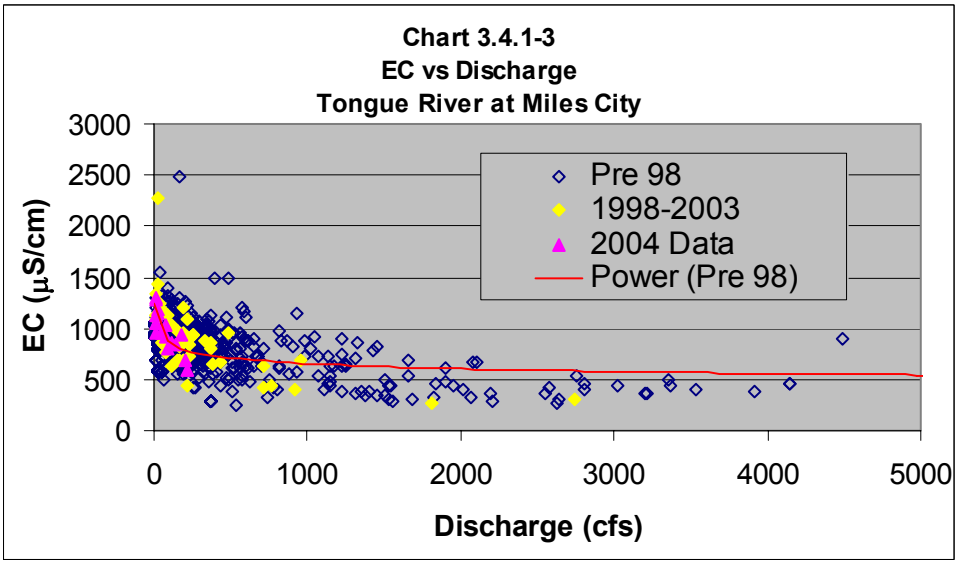
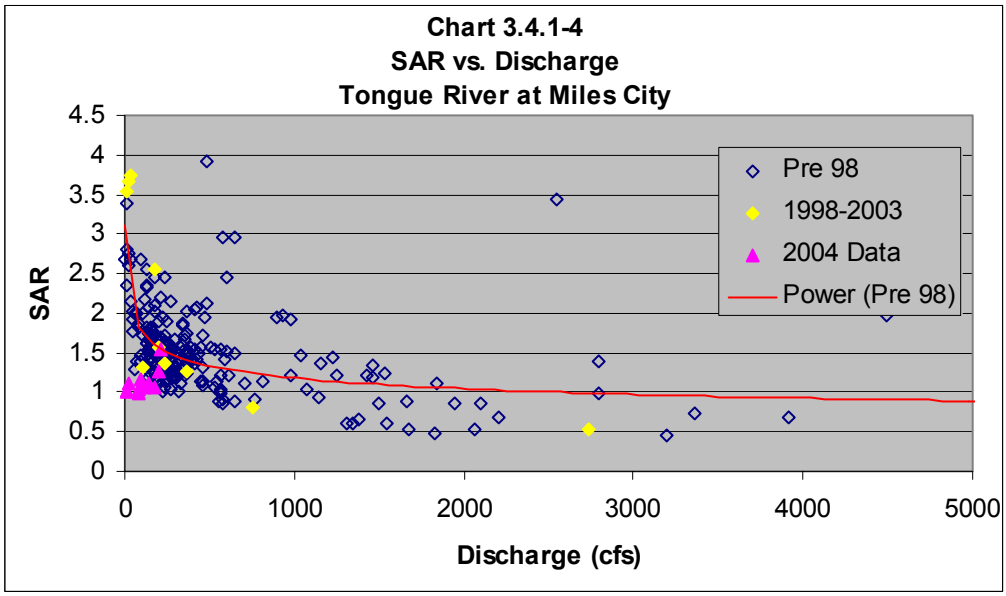


Chart 3.4.1-3
EC vs Discharge
Tongue River at Miles City
EC (µS/cm)
3000
2500
2000
1500
1000
500
0
0
1000
2000
3000
4000
5000
Discharge (cfs)
Pre 98
1998-2003
2004 Data
Power (Pre 98)



In addition to the discharges which are currently taking place, it is also necessary to address the potential impacts of the discharge permits which exist or have been applied for, and are therefore reasonably foreseeable (see Table 3.4.1-1). The results of this analysis will provide for comparison of the cumulative impacts for each alternative.

Table 3.4.1-3: Comparison of Historical Surface Water Conditions to Foreseeable Conditions

		Historical Conditions+			**Foreseeable Conditions*** (Non-Project) (0 gpm from PRG)		
	Flow Conditions	Flow (cfs)	EC (µS/cm)	SAR	Flow (cfs)	EC (µS/cm)	SAR
Tongue River Below Dam	7Q10	70.0	809	0.97	77.4	824	1.30
	LMM	179.0	646	0.78	186.4	664	1.01
	HMM	1429.0	392	0.49	1436.4	401	0.56
Tongue River at Birney Day School	7Q10	49.0	1134	1.56	56.4	1149	1.90
	LMM	173.0	719	1.02	180.4	736	1.25
	HMM	1119.0	377	0.56	1126.4	386	0.63

+ The historical conditions for the station Below the Dam were determined from USGS data collected from 1975-1998. Birney Day School historical conditions were determined from USGS data collected from 1978-1998.

* The foreseeable conditions include historical values, plus modeled effects from the existing 3.57 cfs discharge permit for untreated water, and the proposed permit for 3.79 cfs of treated CBNG water upstream from the Tongue River Reservoir.

The Montana Board of Environmental Quality has established surface water standards for EC and SAR. These standards have been reviewed and approved by the EPA, and therefore have Clean Water Act standing. The Northern Cheyenne Tribe has also adopted surface water quality standards for EC and SAR. The Northern Cheyenne Tribe has not been granted "Treatment as a State" status by the EPA, therefore the EPA has not reviewed these standards. As such, the Northern Cheyenne numerical standards do not have Clean Water Act standing;

however, they do set out the Tribe's considered determination of the water quality needed to protect irrigated agriculture on the Reservation (Northern Cheyenne Tribe, 2002), and to protect native plant species that have cultural significance and are integral in ceremonial and traditional aspects of the Northern Cheyenne Tribe. Therefore, the Northern Cheyenne standards provide reasonable criteria against which to compare the resulting water qualities. These standards were developed by the State to protect the agricultural uses of the Tongue River, which has been determined to be the most sensitive beneficial use of the Tongue River (BLM, 2003a). Any changes in EC and SAR that do not cause these standards to be exceeded would not be anticipated to impair the beneficial uses of the Tongue River. These various standards are summarized on Table 3.4.1-3.

Table 3.4.1-4: Surface Water EC and SAR Standards for the Tongue River

	Monthly Mean SAR	Inst. Max SAR	Monthly Mean EC (µS/cm)	Inst. Max EC (µS/cm)
MDEQ Irrigation Season[1] Standards	3.0	4.5	1000	1500
MDEQ Non-Irrigation Season[1] Standards	5.0	7.5	1500	2500
Northern Cheyenne Irrigation Season[1] Standards; Southern Boundary	---	2.0	1000	2000
Northern Cheyenne Non-Irrigation Season[1] Standards; Southern Boundary	---	2.0	---	2000

1: The Irrigation Season specified by the MDEQ is from March 1st to October 31st while the Irrigation Season specified by the Northern Cheyenne is from April 1st to November 15th.

For the purposes of impact analysis, the high mean monthly and low mean monthly results are compared to the mean monthly standards, while the 7Q10 result are compared to the instantaneous maximum standards. This is appropriate since the 7Q10 is the lowest flow that would be expected to occur for 7 consecutive days over any 10 year period. It should be noted that this approach is being used for this impact analysis, however, the same approach would not be used for a regulatory determination. The reason for this difference is that it is felt that this impact analysis more closely depicts the actual impacts that would be anticipated.

For more information regarding surface water, please refer to the MT FEIS Chapter 3, Affected Environment, pages 3-22 through 3-31 (BLM, 2003), the Water Resources Technical Report (ALL, 2001), and the Surface Water Quality Analysis Technical Report (SWQATR) (Greystone and ALL, 2003). Real time and historical monitoring data for the Tongue River are also available from the USGS at http://tonguerivermonitoring.cr.usgs.gov/index.htm.

3.4.2 Groundwater:

Eight of the proposed wells would be completed in the Wall coal seam and the other eight proposed wells would be completed in the Flowers-Goodale coal seam. Well depths would range from approximately 250 to 1,500 feet below ground surface (BGS). The Wall and the Flowers-Goodale coal zones are contained within the Tongue River Member of the Fort Union Formation. The Tongue River Member is composed of interbedded sand, silt, clay, and coal (Zelt et al., 1999). Coal beds are typically overlain and underlain by shale. In this area, the top of the Wall coal is between approximately 2560 and 3414 feet above mean sea level (ft-amsl) (dipping to the SSE) and it is approximately 55 feet thick. The top of the Flowers-Goodale coal is between approximately 1771 and 2591 ft-amsl (dipping to the SSE) and it is approximately 20 feet thick.

Based upon water analysis from the 2 existing CBNG wells in the POD area, the SAR of the coal bed water is expected to be approximately 53.2, and the EC is expected to be approximately 1,355 µS/cm.

Due to the common clay rich layers in the Tongue River Member of the Fort Union Formation, the vertical hydraulic conductivity in these units is very low. As such, the coal beds are considered to be confined aquifers. Based upon the results of 370 aquifer tests, (Wheaton and Metesh 2002) have calculated that the geometric mean horizontal hydraulic conductivity values of the coal seam aquifers in the Fort Union Formation is 1.1 feet per day.

Mean storativity values of these coals are approximately $9x10^{-4}$ (storativity is unitless) (Wheaton and Metesh, 2002). It is also known that faults are present in this area with the major faults trending to the northeast (Vuke et al., 2001). It has been shown that faults are typically barriers to groundwater flow in this area (VanVoast and Reiten, 1988).

There are no CBNG wells being developed in the Montana portion of the Powder River Basin in either the Wall or Flowers-Goodale coal seams. Thus, there is no other development that could overlap with the proposed action to create environmental impacts to groundwater.

The Montana Bureau of Mines and Geology (MBMG) maintain the Groundwater Information Center (GWIC) database of known wells, springs, and borings in Montana. Under current Montana law, drillers are required to provide well logs to MBMG for all wells drilled, or indirectly to DNRC, within 60 days of drilling the well. This database provides information on the wells and springs which are located within and around the area of the proposed project. PRG has also identified a developed spring within the project area which is not in the GWIC database. This spring emits from the base of a clinker, and so does not acquire its water from either the Wall or Flowers-Goodale coal seams.

The Operator has certified that for each well "All potentially affected landowners having existing water wells within the circle of influence for the proposed well will be offered a Water Well Agreement." This is in compliance with the requirements of the Powder River Basin Controlled Groundwater Area (MBOGC Order 99-99).

Additional general information on groundwater is found in the MT FEIS (BLM, 2003), Chapter 3, Affected Environment pages 3-22 through 3-39 (ground water), the 2D modeling report (Wheaton and Metesh, 2001) and the 3D modeling report (Wheaton and Metesh, 2002). Groundwater monitoring information relating to CBNG (CBM) development is also available at MBMG's online GWIC database at http://mbmggwic.mtech.edu/ and using the Ground-Water Projects link. The year one Groundwater Monitoring Report for CBNG (Wheaton and Donato, 2004) is also available at http://www.mt.blm.gov/mcfo/cbng/CBNG-Monitoring.htm. This monitoring data indicates that "After 4 years of production from the CX field, water levels have been lowered by 20 feet at distances of less than 1 mile to as much as 2 miles outside the production area. Within the production area, water levels are as much as 150 feet lower than baseline conditions. As production continues, and as field sizes enlarge, greater drawdown is expected to occur, and at greater distances from the well fields. Drawdown of 20 feet may eventually reach 4 or more miles outside production areas." (Wheaton and Donato, 2004).

3.5 INDIAN TRUST AND NATIVE AMERICAN CONCERNS

Indian Trust Assets are defined as "lands, natural resources, money, or other assets held by the federal government in trust or that are restricted against alienation for Indian Tribes and individual Indians" (DM 302, 2.5). No Indian lands or Indian owned leases are present in the project area. The Northern Cheyenne Reservation is a Class I PSD Airshed. The Northern Cheyenne Tribe owns water rights on the Tongue River.

3.6 LIVESTOCK GRAZING

Livestock grazing is the principal economic use of land in the project area. There are three surface landowners/lessees in the project area. All three are either in the livestock business or are leasing to a livestock operator. Currently, the livestock operations within the project area run approximately 250 to 300 cow/calf pairs. The livestock season of use varies for each operation. Water is a limiting factor to all livestock operations and affects where and when the grazing land in the project area is used.

3.7 SOCIAL AND ECONOMIC CONDITIONS

The exploration project area is located in the southeastern corner of Big Horn County, just north of the Tongue River Reservoir dam, and adjacent to the southwest corner of Rosebud County. It is ten miles east of the Crow Reservation, approximately 12.5 miles south of the Northern Cheyenne Reservation and thirty-five miles by paved road from Sheridan, Wyoming. A description of the social, economic and fiscal conditions on the Reservations and Big Horn and Rosebud Counties are found in the Affected Environment, Chapter 3 and the Socioeconomic Appendix of the MT FEIS. The MBOGC reported natural gas production in Big Horn County in 2002 was 9,679,910 MCF (DNRC Annual Review 2002, Page 19), approximately 11 percent of total statewide production. However, oil & gas production taxes contributed less than one-tenth of one percent of County revenues in FY 1999 (MT FEIS 2003, Socioeconomics Appendix, Table SEA-1). The latest data available from the Minerals Management Service reported Big Horn County Federal gas production of 258,209 MCF in FY2001, with royalty

payments of $118,646.

3.7.1 Environmental Justice

Big Horn and Rosebud Counties include Indian reservations with substantial Native American populations. Based on the 2000 census data the population in Big Horn County is 60 percent Native American. This county includes most of the Crow Reservation and part of the Northern Cheyenne Reservation. Slightly over thirty percent of Rosebud County is Native American. This county is located north of the project area and includes the part of the Northern Cheyenne Reservation not located in Big Horn County. In 2000, over 5,000 Native Americans lived on the Crow Reservation and over 4,000 Native Americans lived on the Northern Cheyenne Reservation.

In 2000, 24% of the population living in Big Horn County and 17% of the population in Rosebud County had incomes below the poverty level. These figures compare to a state-wide figure of 13% and reflect the relatively large numbers of persons on the reservations living in poverty.

3.8 SOILS

Soils within the project area were identified from the *Soil Survey of Big Horn County Area, Montana* (USDA 1977). The soil survey was performed by the Natural Resource Conservation Service according to National Cooperative Soil Survey standards. The physical and chemical soil properties as well as spatial distribution within the POD boundaries were evaluated to assure soil health and productivity are maintained or effects minimized. The soils at wellsites and infrastructure locations were evaluated using the NRCS Soil Data Viewer (SDV) using National Soils Information System (NASIS) data. SDV was utilized for geospatial analysis of the available soils information for resource assessment and management.

Soils in the project area have developed in colluvium and residuum derived from the Tongue River Member of the Tertiary Fort Union Formation and the Eocene Wasatch Formation. Lithology of these units consists of light to dark yellow and tan siltstone and sandstones with coal seams in a matrix of shale. In some areas, the near-surface coals have burned, baking the surrounding rock, producing red, hard fragments (see geology section of Soils Technical Report). Differences in lithology have produced the topographic and geomorphic variations seen in the area. Higher ridges and hills are often protected by an erosion-resistant cap of clinker (porcellanite) or sandstone.

Soils are deep, greater than 40 inches, on alluvial fans, basins, and valley alluvium. Shallow soils, less than 20 inches, occur on plains and ravines underlain by sandstone, siltstone, and shale bedrock as well as in areas with steeper topography. Moderately deep soils are those considered between 20 and 40 inches; these soils generally lie on residual upland plains and relatively gentle sideslopes.

Soil units in the project area are the Kim loam, 4 to 15 percent slopes, Thedalund-Wibaux stony loams, hilly and Thedalund - Wibaux complex, very steep. These soils commonly have surface and subsurface textures of loam and clay loam with occasional sandy loam or channery surface (see Soils Technical Report). Kim soils are very deep, moderately permeable, well drained soils developed on alluvial fans with slopes up to 15 percent. Thedalund soils are moderately deep, well drained, moderately permeable soils developed on hills and ridges with slopes up to 30 percent. Wibaux soils are very deep, well drained soils formed in colluvium and alluvium derived from clinker developed on hills and ridges with slopes up to 75 percent. Slopes in the project area range up to 40 percent, though actions will occur on the lower end of this range.

Hydrologic groups range from A to C indicating low runoff potential, however rutting hazard is high due to low soil strength (see Soils Technical Report).

There is no prime or unique farmland in the project area, or hydric soils. There is no flooding or ponding hazard for these soils.

3.9 VEGETATION

The majority of the project area is an upland community dominated by grasses but includes shrubs and trees. Dominant upland species include bluebunch wheatgrass (*Agropyron spicatum)*, western wheatgrass (*Agropyron smithii)*, green needlegrass (*Stipa viridula)*, blue grama *(Bouteloua gracilis),* needle and thread (*Stipa comata)*, prickly pear cactus (*Opuntia spp.),* big sagebrush (*Artemisia tridentata)*, Ponderosa pine (*Pinus pondersosa),* Rocky Mountain juniper (*Juniperus scopulorum).* The project area also includes a small amount of riparian vegetation

along the Tongue River. Dominant species include plains cottonwood (*Populus deltoides) and* Prairie cordgrass (*Spartina pectinata)* along with sedges and rushes. Differences in dominant species within the project area vary with soil type, aspect and topography. Economically important plants to the Northern Cheyenne Tribe are identified in Appendix D of the Northern Cheyenne Tribal Document (NCT 2002). An on-site review of the project area with the Northern Cheyenne THPO did not identify any traditional plant collecting locations.

There are no known threatened or endangered plant species in the project area. Three plant species identified on the Montana Plant Species of Concern list have been recorded in areas nearby, outside the project boundary. (Barton & Crispin 2003). Two species Barr's milkvetch (*Astragalus barrii) and* Nuttall's desert-parsley (*Lomatium nuttallii*) are both identified as Montana Species of Concern and regional endemics and are designated Watch Species by the BLM in Montana. The third plant species, *Woolly twinpod (Physaria didymocarpa* var. *lanata*), is a regional endemic. The habitats where these three species have been recorded consist of sparse vegetation, which includes Ponderosa pine, Rocky Mountain juniper, blue bunch wheatgrass, western wheatgrass, big sagebrush and rabbitbrush (*Chrysothamnus spp.)* Typically, these species are found on rocky slopes of sandstone, siltstone, or clayey shale, in open pine woodlands. These types of habitats and locations exist within the POD project boundary.

3.9.1 Invasive Species

No state-listed noxious weeds and invasive/exotic plant infestations were discovered by a search of inventory maps and/or databases or during subsequent field investigation by the proposed project proponent. However, leafy spurge is common in the area and is spreading rapidly, especially in areas slightly south of the project area. While not currently occupying the site, it is reasonable to expect this species could occur in the project area in the near future.

3.10 WILDLIFE AND FISHERIES/AQUATICS

Powder River Gas has contracted with Western Land Services (WLS) of Sheridan, Wyoming to develop a Wildlife Monitoring and Mitigation Plan (WMPP) for the project area. In accordance with requirements set forth in the WMPP, wildlife surveys were conducted by WLS to identify wildlife occurrences and values in the project area. Additionally, BLM biologists have evaluated the area for wildlife values. The following discussion identifies the wildlife values on the project area as a result of those investigations.

3.10.1 Threatened, Endangered, and Special Status Species

There is an active bald eagle nest within ½ mile of the project area located along the banks of the Tongue River. The existing county road is located about 100 yards from this nest. The roadway climbs a small hill at this point, which puts it nearly on the same elevational gradient as the nest. Additionally, the existing powerline passes within 100 yards of the nest as it proceeds downriver. There are several power poles that offer perch opportunities for eagles in this area. Bald eagles commonly migrate through the Tongue River valley and will winter in the river corridor as long as open water and forage remains available. A second bald eagle nest was identified during a comprehensive raptor survey conducted in 2004 by Greystone Environmental Consultants located about ¼ mile east of the project boundary in the NE¼SW ¼ of Section 5, T. 8 S., R. 41 E. The nest is in a live cottonwood along the Tongue River riparian corridor, north of the reservoir. Three nestlings were documented when the nest was surveyed on May 21, 2004. There are no other known threatened, endangered or special status species in the project area.

3.10.2 Big Game Species

Mule deer are found year-round in the project area and the area is considered important, although not "critical" winter range. White-tailed deer are commonly found along the Tongue River corridor. Antelope use the benchlands and more open topography located along the western edge of the project area. Other big game, including elk, black bear and mountain lion, use the area as transitory habitat as they travel between more preferred habitats.

3.10.3 Upland Game Birds

The project area is considered good sharp-tailed grouse habitat, although the closest known lek is several miles away. Sage grouse, a Montana BLM Sensitive Species, may be found along the western edge of the project, although nearly all of the sagebrush in the area has been removed as a result of extensive spraying by the landowner thus greatly reducing habitat values for this species. Wild turkeys are year-round residents and nest throughout adjacent ponderosa pine uplands and riparian areas.

3.10.4 Raptors

Although the project area is considered good habitat for a number of raptor species, such as red-tailed hawks, great

horned owls, American kestrels, and Northern Harriers, only one red-tailed hawk nest has been identified within the project area. During a comprehensive aerial survey conducted under contract by BLM, an active red-tailed hawk nest was found in a live cottonwood tree along the Tongue River riparian corridor. The nest had 5 nestlings in it when surveyed on May 21, 2004. There is an active bald eagle nest within ½ mile of the project area located along the banks of the Tongue River. The existing county road is located about 100 yards from this nest. The roadway climbs a small hill at this point, which puts it nearly on the same elevational gradient as the nest. Additionally, the existing power line passes within 100 yards of the nest as it proceeds downriver. There are several power poles that offer perch opportunities for eagles in this area. Bald eagles commonly migrate through the Tongue River valley and will winter in the river corridor as long as open water and forage remains available.

3.10.5 Fisheries/Aquatics

The Tongue River below Tongue River Dam supports a major recreational fishery. Key species include smallmouth bass, sauger, walleye, rainbow trout, brown trout, and channel catfish. The Montana FWP identified 26 fish species in one sample reach near the project location (refer to http://maps2.nris.state.mt.us/). There were 19 fish species collected 4-6 miles downstream of the Tongue River dam through electroshocking in 1999, 2003 and 2004. The sauger is the only sensitive fish species within and immediately downstream of the project area. The Northern Leopard Frog, spiney softshell, snapping turtle, Plains spadefoot, Great Plains Toad are all sensitive aquatic dependent species that occur or may occur within the project area. In addition to the above aquatic species, there are also other amphibians and aquatic invertebrates that are common in and along the Tongue River and many of its tributaries.

Rainbow and brown trout habitat and populations exist from the Tongue River dam downstream ten miles. This fishery exists due to the stocking of rainbow and brown trout by Montana Fish Wildlife and Parks. Limited natural reproduction of brown trout occurs and no known rainbow trout natural reproduction occurs (Schmitz 2004). Electroshocking data indicated no rainbow or brown trout below 5-6 inches (which indicates little to no spawning success). High water temperatures, fish habitat, flow fluctuations and predation are the main factors that limit natural reproduction (Schmitz 2004). Schmitz (2004) indicated that trout are able to inhabit this reach of the Tongue River because of the release of colder water from the Tongue River dam. Without the release, the water temperatures would be too high to support trout. Schmitz (2004) indicated that the hatchery rainbow trout stocked into the river have been propagated for so long that they no longer know where the stock is from. In addition, their spawning period (in the hatchery) has been switched from spring to fall. This could also have an effect on whether they can produce naturally within the Tongue River.

Two sites on the Tongue River (Site 1: 2 miles downstream of the Tongue River Dam; Site 2: 2 miles downstream of its confluence with Hanging Woman Creek) were sampled for fish, macro-invertebrate, periphyton, water quality, instream habitat, streambed substrate composition and riparian habitat by BLM personnel on 7/28/04 and 7/23/04, respectively. While most of the above data is currently being analyzed and will not be available until March of 2005, preliminary observations indicated an abundance of aquatic invertebrates, such as caddisfly larvae (Trichoptera), mayfly larvae (Ephemeroptera) and other aquatic invertebrates. Additional sampling for aquatic invertebrates was completed by the USGS on the Tongue River at the state line (upstream of the reservoir) and the Tongue River at Brandenburg Bridge (approximately 80 - 90 stream miles downstream of the project area) in 2003. In fast-flowing habitats, the most abundant taxa for the site near Brandenburg Bridge were Ephemeroptera (49%) and Tricoptera (27%). The Tongue River at the State Line site consisted of Ephemeroptera (62%), Miscellaneous Diptera (aquatic flies) (12%) and Coleptera (aquatic beetles) (11%). Scott and Crossman (1973) indicate that rainbow trout food sources are plankton, larger crustaceans, insects, snails, leeches, other fishes, and fish eggs. Scott and Crossman (1973) also indicate that virtually all species of aquatic insects that occur within its habitat are food sources. Brown trout have similar food sources to rainbow, but rely more on fishes and crayfish as they grow larger. Future monitoring for the above parameters, except periphyton, has been identified in the aquatic task force monitoring plan.

The water temperatures at both of the above sites (sampled by the BLM) measured 68 Degrees F at 8:00 AM and 10:30 AM, respectively. The USGS stream gauging station located just downstream of the dam indicated that the maximum temperatures were between 69 and 72 degrees F for the month of August, 2004. Minimum temperatures were between 65 and 69 degrees F. Scott and Crossman (1973) indicate that spawning temperatures for rainbow trout are between 50 degrees F and 60 degrees F. The upper lethal temperature of Kamloops rainbow trout fingerlings is 75.2 Degrees F. "Rainbow trout are most successful in habitats with temperatures of 70 degrees F or

slightly lower…" (Scott and Crossman 1973). Spawning temperatures for brown trout are 44 to 48 degrees F with an optimum range for rearing from 65 to 75 degrees F.

The location of proposed treated water discharge associated with this project is located approximately two miles downstream of the dam. Discharge water temperature would be between 55 and 61 degrees F. These temperatures are actually a more desirable temperature for rainbow and brown trout than what is currently in the Tongue River in the summer months. The water would be treated to meet state standards (i.e. EC, SAR,). Other ions and anions, such as bicarbonate and ammonia, etc. are also within state standards and guidelines. Refer to Section 3.4.1, Surface Water, for additional water quality information.

Potential effects to fisheries/aquatics have occurred from the following current and past activities: Decker Coal Mine, Spring Creek Coal Mine, Montana and Wyoming CBNG development, gravel/scoria pits, livestock grazing, agriculture/irrigation, Tongue River dam and reservoir, logging, prescribed fire, residential areas, recreation, existing roads and road reconstruction/maintenance (refer to Chapter 2 for more detailed descriptions). These actions occur in various degrees throughout the drainage which influences the degree at which aquatic life is affected. Water quality, erosion and streamflows are identified as parameters that could be changed or impacted and subsequently result in potential effects to aquatic life.

Coal Mining: Coal mining has the potential to affect water quality, erosion, and streamflows. This activity consists of 18,400 surface acres. This is equal to .5 % of the area within the Tongue River drainage (3,458,832 acres). The amount of water discharged into the Tongue River Reservoir from these mines is 3.74 cfs which is approximately 5 percent of the flow at the low monthly 7Q10 (70 cfs) below the dam. This project could have potential effects on habitat or populations.

CBNG development: CBNG has the potential to affect water quality, erosion and streamflows. Currently, there is a discharge permit of 1600 gpm (3.56 cfs) for CBNG produced untreated water (approx. 5 percent of the flow at the low monthly 7Q10 (70 cfs) below the dam (this only includes Montana). This activity could have potential effects on habitat or populations.

Livestock Grazing: Livestock grazing occurs over most of the drainage. Potential impacts are increased erosion and higher stream temperatures from reduced riparian vegetation through livestock browse, livestock reservoirs that breach, and livestock trailing/loafing. The degree of the effect varies throughout the drainage and depends on the vegetation types, type of grazing system, topography, fencing, water, forage availability, and natural conditions. Livestock grazing could have potential effects on aquatic habitat or populations.

Agriculture/irrigation: Potential impacts from agriculture/irrigation are decreased streamflows, changes in water quality and erosion. Agriculture is primarily limited to dry land farming or irrigated farmland adjacent to perennial streams and rivers. This area is primarily limited by terrain. The amount of flow removed from the Tongue may vary per day based on irrigation needs. However, the most impacted portion of the Tongue River from irrigation withdrawal is downstream of the T&Y diversion at 12 mile dam (approx. 160 miles downstream of the project area). The river is almost de-watered during a portion of the irrigation season. This can have an effect on spawning fish, such as the sauger, and affect the fish and aquatic habitat and populations within the river. Potential effects could occur to aquatic habitat or populations.

Tongue River Dam and Reservoir: The Tongue River Dam and Reservoir regulates the amount of cubic feet per second (cfs) flowing downstream of the dam. As a result, flushing or high peak flows on the Tongue River do not always occur. These flows may be preventing the recruitment of cottonwood and other flushing flow dependant riparian species on the Tongue River. In addition, Schmitz (2004) indicated that during dam reconstruction (which has occurred within the past decade) there were periods when no flow was permitted through the dam. This activity could have potential effects on habitat or populations. However, there is a potential benefit to aquatics from the dam and reservoir. There could be less potential for erosion of streambanks from the lack of high peak flows.

Logging: Potential impacts from logging in the Tongue River drainage are primarily associated with erosion. Logging is limited in the drainage due to the limited amount of marketable forested acres and distances to mills. In addition, very little marketable timber is located adjacent to perennial streams within the watershed. Therefore, logging and timber related activities have no adverse effects on aquatic habitat or populations. The activity is

controlled by spatial restrictions and not likely to affect habitat or populations.

Prescribed fire: Potential effects from prescribed fire are primarily associated with erosion. Prescribed fire occurs over a small portion of the watershed and in many ways is a benefit to the resource by reducing the risk of wildfire. The activity also occurs when environmental conditions are such that high intensity burns do not occur. Prescribed fire activities have no adverse effects on aquatic habitat or populations. The activity is controlled by seasonal or spatial restrictions and not likely to affect habitat or populations.

Residential Areas: Effects from residential areas includes erosion and changes in water quality and streamflows. Major residential areas in the watershed include Sheridan, WY, Miles City, MT, and Ashland, MT (approximate combined population of 24,375 people). Birney, Decker, Otter, Quietus, Sonnette and Volborg are other very small residential areas (may only consist of a post office) that are in the area. There are also ranch residential areas scattered across the entire watershed. Generally, the Tongue River drainage could be described as sparsely populated, which reduces the potential for effects on habitat or populations.

Recreation: Major Recreation areas are typically associated within and around Miles City, MT, Ashland, MT, Sheridan, WY, the Bighorn Mountains in Wyoming and the Tongue River Reservoir. Other major recreational activities in the drainage include fishing, hunting, and camping. The main effects from recreational activities are related to increased erosion, changes in water quality, and direct take of aquatic species. However, recreational activities are limited due to land ownership, the type of opportunities available, low population base, and state fishing regulations. Therefore, recreation activities have no adverse effects on aquatic habitat or populations. The activity is controlled by seasonal or spatial restrictions and not likely to affect habitat or populations.

Existing roads: Roads have the potential to increase erosion, block fish passage (where culverts are installed) and remove riparian and upland vegetation. It is likely that past road construction activities and current road locations are having some effect on aquatic life.

Road reconstruction and maintenance (including gravel/scoria pits): Road reconstruction and maintenance occurs at some level on all of the BLM, state, city and county roads within the drainage. The main effects from road (re)construction and maintenance are associated with erosion and in some cases decreased vegetation adjacent to the river/streams. In many cases road maintenance and reconstruction reduces the risk of erosion by preventing failures during high flood events. Therefore, road (re) construction and maintenance activities have no adverse effects on aquatic habitat or populations. The activity is controlled by seasonal or spatial restrictions and not likely to affect habitat or populations.

The degree of effects from the combination of the above activities within the Tongue River drainage depends on a variety of factors, some of which are natural. Drought conditions have affected aquatic habitat and populations within the drainage for the past several years. Local geology, severe wildfire and soil composition also influence water quality, streamflows, and erosion.

Of the above activities, present CBNG development, coal mining, agriculture/irrigation, residential areas, livestock grazing, the Tongue River dam and reservoir, and existing roads indicate potential effects to aquatic habitat and populations. The other activities, logging, prescribed fire, recreation, and road (re)construction and maintenance have a minor potential for effects and are not detrimental. Although difficult to quantify in numerical terms, it is reasonable to assume that, with the magnitude of activities there would be some impacts to most aquatic species residing in the area that cannot be avoided.

3.10.6 Bird Species

The Montana Natural Heritage Program identified 104 species of birds inhabiting this portion of Southeast Montana and another 55 species as probable/possible inhabitants (Carlsen and Cooper, 2003). BLM commissioned 2 breeding bird surveys in the area of the project in 2002 and 2003. Ten transects recorded 62 species of which western meadowlarks, lark/vesper/clay-collared/Brewer's sparrows and Brewer's blackbirds and brown-headed cowbirds were the most common species represented. No migratory bird transects have been done in this area, but the area has much the same type of habitat where the two closest transects were run and it is likely that the most common species found there would also be found in the project area. There are many Montana bird species of special concern that may occur in the area. These either are in very low numbers or simply have not been

documented at this time. These may include, but not limited to, Swainson's hawk, hairy woodpecker, loggerhead shrike, etc.

The Tongue River is important habitat for waterfowl. Canada geese, wood ducks, gadwall and mallards commonly nest along the river corridor. The river serves as an important migration corridor for waterfowl during early winter and spring and will support large numbers of ducks, especially mallards, until covered by ice.

3.10.7 BLM Sensitive Species

There are several BLM Sensitive Species of mammals that may occur in the area, but they are extremely rare and/or documentation is nearly non-existent (Foresman, 2001). These include Preble's and Merriam's shrews and spotted and Townsend's big-eared bats. Refer to the table in Appendix B for an accounting of all Montana BLM Special Status Species (SSS)-listed species. (A species may be referred to, by BLM, as a special status species but not be a federally listed species.) BLM uses the term Special Status Species to identify any species which has been elevated to any degree of management concern, including species listed as threatened, endangered, or proposed for listing under the federal Endangered Species Act (ESA), species listed by the BLM state director as sensitive, species listed by the state wildlife agency, or species identified by a state heritage program. It is important not to interpret a designation of special status species as exclusively meaning a species protected by the ESA.

3.10.8 West Nile Virus

West Nile Virus (WNV) is a mosquito-borne disease that can cause encephalitis and other brainstem diseases in humans and major impact on vertebrate wildlife populations. WNV was identified as a mortality factor in a sage grouse population near Gillette, WY in 2003. This population is part of a research project evaluating CBNG development impacts to sage grouse populations in southeast Montana and northeast Wyoming. WNV is spread when mosquitoes feed on infected birds, and then people, other birds and animals. WNV is not spread by person-to-person contact and there is no evidence people can get the virus by handling infected animals. Mosquitoes can potentially breed in any standing water that lasts for more than four days.

Surface water availability has increased with CBNG development in the Powder River Basin. WNV has been identified in mosquitoes trapped in and around CBNG produced water reservoirs in the vicinity of the sage grouse mortalities (B. Walker, personal communication). Research on this issue is currently being conducted by several entities (WY Veterinary lab, University of Montana, Montana State University, USDA and the University of Alberta).

Other factors that may be influencing WNV are the stock water reservoirs present within and adjacent to the area. These reservoirs could contribute to WNV. However, many of these reservoirs tend to go dry during the late summer months, which would limit mosquito production at those times of year.