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 require analysis under BLM policy. These items are presented below in Table 3.0-1.

Table 3.0-1 Critical Elements Requiring Mandatory Evaluation

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site
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		
Wastes, Hazardous or Solids		X	
Invasive, Nonnative Species	X		
Environmental Justice		X	

The following non-critical resources will not be impacted by this proposed action; therefore they will not be analyzed in detail by this Environmental Assessment: ***Forestry and Fire***

3.1 AIR QUALITY

The climate of the project area is classified as mid-latitude semi-arid steppe (Trewartha & Horn, 1980). Steppe climate is characterized by large seasonal variations in temperature (cold winters and warm summers) and by precipitation levels that are low, but still sufficient for grasses.

Table 3.1-1: Summary of Existing Air Quality and Climate in the CX Field Region

Air Quality Component	Comment
Climate	
Temperature	Mean annual maximum: 60 °F Mean annual minimum: 32 °F
Precipitation	Mean annual precipitation: 14.7 inches Mean annual snowfall: 37.7 inches Mean annual snow depth: 1 inch
Air Pollutant Concentrations	
MAAQS & NAAQS: Criteria pollutants from 2003 – 2008 Rosebud County, Montana	• NO_2: ○ 1 hour < 15% of MAAQS ○ annual < 10% of MAAQS • PM_{10} ○ 24 hour: 2 exceedances, 2003 of MAAQS, Lame Deer Station ○ annual < 70% of MAAQS • SO_2 ○ 1 hour < 20% of MAAQS ○ 3 hour < 5% of NAAQS ○ 24 hour < 5% of MAAQS

	○ annual < 10% of MAAQS
PSD Class I Increments (Roundup Power Project, Appendix B 2002-Draft Environmental Impact Statement)	• Yellowstone National Park ○ .02% of PSD Class I NO_2 annual ○ .6% of SO_2 annual ○ 11% of SO_2 24 hour ○ 7.2% of SO_2 3 hour ○ .1% of PM_{10} annual ○ 2% of PM_{10} 24 hour • North Absaroka Wilderness ○ .04% of PSD Class I NO_2 annual ○ 2% of SO_2 annual ○ 15.6% of SO_2 24 hour ○ 12.3% of SO_2 3 hour ○ .3% of PM_{10} annual ○ 3.9% of PM_{10} 24 hour • UL Bend Wilderness ○ .02% of PSD Class I NO_2 annual ○ .6% of SO_2 annual ○ 11% of SO_2 24 hour ○ 7.2% of SO_2 3 hour ○ .1% of PM_{10} annual ○ 2% of PM_{10} 24 hour • Northern Cheyenne Reservation ○ 50% of PSD Class I NO_2 annual ○ .25% of SO_2 annual ○ SO_2 24 hour exceedance ○ SO_2 3 hour exceedance ○ 3.5% of PM_{10} annual ○ 28% of PM_{10} 24 hour
Visibility	
Yellowstone National Park (1991-2004)	• Cleanest 20%: 140 – 185 miles • Average:93 – 131 miles • Haziest 20%: 59 – 81 miles
Northern Cheyenne Reservation (2003 & 2004)	• Cleanest 20%: 171 – 173 miles • Average:110 – 120 miles • Haziest 20%: 50 – 72 miles
North Absaroka Wilderness (2002-2004)	• Cleanest 20%: 181 – 186 miles • Average:126 – 135 miles • Haziest 20%: 62 – 86 miles
Atmospheric Deposition	
Little Big Horn Battlefield National Monument (1984-2002)	• Precipitation ○ pH: very slight acidification in 1998 & 1999 ○ SO4: <.8 mg/L • Wet deposition ○ SO4: < .4 kg/ha
Yellowstone National Park	• Total Sulfur: <50% of guidelines

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 3.1-2 summarizes the NAAQS and MAAQS.

Table 3.1-2: National and Montana Ambient Air Quality Standards

Pollutant	Time Period	Federal (NAAQS)	Montana (MAAQS)	Standard Type
Carbon Monoxide	Hourly Average 8-Hour Average	35 ppm [a] 9 ppm [a]	23 ppm [b] 9 ppm [b]	Primary Primary
Fluoride in Forage	Monthly Average Grazing Season	-- --	50 µg/g [c] 35 µg/g [c]	-- --
Hydrogen Sulfide	Hourly Average	--	0.05 ppm [b]	--
Lead	90-Day Average Quarterly Average	-- 1.5 µg/m^3 [c](calendar)	1.5 µg/m^3 [c](rolling) --	-- Primary & Secondary
Nitrogen Oxide	Hourly Average Annual Average	-- 0.053 ppm [d]	0.30 ppm [b] 0.05 ppm [e]	-- Primary & Secondary
Ozone	Hourly Average 8-Hour Average	0.12 ppm [f] 0.08 ppm [g]	0.10 ppm [b] --	Primary & Secondary Primary & Secondary
PM-10	24-Hour Average Annual Average	150 µg/m^3 [k] 50 µg/m^3 [l]	1.5 µg/m^3 [k] 1.5 µg/m^3 [l]	Primary & Secondary Primary & Secondary
PM-2.5	24-Hour Average Annual Average	65 µg/m^3 [m] 15 µg/m^3 n	-- --	Primary & Secondary Primary & Secondary
Settleable Particulate	30-Day Average	--	10 g/m^2 [c]	--
Sulfur Dioxide	Hourly Average 3-Hour Average 24-Hour Average Annual Average	-- 0.50 ppm [a] 0.14 ppm [a,i] 0.03 ppm [d]	0.50 ppm [h] -- 0.10 ppm [b,j] 0.02 ppm [e]	-- Secondary Primary Primary
Visibility	Annual Average	--	3 x 10^{-5}/m [e]	--

Source: http://www.deq.mt.gov/AirQuality/Planning/AIR_STANDARDS%20NEW.pdf

[a] Federal violation when exceeded more than once per calendar year.

[b] State violation when exceeded more than once over any 12 consecutive months.

[c] Not to be exceeded (ever) for the averaging time period as described in the state or federal regulation

[d] Federal violation when the annual arithmetic mean concentration for a calendar year exceeds the standard.

[e] State violation when the arithmetic average over any four consecutive quarters exceeds the standard.

[f] Applies only to NA areas designated before the 8-hour standard was approved in July, 1997. MT has none.

[g] Federal violation when 3-year average of the annual 4th –highest daily max. 8-hour concentration exceeds standard.

[h] State violation when exceeded more than eighteen times in any 12 consecutive months.

[i] State and federal violation when more than one expected exceedance per calendar year, averaged over 3-years.

[j] State and federal violation when the 3-year average of the arithmetic means over a calendar year at each

monitoring site exceed the standard.

[k] Federal violation when 3-year average of the 98th percentile values at each monitoring site exceed the standard.

[l] Federal violation when 3-year average of the annual mean at each monitoring site exceeds the standard.

Under the EPA approved State Implementation Plan, MDEQ is the primary air quality regulatory agency responsible for determining potential impacts from detailed development plans that exceed MAQPs thresholds. Emission levels from the exploration portion of the preferred alternative (Alternative C), as well as the exploration portion of Alternative A and Alternative B, are below the 25 tons 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 PTE less than 100 tons per year and do not operate in the same location for more than 12 months from the need to obtain an MAQP. Therefore, an MAQP permit would not be required for the exploration activities of the proposed project. All facilities that would be used to process and transport the CBNG have already received MAQPs from the MDEQ. Based on information provided by Fidelity, for Decker Mine East, two permitted batteries would be used to extract the gas. The batteries that would be used for Fidelity's Decker Mine East POD are the Bitter Creek Pipelines, LLC (BCPL) Holmes 29 Battery (MAQP #3335, formerly named Rancholme 29 Battery) and Decker 17 Battery (MAQP #4066). In addition, an existing sales battery, BCPL Symons Central Compressor Station (MAQP #3250), would also be used for Fidelity's Decker Mine East POD. MDEQ has issued MAQPs for all batteries associated with this project.

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 22 miles north of the project.

The proposed project's PTE 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 date 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, is not renewable, 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.

Although the proposed project is not subject to PSD, the two permitted field compressor sites and one sales compressor site used to process gas from the proposed wells, have applied for and received MAQPs from the MDEQ. MDEQ requests operators of all CBNG compressor stations to perform ambient air quality modeling to demonstrate compliance with the MAAQS/NAAQS. In addition, MDEQ requests that the modeling include a NO_x PSD increment analysis to demonstrate compliance with the Class I NO_x increment and periodically the Class II NO_x increment, regardless of whether or not PSD applies to the facility. The ambient air quality modeling that was conducted for the permitted facilities that would be used to extract the CBNG from the proposed wells is summarized in Chapter 4 of this EA.

3.1.1 Existing Visibility

Visibility values in Yellowstone National Park (1991 through 2004), North Absaroka Wilderness (2002 through 2004), and the Northern Cheyenne Reservation (2003 and 2004) are displayed in Table 3.1-1. The Yellowstone National Park data is the only one of the three that can demonstrate a trend of more than three years. Yellowstone's visual range on the 20% cleanest days varies from 140 to 185 miles. Average visual range varies from 93 to 131 miles. Visual range for the 20% haziest days varies from 59 to 81 miles.

Trend analysis of Yellowstone visibility data reveals no significant trend of worsening visibility from 1991 through 2004.

3.1.2 Existing Atmospheric Deposition

3.1.2.1Wet Deposition

The precipitation pH in the Little Big Horn Battlefield National Monument near the Northern Cheyenne Reservation from 1987 through 2002 is displayed in Table 3.1-1. The natural acidity of rainwater is considered to be represented by a range of pH values from 5.0 to 5.6 (Seinfeld, 1986). Mean annual pH near the Northern Cheyenne Reservation is generally within this range, although mean annual pH fell to 4.9 in 1998 and 1999. Precipitation pH values lower than 5.0 may be considered acidification and may cause adverse effects to plants and animals.

As demonstrated in the3.1-1, the mean annual sulfate concentrations in precipitation in the Little Big Horn Battlefield National Monument, from 1984 through 2002, all values are below .8 mg/L. Additionally, the wet sulfate deposition in the National Monument, all values are below .4 kg/ha.

3.1.2.2 Dry Deposition

No dry deposition data is available for eastern Montana.

3.1.2.3 Total Deposition

Table 3.1-1compares total sulfur deposition in Yellowstone National Park from 1992 through 1999 with the total sulfur deposition guidelines set for the Bridger Wilderness. Total sulfur deposition values are well below guidelines.

3.2 CULTURAL RESOURCES

3.2.1 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. Additional guidance for conducting cultural resources is found in BLM Montana/Dakotas Cultural Resources Handbook H-8110-1: Guidelines for Identifying Cultural Resources (BLM 2002). More specific guidance for Coal Bed Natural Gas Projects is found in Appendix E: Cultural Resources in the 2003 Miles City Field Office POD Guidance Manual.

The East Decker POD Area was blocked inventoried by Ethnoscience Inc in October 2006. That is the area around both the proposed wells and infrastructure was inventoried as a whole rather than only those portions containing the wells and associated developments. The general POD area had been inventoried for the Decker Coal mines in the 1970's. These reports were found to be inadequate to meet current BLM report standards and additional inventory was required. The inventory results are discussed below.

3.2.2 East Decker Mine Permit Area: Ethnsocience, a cultural resource consulting firm from Billings, Montana completed a block Class III Cultural Resource Inventory of the East Decker Area in October 2006. Class III Inventories are continuous, intensive and complete surveys carried out by trained observers walking close-interval, parallel transects until the area has been thoroughly examined. Class III inventories are the standard method of identifying cultural properties in three state area covered by the Montana/Dakotas BLM (BLM 2002).

The Ethnoscience inventory covered 1968.8 acres and located six sites and one isolate. Additionally, two prehistoric sites recorded during earlier (1970's) coal mine surveys near the project area were not relocated. These are 24BH1516 and 24BH1976. Both are described below. The six sites recorded during the inventory include one previously recorded historic homestead site (24BH2270), one foundation (24BH3369), three homesteads (24BH3367, 24BH3370, and 24BH3371) and one site with both historic and prehistoric artifacts present (24BH3368). These sites are also described below. Additionally one isolated prehistoric artifact was observed in the inventory area. This was a lanceolate point made of gray porcellanite. The point was compared to similar artifacts from a site in Wyoming that has a radiocarbon date of 8740 $\pm$ 140

years before present. Isolates are not considered eligible for listing on the National Register of Historic Places. The East Decker Federal CBNG proposals would not impact the artifact.

Previously Recorded Prehistoric Sites:
Site 24BH1976 (Middle Creek Drive Lines) was originally recorded by Anthro-Research during a coal sample inventory (Lahren, 1976). The site is a complex of three lines of rock piles. The site was thought to have been used for driving bison into a trap in Middle Creek. Pieces of bone and charcoal were present in power-auger tests conducted as part of cultural resource investigation for the then proposed mine (Fredlund, 1977). Additional testing with a backhoe did not turn up any evidence of a buried kill site (Frison, 1977). Ethnoscience visited the reported site location in September 2006 and found the site had been destroyed by mining (Wagers, 2006).

Site 24BH1516 ((Darby Site) was identified as two stone tools in a 25 sq. meter area on the north side of Deer Creek. The site was not relocated in the Deer Creek North POD inventory (Wagers and Strait, 2005). Since the site was not relocated the south bank of Deer Creek in the general vicinity was examined to insure the site had not been mislocated. No evidence was seen. The report notes that both items (a graver and utilized flake) were collected (Fredlund, 1977:74), so the site no longer exists on the ground.

Previously Recorded Historic Sites in the POD:
Site 24BH1750 is a historic homestead. The site was originally recorded in 1981 (Allen, 1981) and more recently updated by Ethnoscience in 2004 (Strait, 2004). The site in 2004 contained seven features and a scatter of historic debris. The site was recommended by Ethnoscience as not eligible for the National Register. The SHPO CRIS Database addresses the site as unevaluated. The BLM in their 2005 Coal Creek Consultation recommended the site as unevaluated. The SHPO evaluated the site as unevaluated. BLM determined that the site would not be effected during the Coal Creek POD Consultation so no eligibility determination was requested (Hubbell, 2004). The site is located away from any proposed development and would not be impacted by the Decker East Mine POD. BLM recommends eligibility of this site remains unresolved for East Decker Mine POD.

Site 24BH2270 is the remains of the Richard W. Morris Homestead. The site was originally recorded in 1982 by Patricia Bick of the Montana SHPO Office. The 1982 form noted three dugout structures, a cistern, and scatter of historic debris (Bick, 1982). Additional work was recommended for evaluating National Register eligibility. Ethnosccience relocated the site in September 2006. The site was found to have a total of eight features including those observed by Bick. Based on the condition of the site and a review of ownership records, Ethnoscience recommended the site as not eligible for listing on the National Register of Historic Places. The site is away from any planned developments and would not be impacted by the Federal portion of the East Decker POD.

Newly Recorded Sites in the POD:
Site 24BH3367 consists of the remains of the Albert Dukes Homestead. The site consists of ten features (two foundations, five dugouts or depressions, a cistern, a scoria pit, and trash dump) and a scatter of historic and modern debris. The integrity of the site was described as poor. Based on the site condition and review of ownership, the site was recommended as not eligible for listing on the National Register of Historic Places. An existing upgraded road runs through the site, but does not appear to have impacted any of the features at the site.

Site 24BH3368 consists of a small prehistoric lithic scatter and a historic trash scatter. The prehistorc component consists of five pieces of gray porcellanite debitage (the residue from making and using stone tools). The site was thought to have limited depositional potential. The historic component is a trash scatter dating to the 1950's. The site was recommended as not eligible for the National Register. The site is away from any proposed development and would not be impacted by the Federal portion of the East Decker POD.

Site 24BH3369 consists of a single foundation and modern crib feeder. The building associated with the foundation has been removed, and site condition was described as poor. Due to the site condition and lack

of associated artifacts, the site was recommended as not eligible for listing on the National Register of Historic Places. The site would not be impacted by the Federal portion of the East Decker POD.

Site24BH3370 consist of a collapsed log cabin, two dugouts, and some historic debris. The condition of the site is described as poor. Based on the chain of ownership and condition, the site was recommended as Not Eligible for listing on the National Register of Historic Places. An access road runs through the site boundaries, but would not impact the features at the site.

Site 24BH3371 consists of two dugouts in the slope of east-west trending ridge. One piece of clear window glass was observed between the features. The condition of the site was described as poor. Based on the condition of the site and the lack of associated artifacts and a review of the chain of ownership, the site was recommended as Not Eligible for Listing on the National Register of Historic Places. A development corridor is proposed to run through the site.

Cultural Landscapes: BLM contracted with Renewable Technologies, Inc (RTI).of Butte, Montana in 2005 to complete a cultural landscape study of the Northern Powder River Basin in Montana with an emphasis on the area of high potential coal bed natural gas development. This area included the area east of the Crow and Northern Cheyenne Reservations, outside the Ashland District of the Custer National Forest to the Powder River and north from the Wyoming State line to US Highway 212 from Ashland to Broadus. Based on a windshield survey of the area, RTI noted two potential historic districts, north of the Tongue River Dam. They also noted that "other parts of the project area inspected by the windshield survey have been greatly altered by changes in land use activities and/or do not possess a significant concentration or linkage of land use areas and cultural elements. Much of the historic cultural landscape in the southeast section of the project area is essentially gone, having been inundated by the waters of the Tongue River Reservoir or have been impacted by strip coal mining activities" (RTI 2006:103). This would include the East Decker POD, where the East Decker Mine is the dominant feature on the landscape. Ethnoscience also evaluated the East Decker POD as a potential cultural landscape and came up with a similar interpretation as RTI. They noted the dominance of the East Decker Coal Mine on the area, the lack of associated linkages and continuity between the sites and current landscape (Wager, 2006:5.37-5.41).

3.2.2. East Decker POD Conclusions: The BLM has determined that the proposed East Decker POD would have no adverse effect to historic properties. The inventory of the POD Area of 1969 (1,968.8) acres did not encounter any eligible sites, although they are known from other nearby block inventories for CBNG Development (i.e., Deer Creek North). These sites would not be affected by the Federal portion of the East Decker POD.

3.2.3.1 Traditional Cultural Values An ethnographic overview of Southeast Montana (Peterson and Deaver, 2002) was also conducted for the region containing the POD project area. The study identified water and a number of site types as culturally sensitive and also urge avoidance of all sites where possible. The Northern Cheyenne Tribal Document (NCT, 2002) and Crow Tribal Document (CTI, 2002) also identified a number of site types as being culturally sensitive to the tribes. These include large stone ring sites, isolated fasting beds, rock art sites and large diameter fasting structures such as medicine wheels. Although the area may contain these features of concern, such as burials, which may be marked by cairns, communal kills sites, eagle trapping pits, fasting beds, stone rings, petroglyphs or rock art, vision quest sites and environmental locations where plants, water or mineral are gathered, the ethnographic study did not identify an ethnographic landscapes. Sites of this nature were not identified in the East Decker Block Survey or had been previously impacted by coal mining.

3.2.4 Paleontological Resources: Paleontological Resources are defined as fragile and nonrenewable scientific record of the history of life on earth (BLM, 1998). Fossils of the Cenozoic's Paleocene epoch (65 to 54 million years ago) have been found in the Fort Union Formation throughout Wyoming and Montana, but no important localities have been identified in the project area. Vertebrate fossil remains are particularly nonexistent in the Tongue River Member of the Fort Union Formation which is the upper most formation within the POD project area. Paleobotanical fossils have been recovered from the Tongue River Member but not within the project area. Past studies of paleontological resources at the Spring Creek and proposed CX Decker Mines have shown that the POD area has a low potential to yield significant

vertebrate fossil remains. The Tongue River Member of the Fort Union Formation has received a moderate paleontological sensitivity rating in the Miles City Field Office area (Aaberg et al., 2006:149).

Fossils located in the Spring Creek Mine area include plant, amphibian, reptile and invertebrates (NERCO, 1977). A paleontoloogical review of the CX Decker area did not locate any significant vertebrate fossil localites (Hager, 1980). The POD area occurs in similar geologic formations as the Spring Creek Mine and similar paleontological resources may occur. Protection of fossil resources on public lands extends to vertebrate fossils or specially designated areas. No areas designated for special management for paleontological resources are located near the project area in Montana. Although invertebrate fossils are not usually considered significant and permitable paleontological resources (the need to obtain a permit to collect), they do have cultural values to Native American groups and require consideration under laws and executive orders that deal with access and maintenance of religious sites and resources on public lands (Peterson and Deaver, 2002). Fossils on split estate lands are considered part of the surface estate and belong to the surface owner (BLM, 1998). Unanticipated discoveries of paleontological resources during project activities will be dealt with through implementation of measures in the approved federal permit that require notification of BLM's authorized officer in the event of important discoveries and suspension of construction activity to prevent loss of significant paleontological values

3.3 GEOLOGY AND MINERALS

3.3.1 Geology

The project area lies in the Montana portion of the Powder River Basin. The Powder River Basin is an asymmetrical 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 trend from southwest to northeast, 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. At least one fault crosses the Decker Mine East project area and several others are located both north and south of the project areas. Technical data on these faults is currently unavailable.

Outcropping bedrock in the area consists of the Tertiary-age Wasatch and Fort Union Formations. The Wasatch Formation is the exposed in the Decker Mine East project area and also is present, but to a lesser extent, in the Deer Creek North project area . It unconformably overlies the Fort Union Formation. The Wasatch can be as much as 600 feet thick, and is made up of yellowish to light gray siltstone, massive to cross-bedded sandstones, brown carbonaceous shales, coal seams and red clinker. A brown layer of gastropod shells (coquina) about 6 to 8 inches thick is found about 200 feet above the base of the Wasatch in many areas (Vuke, 2001).

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 to allow for ignition, 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 Fort Union Formation is underlain by Cretaceous-age Hell Creek Formation which is not exposed in the area.

The target coal seams are the Smith, Dietz 1, Dietz 2, Dietz 3, Carney, Monarch and Wall and are present from approximately 50 feet to 1,050 feet. There are 14 federal wells that are planned for development of these 7 coal seams, in the Decker Mine East POD.

3.3.2 Coal Bed Natural Gas

Coal Bed Natural Gas is held in the coal beds by hydrostatic pressure within the coal. A drawdown of 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.

3.3.3 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 will be from areas of high pressure to areas of lower pressure. For this reason, the gas will flow towards wells that are pumping water from the coals seam and reducing the pressure enough to cause the gas to be desorbed.

The cumulative effect is more complicated. The pumping of CBNG wells would cause the areas near the wells to desorb the gas and have the gas flow towards them; however, a reduction in hydrostatic head (pressure) would extend beyond that area over which the gas is desorbed in what is called a "cone of depression". For this reason, water wells that are completed in a CBNG producing coal seam(s) could produce gas from these 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.

Any monitoring wells completed in a CBNG producing coal bed may also experience the desorption of gas as a result of the reduction of the hydrostatic pressure. This may cause the monitoring well to become ineffective for monitoring drawdown in the coal bed.

The BLM has determined that the potential for methane migration and the potential impacts from the Decker Mine East is similar to the impacts described in the WY FEIS and Proposed Amendment for the Powder River Basin Oil and Gas Project and the MT FEIS. These could include migration of methane gas to water wells, monitoring wells, or to the surface.

Methane migration to water wells, springs or monitoring wells: Based on the water draw down analysis for the project, the 20 foot drawdown for the Decker Mine East POD would extend approximately 1.5 miles from the exterior boundary of the POD. The ongoing CBNG production and the 30 years of coal mining in the area have drawn down the hydrostatic pressure within the producing area (see Section 3.4.2) especially in the coal beds mined at East Decker (the Anderson coal bed, Deitz 1 coal bed and Deitz 2 coal bed). Ongoing monitoring indicates that "After nearly 9 years of CBM production, drawdown of up to 20 ft has been measured in the coal seams at a distance of roughly 1 to 1.5 miles outside the production areas. These values have not changed substantially since 2004. These distances are similar to but somewhat less than predicted in the Montana CBM environmental impact statement" (Wheaton et al., 2008). A drawdown of 20 feet would be equivalent to a pressure reduction of about 8.7 psi in each coal. The gas in the coal requires a pressure reduction of approximately 10 to 40 percent before desorption begins.

The hydrostatic pressure in the Smith, Dietz 1, 2 and 3 coals are estimated to be 20 psi to 295 psi. To enable gas to desorb from this coal would require a pressure reduction of a minimum of 2 psi. This is equivalent to a water drawdown of at least 5 feet. The East Decker mine has mined the shallowest Dietz coals, therefore, it is likely that this pressure has been reached already and any wells/springs in the Dietz 1 and 2 coal beds may already be affected by gas desorption.

In the Monarch coal, the formation pressure is estimated to be from 121 psi to 315 psi. This coal would require a minimum of 12 psi reduction of pressure before gas would begin to desorb. This is equivalent to a water drawdown of 27 feet.

In the Carney coal, the formation pressure is estimated to be from 198 psi to 372 psi. This coal would require a minimum of 20 psi reduction of pressure before gas would begin to desorb. This is equivalent to a water drawdown of 46 feet.

Based on the Hydrology section (3.4.2), there are monitoring wells, water wells or springs within this area that may be affected by methane migration. The wells or springs would have to be completed or producing from a coal bed and within the area where the hydrostatic pressure has been reduced in the particular coal bed below that required to begin desorption.. The minimum drawdown pressure and depth to initiate gas desorption is shown above for each coal.

The operator has certified that water mitigation agreements have been reached with all potentially affected owners of wells and springs in accordance with the requirements of MBOGC Order No. 99-99. This Order requires that operators offer water mitigation agreements to owners of water wells or natural springs within one mile of a CBNG field, or within the area that the operator reasonably believes may be impacted by CBNG production, whichever is greater, and to extend this area one-half mile beyond any well adversely affected. This order applies to all wells and springs, not just those which derive their water from the developed coal seams. This Order requires "…prompt supplementation or replacement of water from any natural spring or water well adversely affected by the CBM project…" These agreements would apply to those wells which experience an impact to their use whether it is due to decreased yields, the migration of methane, or a change in water quality.

Drainage of Indian Mineral resources: The nearest Crow Indian minerals are located more than 11 miles to the west of the POD project area. Ongoing monitoring indicates that "After nearly 9 years of CBM production, drawdown of up to 20 ft has been measured in the coal seams at a distance of roughly 1 to 1.5 miles outside the production areas. These values have not changed substantially since 2004. These distances are similar to but somewhat less than predicted in the Montana CBM environmental impact statement" (Wheaton et al., 2008).

The nearest Northern Cheyenne lands are approximately 2.8 miles away (N½SW¼, Section 26, T. 8 S., R. 40 E.). Ongoing monitoring indicates that "After nearly 9 years of CBM production, drawdown of up to 20 ft has been measured in the coal seams at a distance of roughly 1 to 1.5 miles outside the production areas. These values have not changed substantially since 2004. These distances are similar to but somewhat less than predicted in the Montana CBM environmental impact statement" (Wheaton et al., 2008).

Methane migration to conventional wells in the area: There is one abandoned well within the project area, a well in the NWNE of Section 19 of T. 9 S., R. 41 E. All the plugged wells that are in or near this POD area are listed below.

Table 3.3.3-1: Conventional Oil & Gas Wells

Well	Location	Total Depth
D-6	Sec. 19, T. 9 S., R. 41 E. NWNE	8,850 feet
Plugged CBNG Wells:		
41EC-3091	Sec. 30, T. 9 S., R. 42 E. NENE	1,222 feet
1	Sec. 9, T. 9 S., R. 41 E. SWNE	795 feet

Drainage of Federal Mineral resources: Federal minerals are adjacent to each side of the exterior boundary of the proposed POD area. Due to this situation, there may be drainage situations identified as the wells in the POD begin producing. These situations will be handled on a case by case basis.

3.4 HYDROLOGY

3.4.1 Surface Water

CBNG produced water would be transported through buried plastic flowlines from each well site to the following water management options: (1) transferred for industrial uses (dust suppression) in the Spring Creek and Decker Coal Mines; (2) used by Fidelity for CBNG drilling, construction, and dust suppression; (3) transferred to stock tanks for use by livestock and wildlife; (4) discharged to the Tongue River using Fidelity's existing MDEQ direct discharge permit (MT-0030457); or (5) treated and discharged to the Tongue River using Fidelity's existing MDEQ discharge permit for treated water (MT-0030724), which includes the use of impoundments 34E-3490 and 12-3490 which are lined off-channel impoundments which are part of the treatment works.

The ion exchange water treatment process which Fidelity is using causes a concentrated low pH Na-Cl type brine to be generated (~1% of the feed volume). This brine is neutralized on site with lime to maintain a pH above 6. This brine is currently transported by Kissack Water and Oil Services, Inc., a licensed waste hauler, and is disposed of at Kissack's Kuehne injection well (operated under UIC permit #01-109), and Kissack's Hamm #1 injection well (operated under UIC permit #01-036). Both of these wells are permitted as Class I injection wells. Fidelity has also received approval from the MBOGC to convert an exploratory oil well in T. 9 S., R. 39 E., Sec. 11 (Consolidated Coal 32 11-9-39; API# 25-003-22377) to a Class IID injection well. This well would inject into the Shannon Sandstone between 5600 and 5,700 feet (~1.1 miles) below ground surface. The EPA has noted that so long as the corrosively of the brine is neutralized "…it meets the regulatory definition of a Class II waste under 40 CFR 144.6(b)(1), and therefore, is considered suitable for injection in a Class II disposal injection well" (EPA, 2007). Fidelity still needs to sample the water in the Shannon to determine if the TDS of the injection zone is less than 10,000 ppm. If the TDS is less than 10,000 ppm an aquifer exemption will be needed prior to injection into this zone. Provided that the TDS of the Shannon is greater than 10,000 ppm, or that an aquifer exemption is obtained, and that the injection zone is sufficiently permeable, it is anticipated that Fidelity will use this well in the future to dispose of a mixture of neutralized brine and untreated CBNG production water. The procedures used by the EPA and MBOGC to permit deep injection make the potential to create noticeable impacts quite unlikely. As such, it will not be analyzed in detail.

Two of the proposed well sites drain to Coal Creek and into the storm water management system developed by the East Decker Coal Mine. Six of the proposed well sites drain to an unnamed drainage which flows into the storm water management system developed by the East Decker Coal Mine. The water that flows into the East Decker mine water management system eventually is discharged to the Tongue River Reservoir. These first eight proposed well sites are located within the Tongue River – Spring Creek 6th Order Watershed (12 digit HUC Code = 100901010501). The final six proposed well sites drain to Deer Creek, which flows just north of the East Decker Coal Mine to the Tongue River Reservoir. These last six well sites are located within the Deer Creek 6th Order Watershed (12 digit HUC Code = 100901010502). 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 portion of the Tongue River is classified as a Class 3 stream by the MDEQ's 2006 303(d) impaired stream list. Deer Creek is also classified as a Class 3 Stream. The Tongue River Reservoir is classified as a Class 5 water. Coal Creek is not classified by the MDEQ's 303(d) list. Class 3 designation indicates that there is "Insufficient data to assess any use". Class 5 designation indicates that "One or more uses are impaired and a TMDL is required." In the case of the Tongue River Reservoir the MDEQ indicates that the uses that are only partly supported are "Aquatic Life" and "Primary Contact Recreation", the probable cause of this impairment is "Chlorophyll-a" and the probable sources of the impairment are "Agriculture" and "Municipal Point Source Discharges". The total maximum daily load (TMDL) process for the Tongue River watershed is currently underway (http://www.deq.state.mt.us/wqinfo/TMDL/2007TMDL%20Schedule.pdf).

The Tongue River along the reach where the permitted discharge points for this project are located (upstream from the Tongue River Reservoir) was listed as impaired for aquatic life support, and cold-water fishery for trout in the MDEQ's 1996 303(d) list for impaired streams. The probable cause was listed as flow alteration. The probable sources were identified as being agriculture, flow regulation and/or modification, and irrigated crop production. Thus, this reach of the Tongue River was listed due to a lack of flow. The Tongue River in the areas of proposed discharges was not listed as impaired on the 2000, 2002, 2004, and 2006 303(d) lists based upon a reassessment of water quality.

The portion of the Tongue River from the diversion dam just above Pumpkin Creek (12 Mile Dam for the TY irrigation ditch) to the mouth is classified as a Class 4C stream in the MDEQ's 2006 303(d) list. This reach has been on the 303(d) list since 1996. Class 4C designation indicates that "TMDLs are not required; no pollutant-related use impairment identified". The uses that are only partly supported are "Aquatic Life", "Primary Contact Recreation" and "Warm Water Fishery", the probable cause of this impairment is "Low flow alterations" and the probable sources of the impairment are "Dam Construction (Other than Upstream Flood Control Projects)" and "Impacts from Hydrostructure Flow Regulation/modification". The flow along this reach has been substantially reduced during the irrigation season by the diversion of water at the 12 Mile Dam 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, other minor tributaries and irrigation return flows than they are of the Tongue River (Bobst, 2007). The total maximum daily load (TMDL) process for the Tongue River watershed is currently underway (http://www.deq.state.mt.us/wqinfo/TMDL/2007TMDL%20Schedule.pdf). This portion of the Tongue River is located approximately 100 miles N/NE from the project area (~142 river miles downstream). This reach was listed due to a lack of flow.

This analysis will focus on the Tongue River since this is the only stream that would receive CBNG water discharges. The ephemeral to intermittent drainages were not analyzed in detail since they are not considered to be impaired, and they would not receive any CBNG produced water.

The entire length of the Tongue River below the Tongue River Dam 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).

Currently (September, 2008) the total water production from Fidelity's Tongue River project area is approximately 2,931 gpm. Of this approximately 1,430 gpm is being managed by treated discharge to the Tongue River under MPDES permit MT0030724, and approximately 1,046 gpm is being discharged to the Tongue River untreated under MPDES permit MT0030457. Approximately 455 gpm is being managed through beneficial uses. These discharges of treated and untreated water are occurring approximately 3 miles upstream of the Tongue River Reservoir.

According to the Statement of Basis for MPDES Permit MT0030457 the untreated discharge has a median electrical conductivity (EC; listed as specific conductance in the permit, which is equivalant) of 1,964 μS/cm, a median calcium concentration of 4.8 mg/L, a median magnesium concentration of 1.6, and a median sodium concentration of 496 mg/l. Using these values the resulting SAR is 50.1. The volume that can be discharged under the untreated permit varies seasonally with 2,500 gpm allowed in the "winter" (November 1 to February 28), 2,375 gpm allowed in the "spring" (March 1 to June 30) and 1,600 gpm allowed in the "summer" (July 1 to October 31).

The treated discharge permit (MT0030724) allows for the discharge of 1,700 gpm year round; however the effluent limitations vary seasonally. For this analysis it is conservatively assumed that the discharge will be at the applicable average monthly effluent limit. During the winter the average monthly SAR may not be in excess of 5.0 and the average monthly EC may not be in excess of 1,500 μS/cm. During the spring and summer the average monthly SAR may not be in excess of 3.0 and the average monthly EC may not be in excess of 1,000 μS/cm. This permit allows untreated water to be blended with the treated water so long as these effluent water quality criteria are not exceeded, and the percentage of untreated water does not exceed 23% during the winter, and 14% for the rest of the year.

Pinnacle Gas also has a MPDES permit for the discharge of up to 1,122 gpm of treated CBNG water below the reservoir (MT0030660); however that permit is not in use at this time.
Within Wyoming, two permits were originally issued in 1999 allowing for the direct discharge of untreated CBNG water to surface waters in the Tongue River watershed. Both permits were renewed in April, 2004. Currently, these permits authorize the discharge of 135 gpm from 11 discharge points to Goose Creek, and 40 gpm from three discharge points to the Tongue River. More recently, the "Brinkerhoff" permits were issued in the Prairie Dog Creek watershed for discharge of untreated water into impoundments. A permit for the discharge of up to 600 gpm of treated water into Prairie Dog Creek has also been approved by the WDEQ. This permit, establishes a dissolved sodium effluent limit of 50 milligrams per liter (mg/L) and an EC effluent limit of 1,000 µS/cm. Within the Wyoming portion of Hanging Woman Creek there is a WYPDES permit for the discharge of untreated CBNG water to 13 off-channel impoundments (WY0053023), and a WPDES permit for the discharge of untreated CBNG water to one on-channel impoundment (WY0052407).

This project would not contribute to the impairment of any 303(d) listed waters. There are several reasons for this, including (1) the proposed discharge is small relative to the river at the point of discharge (2,500 gpm + 1,700 gpm = 3,300 gpm = 7.3 cfs = 4.1% of flow at LMM), (2) flows below the dam are controlled by reservoir releases, and (3) 142 miles of tributary inputs and irrigation removals (especially the 12 Mile Dam). The impaired waters in the Tongue River watershed that would be affected by this project are listed due to a lack of flow or due to nutrient enrichment. The MPDES permits specifically analyzed the nutrients to be discharged, and found them to be acceptable under the federal Clean Water Act and the Montana Water Quality Act. In addition, even if this project did cause a measurable increase in flow, the listings are because of decreased flows so this project would not be adding to the impairment.

EC and SAR are primary constituents of concern with CBNG discharges (MDEQ, 2003); therefore, the discussion in this document will focus on these parameters. Prior to the issuance of MPDES permits analysis of all constituents for which surface water quality criteria have been developed are conducted. These analyses are included in the MDEQ's supporting documents (Statement of Basis and Fact Sheet).

Increases in sediment delivery are a potential concern from the disturbances which would result from CBNG activities. Existing activities which contribute to sediment levels in local surface waters include existing disturbance from CBNG development, the Decker and Spring Creek coal mines, and grazing. CBNG disturbance contributes sediment due to disturbance, and this erosion remains elevated until vegetation becomes reestablished. The disturbance from CBNG is permitted under a general storm water permit. The coal mines contribute to sediment levels due to the substantial disturbance associated with their mining activities. These disturbances are regulated by individual storm water MPDES permits established for the mines. Grazing contributes to sediment loads since it results in lower levels of litter and standing plants (particularly grasses) which historically were responsible for protecting the soil from rain drops and wind, and which filtered runoff. Grazing in riparian zones can also cause changes in riparian vegetation, and trampling of stream banks, which increases the susceptibility of the banks to erosion. The Tongue River Reservoir also affects sediment levels since it traps much of the sediment behind the dam. Sediment levels in the Tongue River at the State Line measured from 2000 – 2007 averaged 54 mg/L (n=104); with the range being from 3 to 697 mg/L. Sediment levels in the Tongue River below the dam measured from 2000 – 2007 averaged 12 mg/L (n=53); with the range being from 1 to 43 mg/L.

EC is the ease with which electric current will pass through a water sample, and it is proportional to the salinity of the sample. The units used for the EC of a water sample are microSeamens per centimeter (uS/cm). SAR is a complex ratio of sodium to calcium and magnesium, and is an important parameter for determining the utility of water for irrigation due to potential impacts on clay rich soils. Since SAR is a ratio, it is unitless. EC and SAR are the primary factors that determine the usability of water for irrigation, and irrigation is the use that has been determined to be most sensitive to CBNG inputs (MDEQ, 2003).

A USGS Gaging Station is located on the Tongue River between the state line and the reservoir (Tongue River at State Line), and data from this station should be representative of the reach of the Tongue River in Montana above the reservoir. A USGS Gaging Station is located immediately downstream of the reservoir (Tongue River below Dam), and data from this station should be representative of the mixing effects within

the reservoir. A USGS Gaging Station is located at the Birney Day School Bridge (Tongue River at Birney

Day School), and data from this station should be representative of this reach of the Tongue River, and provide for comparison to the Northern Cheyenne Surface Water Quality Criteria.

Recent and historical water quality and flow data can be used to model historical, existing, and future water quality at a variety of different flows. This is necessary since natural EC and SAR levels are inversely related to flow (i.e. high EC and SAR values during low flows). Due to this relationship between flow and water quality it is important to be able to compare water quality values at comparable flows. Since monitoring data are rarely collected at exactly the same flow modeling is needed to back out these flow effects. Upstream of the reservoir, the modeled results are based upon simple mixing with historical water samples collected between May, 1994 and September, 1995. This time period was chosen because of the relative abundance of data which was available for this time period. Resultant SAR values are calculated from the resultant Na, Ca, and Mg values. The resultant SAR and EC values are then graphed vs. flow, and used to extrapolate water quality values at the flows in question (low mean monthly flow (LMM), high mean monthly flow (HMM), and 7Q10 flow (a statistical value indicating the lowest flow that would be anticipated to occur for seven consecutive days over any 10 year period)). The resulting values are adjusted by a constant correction factor to adjust for the difference between the historical record for this site up to September, 1999, and the shorter data set used for this analysis. These constant values were determined by comparing the extrapolated values from the model with no CBNG inputs to extrapolated data using Pre-September, 1999 data. All CBNG discharges above the reservoir were added at this station and mixed.

Below the dam, the resultant water quality data are based upon the inputs from upstream of the reservoir from May, 1994 to September, 1995 being mixed with the coal mine discharges into the reservoir during this time, and complete mixing in the reservoir. The effect of the reservoir is to moderate the variability of water quality (i.e. the water quality at the State Line station above the reservoir is more variable than the water quality at the station below the Tongue River Dam). This approach is supported by the historical record of water quality above and below the reservoir. This approach does not take into account evaporation, infiltration, or chemical reactions in the reservoir. A constant correction factor which was determined from the difference between the extrapolated values from Pre-September, 1999 data, and the results from using the shorter data set for this analysis was also applied to these results.

The water quality at Birney Day School was determined by adding the historical increase in EC and SAR, at the flows in question, between the station below the Dam and the station at Birney Day School to the results from below the Dam. This constant correction factor also serves to adjust for the difference between the extrapolated values from the Pre-September, 1999 data at this site to the results from the shorter data set used in this analysis.

In 2003 the Montana Board of Environmental Quality determined that permitting in relation to EC and SAR should be flow based. This requirement has since been repealed; however MT-0030457 and MT0030724 needed to be flow based. MDEQ determined that the most reasonable way to conduct the flow based analysis is by separating the water year into 3 segments (Winter-November to February; Spring-March-June; and Summer-July-October), and conducting independent statistical analysis for each of these segments. Through this approach a "seasonal 7Q10" is determined for each segment of the year, and allowable discharge is calculated using these values. Under the MT0030457 permit (untreated) 2,500 gpm could be discharged in the winter; 2,375 gpm in the spring; and 1,600 gpm in the summer. Similarly, under MT0030724 the volume that can be discharged is constant throughout the year; however the effluent limits vary by season (see above). For this reason three sets of models were conducted for each scenario in this analysis; one for each season. A summary of modeled historical (Pre-CBNG) flow, EC and SAR values are provided in Table 3.4.1-1. A summary of the modeled existing conditions, assuming that the current discharge rates occur in all seasons, are provided in Table 3.4.1-2.

Table 3.4.1-1: Historical Conditions

	Flow Conditions	Historical-Winter			Historical-Spring			Historical-Summer		
		Flow (cfs)	EC (uS/cm)	SAR	Flow (cfs)	EC (uS/cm)	SAR	Flow (cfs)	EC (uS/cm)	SAR
Tongue River at State Line	7Q10	76	972	0.87	118	805	0.74	36	1341	1.15
	LMM	171	686	0.64	297	541	0.52	167	693	0.65
	HMM	217	619	0.59	1580	264	0.28	436	459	0.45
Tongue River Below Dam	7Q10	75	799	0.95	86	773	0.92	57	855	1.01
	LMM	168	655	0.79	216	616	0.75	263	586	0.71
	HMM	245	597	0.73	1400	388	0.49	559	487	0.60
Tongue River at Birney Day School	7Q10	74	978	1.38	85	931	1.32	48	1136	1.59
	LMM	166	738	1.05	215	674	0.97	224	665	0.95
	HMM	202	689	0.99	1110	381	0.56	530	493	0.72

Table 3.4.1-2: Modeled Existing Conditions

	Flow Conditions	Modeled Existing-Winter (1430_1046 gpm)			Modeled Existing-Spring (1430_1046 gpm)			Modeled Existing-Summer (1430_1046 gpm)		
		Flow (cfs)	EC (uS/cm)	SAR	Flow (cfs)	EC (uS/cm)	SAR	Flow (cfs)	EC (uS/cm)	SAR
Tongue River at State Line	7Q10	83	1013	1.28	125	836	1.04	43	1336	1.66
	LMM	178	719	0.89	304	562	0.68	174	721	0.88
	HMM	224	648	0.81	1587	269	0.32	443	475	0.58
Tongue River Below Dam	7Q10	81	828	1.23	92	791	1.16	63	871	1.29
	LMM	174	681	0.99	222	634	0.91	269	603	0.86
	HMM	251	620	0.90	1406	397	0.55	565	500	0.70
Tongue River at Birney Day School	7Q10	80	1006	1.66	91	949	1.56	54	1152	1.87
	LMM	172	764	1.26	221	692	1.13	230	682	1.10
	HMM	208	712	1.16	1116	390	0.62	536	506	0.82

Values in parentheses represent the rate to be discharged under MPDES permit MT-0030724 (treated)followed by the amount to be discharged under MT-0030457 (untreated).

Other discharges accounted for include the Wyoming treated (600 gpm) and untreated (225 gpm) discharges, and discharges from the Coal Mines (variable).

The maximum calculated change in water quality relative to historical conditions occurs during the winter. The modeled existing conditions during winter LMM flows at the Birney Day School station show a 3.6% increase in flow, a 3.5% increase in EC, and a 19.2% increase in SAR relative to historical conditions. The modeled winter conditions at 7Q10 flows show 8.1% increase in flow, a 2.9% increase in EC, and a 20.2% increase in SAR relative to historical conditions.

Monitoring data indicates that since the start of CBNG production in the Tongue River Watershed (~ September 1999) "…flow corrected SC is decreased and flow corrected SAR is increased…" however the increase in flow corrected SAR is "…due to the decreased Ca and Mg (since SAR is a ratio)" (Bobst, 2007). As such, there has not been a noticeable change in surface water EC or SAR values attributable to CBNG production. Figure 3.4.1-1 below, which shows a comparison between pre and post September 1999 monitoring data from the Tongue River at the State Line further supports the lack of a noticeable change in surface water quality. This suggests that the surface water model used for this analysis is somewhat conservative (i.e. it overestimates impacts).

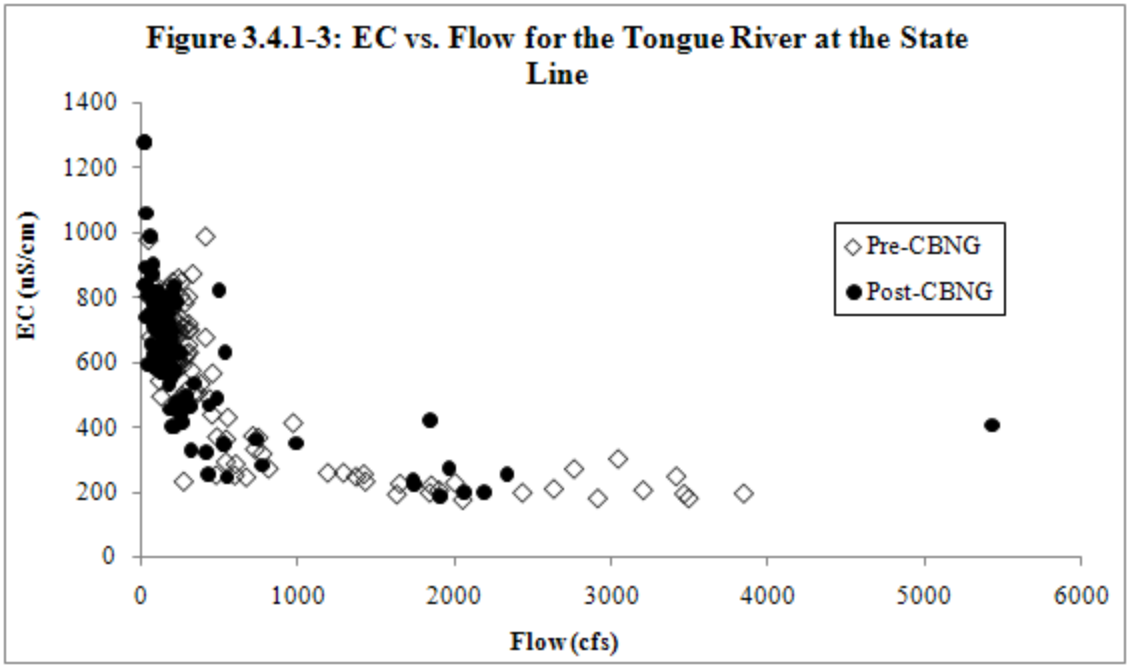

Figure 3.4.1-3 shows monitoring data for electrical conductivity (EC) vs. stream flow in the Tongue River at the State Line (USGS Station 06306300). Data are displayed as Pre-CBNG or Post-CBNG with September 1999 being the break between the two. The two data sets overlap, indicating that there is not a noticeable change in surface water quality, and that the surface water model used in this analysis is somewhat conservative.

Prior to issuing the MPDES permits that would be used for this project; an analysis was conducted by the MDEQ in relation to all surface water quality criteria in place at that time, including non-degradation. The Montana Board of Environmental Review (BER) established surface water standards for EC and SAR in 2003. These numerical standards have been reviewed and approved by the EPA, and therefore have Clean Water Act standing. In 2006, the BER modified the standards for EC and SAR. The most substantial changes adopted by the BER were to designate EC and SAR as "harmful" parameters, and to remove the requirement that permitting in relation to EC and SAR be flow based. These changes have been approved by the EPA, and it would be used for any new permits; however MPDES permits MT0030457 and MT0030724 were written prior to these modifications. Non-degradation analysis is conducted only for new or increased sources including discharges from permitted facilities which may cause degradation or a change in water quality. If a discharger has a permit to discharge at a specified level (load) and it is not a new or increased source, non-degradation does not apply. MDEQ reviews the available data, both ambient and effluent Discharge Monitoring Report (DMR), at renewal to ensure the facility is in compliance with the current limits and non-degradation requirements considered in the original permit issuance (T. Reid, personal communication, 6/24/08). Non-degradation criteria do not apply in-stream for assessing standards attainment, but rather serve as a trigger during the permitting process. The MDEQ non-degradation requirements for harmful parameters allow for a 10% increase in a parameter outside of a mixing zone, as long as existing water quality is less than 40% of the numerical standard. Monitoring data indicates that EC and SAR values in the Tongue River are typically greater than 40% of the numerical standards. As such, it is unlikely that any new or increased discharges which would increase in-stream EC or SAR would be approved by the MDEQ without an authorization to degrade.

The Northern Cheyenne Tribe adopted surface water quality standards for EC and SAR in 2001. The Northern Cheyenne Tribe has been granted "Treatment as a State" status by the EPA; however, the EPA has not approved their standards. As such, the Northern Cheyenne numerical standards do not have Clean Water Act standing. These standards do set out the Tribe's considered determination of the water quality needed to protect irrigated agriculture on the Reservation (Greystone and ALL, 2003), 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. The Northern Cheyenne's non-degradation criteria apply to all numerical standards. Non-degradation criteria do not apply in-stream, but rather serve as a trigger during the permitting process. The Northern Cheyenne's non-degradation requirements allow for a 5% increase in a parameter per permit, with the cumulative change being limited to the numerical standards. Monitoring data indicates that EC and SAR values in the Tongue River are typically less than the numerical standards. As such, some new or increased discharges which would increase in-stream EC or SAR could be approved under the Northern Cheyenne non-degradation criteria. If the Northern Cheyenne standards are approved by the EPA under the Clean Water Act both the numerical limits and the non-degradation criteria would need to be applied to upstream discharges. In their current form the Northern Cheyenne numerical standards are more stringent than the MDEQ numerical standards; however the non-degradation criteria would be less stringent. These various standards are summarized in Table 3.4.1-3.

Table 3.4.1-4: Surface Water 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[2]	3	4.5	1000	1500
MDEQ Non-Irrigation Season[1] Standards	5	7.5	1500	2500
Northern Cheyenne Irrigation Season[1] Standards; Southern Boundary	---	2	1000	2000
Northern Cheyenne Non-Irrigation Season[1] Standards; Southern Boundary	---	2	---	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.

2: The Irrigation Season standards apply to the portion of the Tongue River between the State Line and Tongue River Reservoir for the entire year.

For the purposes of this impact analysis, the high mean monthly (HMM) and low mean monthly (LMM) results are compared to the mean monthly standards, while the 7Q10 result are compared to the instantaneous maximum standards. The results from the analysis during the winter trimester will be compared to the non-irrigation season standards, while the spring and summer results will be compared to the irrigation season standards. The historical and modeled existing water quality meets all applicable water quality criteria established by the MDEQ and Northern Cheyenne for EC and SAR (see Tables 3.4.1.1, 3.4.1-2 and 3.4.1.3).

For more information regarding surface water, refer to the MT FEIS Chapter 3, Affected Environment, pages 3-22 through 3-31 (BLM, 2003), the Water Resources Technical Report (ALL, 2001), the Surface Water Quality Analysis Technical Report (SWQATR) (Greystone and ALL, 2003), and the 2006 Overview of Surface Water Monitoring Data for SC and SAR in the Tongue River Watershed (BLM, 2005; http://www.mt.blm.gov/mcfo/cbng/Tng_Rvr_06.pdf). Real time and historical monitoring data for the Tongue River are also available from the USGS at http://tongueriverm onitoring.cr.usgs.gov/index.htm.

3.4.2 Groundwater:

All of the coal seams proposed for development under the Decker Mine East POD are contained within the Tongue River Member of the Tertiary Fort Union Formation. The Tongue River member may contain 20 or more coal seams (Decker Mine East POD; Hydrogeology section). Four coal seams are proposed for development in this POD; the Dietz, Monarch, Carney, and Wall. The Dietz seam may be split into up to three beds (D1, D2 and D3). Different nomenclature is sometimes used to identify these coals; the D1 is also called the Anderson, the D2 is also called the Upper Dietz, the D3 is also called the Lower Dietz, the

Monarch is also called the Canyon, and the Carney is also called the Cook. Artesian pressure within these coal seams may range from 50 to 600 feet above the top of the seams, with pressure increasing with depth (Wheaton and Metesh, 2002). Fidelity plans to develop these coal seams using a "mono-bore" approach where the well bore would be drilled 40-50 feet below the base of the deepest coal (the Wall for this proposal), then a 7-inch steel casing would be cemented in place from the total depth (TD) to the surface. This casing would be perforated in each of the potentially producing coal seams. Anticipated well depths would vary from approximately 550 to 1,090 feet deep. Of the 14 proposed federal CBNG wells, 12 would be perforated in the D1 and D2 coal seams, and all 14 would be perforated in the D3, Monarch, Carney, and Wall coal seams. These wells would be drilled from locations, which vary in elevation from 3,518 to 3,827 feet above mean sea level (ft-amsl).

When CBNG is produced groundwater is pumped to reduce the hydrostatic head within the coal seam which allows the methane to desorb from the coal surface and flow to the well. Based upon historical data from the CX field, initial water production rates are anticipated to be approximately 5 gpm per produced coal seam. As such, each well is anticipated to produce approximately 24 gpm initially. The rate of water production per well decreases over time as the pressure within the aquifer is reduced over an increasing geographic area. For this POD a 20% decline rate per year is assumed.

Any drawdown that occurs within the developed coal seam would primarily affect that coal seam, and would not noticeably affect overlying or underlying formations. The coals within the Tongue River member of the Fort Union formation are typically bounded by clay rich strata, and as such the vertical hydraulic conductivity above and below these units are very low (Wheaton and Donato, 2004a). Wheaton and Metesh (2002) have noted that "Even a very small vertical hydraulic conductivity value can have a very strong effect. However, based on conditions near Decker, vertical leakage from units near ground surface is thought not to be a major factor. There, drawdowns in coal beds pass un-interrupted beneath perennial streams (Squirrel Creek and Tongue River) and the associated alluvial valley floors. Water-table levels in the alluvium and a shallow sandstone unit have not responded to coal-mine induced drawdown."

The Montana Bureau of Mines and Geology (MBMG) maintains the Groundwater Information Center (GWIC) database of known wells, springs, and borings in Montana (http://mbmggwic.mtech.edu/). Under current Montana law, drillers are required to provide well logs to MBMG or indirectly to DNRC for all wells drilled within 60 days of drilling the well. The MBMG GWIC database is used to determine the wells or springs which are located within the existing and potential drawdown areas.

Groundwater monitoring to determine the magnitude and geographic extent of drawdown related impacts from CBNG development is ongoing. The Montana Bureau of Mines and Geology (MBMG) is conducting this monitoring with support from the BLM, USFS, the Big Horn Conservation District, and the Montana Department of Natural Resources and Conservation. MBMG prepares an annual report interpreting these monitoring results. The most recent report (Wheaton et al., 2008) indicates that "After nearly 9 years of CBM production, drawdown of up to 20 ft has been measured in the coal seams at a distance of roughly 1 to 1.5 miles outside the production areas. These values have not changed substantially since 2004. These distances are similar to but somewhat less than predicted in the Montana CBM environmental impact statement." (Wheaton et al., 2008). This report is incorporated by reference. This magnitude of drawdown is also thought to be appropriate for estimating drawdown from coal mines. Since the observed drawdown values developed within a couple of years of CBNG wells being installed, and have not substantially changed for the past several years, it is believed that the 1.5 mile drawdown radius is an appropriate, if somewhat conservative, value to use for existing and foreseeable drawdown from CBNG development in this area.

From a cumulative perspective, given that CBNG wells and coal mines are anticipated to result in a 1.5 mile drawdown radius, only those activities which occur within 3 miles of the proposed DME wells would have the potential to have impacts which overlap with the impacts of the DME wells to create cumulative impacts. As such, this analysis only includes those activities within 3 miles of the proposed DME wells. Activities included in this 3 mile buffer include the West Decker Coal Mine, East Decker Coal Mine, and 392 CBNG wells in Montana (see Figure Hydro-1 in the Hydrology Appendix). Active CBNG

development in Wyoming is too far removed from the DME development to have overlapping drawdown effects.

The 1.5 mile value is used to buffer the West Decker and East Decker coal mines, and active CBNG wells within 3 miles of the proposed DME wells in order to estimate the total area of drawdown of 20 feet or more that will result from existing activities in this area. It is estimated that the current level of development (coal mines and CBNG) will result in a maximum drawdown area of 97.8 square miles (mi^2) in size (see Figure Hydro-2 in the Hydrology Appendix). According to MBMG's GWIC database, there are 50 drinking water or stock water supply wells and 3 springs within this area. These water sources are summarized on Table Hydro-1.

Monitoring will be the key to determining if actual impacts are occurring. Monitoring wells are in place in this area, and they are being monitored by the Montana Bureau of Mines and Geology. MBOGC Order 99-99 also requires the monitoring of potentially affected water sources by CBNG operators. Fidelity has prepared and submitted annual groundwater monitoring reports to the Technical Advisory Committee (TAC) as required by MBOGC Order 99-99.

Fidelity has certified that, in compliance with MBOGC Order 99-99, executed water mitigation agreements are in place with the owners of all wells or springs within 1 mile of the proposed federal wells. This Order requires that operators offer water mitigation agreements to owners of water wells or natural springs within one mile of a CBNG field, or within the area that the operator reasonably believes may be impacted by CBNG production, whichever is greater, and to extend this area one-half mile beyond any well adversely affected. These mitigation agreements apply to any spring or well adversely impacted by CBNG development.

Wheaton et al. (2008) have noted that water levels in the Dietz coal seam near the Tongue River Reservoir have historically responded to changes in reservoir stage. This indicates that there is a hydrologic connection between the reservoir and the coal seams. Wheaton et al. (2008) also show that the 5 foot drawdown contour is approaching the southern end of the Tongue River Reservoir. Lower hydrostatic pressure within the Dietz coal seam would cause leakage from the reservoir to the Dietz coal seam to increase. This leakage would not be likely to result in a noticeable change in reservoir stage since the rate of increased leakage is estimated to be approximately 1.5 gpm (BLM, 2006) while the maximum CBNG discharge from Fidelity's Tongue River CBNG project to the Tongue River would be approximately 3,800 gpm.

Fidelity proposes to use two existing lined off-channel impoundments in conjunction with the treatment plant. Impoundment 34E-3490 has been constructed with a capacity of 13 acre-feet and provides backup storage when treatment system interruptions occur. Impoundment Conner 12-3490 has been constructed with a capacity of 7 acre-feet and is located between the treatment plant and the outfall. The Conner pond is utilized for pH stabilization and suspended solid removal prior to discharge to the Tongue River. A MDEQ approved groundwater monitoring network has been implemented for these off-channel reservoirs under MPDES permit MT0030724.

For additional general information on groundwater, refer to 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 development is also available by logging into MBMG's online GWIC database (http://mbmggwic.mtech.edu/) and using the Ground-Water Projects link. The most recent CBNG groundwater monitoring report (Wheaton et al., 2008) is also available online (http://www.mbmg.mtech.edu/pdf-open-files/mbmg-576-CBM_AnnualReport2007.pdf).

3.5 LANDS AND REALTY

The Project area is composed of a mixed ownership of both the surface estate and mineral estate in T. 9 S., R. 40 E., Section 13 and the NE¼ of Section 24 and T. 9 S., R. 41 E., Sections 7, 8, 17, 18 and the N½ of Section 19 in Big Horn County, Montana. Ownership of the surface estate and mineral estate within the POD area is split between federal (BLM administered) and private. The surface and mineral (oil and gas)

acreages for the Decker Mine East POD are found in Table 3.6-1. There are five authorized rights-of-way (ROWs) on the proposed affected federal surface: 1) ROW MTM93705 was issued to Fidelity E & P for "off-lease" facilities for their Coal Creek POD in T. 9 S., R. 41 E., Section 19, SE¼NW¼; 2) ROW MTM93792 was issued to Powder River Energy Corp. for a power line for Fidelity's PODs in T. 9 S., R. 41 E., Section 17, NW¼SW¼ and Section 19, Lot 6 and SE¼NW¼; 3) ROW MTM51684 was issued to Powder River Energy Corp for a power line in T. 9 S., R. 41 E., Section 17, W½SW¼; 4) ROW MTM49847 was issued to Big Horn County for a road in T. 9 S., R. 41 E., Section17, NW¼SW¼ and Section 19, Lot 5; and 5) ROW MTM59302 was issued to Range Telephone Coop. for a buried telephone cable in T. 9 S., R. 41 E., Section 17, NW¼SW¼ and Section 19, Lots 5 and 6. A new right-of-way, MTM98478, would be issued to Fidelity for the Decker Mine East POD for "off-lease" facilities in the NW¼SW¼, Section 17, T. 9 S., R. 41 E., P.M.M. The entire project area is within the Powder River Basin Known Coal Leasing Area (KCLA). There are no withdrawals or mining claims affecting the subject federal land.

Table 3.5-1 Decker Mine East POD Surface & Mineral (Oil & Gas) Ownership

Surface	Acres	Mineral (Oil & Gas)	Acres
BLM	229.33	BLM	1,363.73
Private	3,406.48	Private	2,272.08
Project Area Total	3,635.81	Project Area Total	3,635.81

3.6 LIVESTOCK GRAZING

Decker Coal Co. leases to one livestock operation within the Decker Mine East POD area. The livestock operation runs approximately 30 to 60 head, depending on the current year's available forage.

3.7 RECREATION AND VRM

Recreational use in the vicinity of the project area primarily comes from the Tongue River Reservoir. The reservoir attracts a large number of boaters and fisherman to the area and is located approximately 1 mile west of the project boundary. The Tongue River Reservoir receives between 80,000 – 100,000 visitors per year. Visitation has increased within the last 6 years and this trend is expected to continue. The major recreational use within the projects boundaries comes from the fall hunting season of big game; however this use is minimal due to limited public access. These and other recreational uses of the area are considered casual, because the public cannot access public land without private surface owner permission.

The visual resources landscape character, in the Decker area, is managed under a Class III Management objective. It is not unique in character, but the overall condition of the area is pastoral and rural, partially retaining the existing character of the landscape. Evidence of man is slight to moderate. Although non-federal land is not considered under any visual resource management system, the entire landscape is considered when assessing the management class. Activities of the Decker area that could modify the visual quality include the following: Decker Coal (including expansion), Spring Creek Coal (including expansion) and the Montana CBNG development (including the CX Field and the Powder River Gas-Coal Creek Project).

3.8 SOCIAL AND ECONOMIC CONDITIONS

The project areas are located in the southeastern corner of Big Horn County. The Decker Mine East POD is a few miles southeast of the Tongue River Reservoir, and just east of the East Decker mine. It is twelve miles east of the Crow Reservation, approximately twenty miles south of the Northern Cheyenne Reservation and thirty 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 2003 Statewide MT FEIS. A description of the social, economic and fiscal conditions in Sheridan and Sheridan County, Wyoming are found in the Affected Environment Chapter 3 of the 2003 Buffalo Field Office Plan Amendment FEIS. The proposed action is to drill and produce the Carney, Monarch and Dietz coal zones. The MBOGC reported natural gas production in Big Horn county in 2003 was 7,229,945 MCF (DNRC Annual Review 2003 Page 12-1), approximately 9 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 Mineral Management Service reported Big Horn County Federal gas production of 258,209 MCF in FY2001, latest data available, with royalty payments of $118,646.

3.8.1 Environmental Justice

(All data is based on the 2000 Census)
Big Horn and Rosebud Counties include Indian reservations with substantial Native American populations. In Big Horn County, where the project is located, the population is 60% Native American. This county includes most of the Crow Reservation and part of the Northern Cheyenne Reservation. Slightly over 30% 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 figure of 13% and reflect the relatively large numbers of persons on the reservations living in poverty.

3.9 SOILS

Soils within 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 (NRCS) according to National Cooperative Soil Survey standards. Pertinent information for analysis was included in Fidelity's POD from the published soil survey and the National Soils Information System (NASIS) database for the area. Information in the POD includes a soil map, general soils descriptions, official series descriptions, chemical properties, physical properties, rangeland productivity, plant communities and erosion related attributes.

The soils physical and chemical 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 and impacts were evaluated using the NRCS Soil Data Viewer ArcView extension using NASIS data.

Soils in the project areas 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 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 called clinker. Differences in lithology and resistance to weathering 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 or sandstone. Soils within the area are distributed according to differences in parent material - both residual and depositional, elevation, moisture, and topographic slope and position.

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 between 20 and 40 inches deep; these soils generally lie on residual upland plains and relatively gentle sideslopes.

Official Soils Descriptions for these series include taxonomy, horizon descriptions, range of characteristics and other information. Official Soil Descriptions are available in the POD or on line at: http://soils.usda.gov/technical/classification/osd/. Permeability, depth classes and drainage classes and other classifications are defined in National Soil Survey Handbook available at: http://soils.usda.gov/technical/handbook/.

Soil series potentially affected in the area include:

Allentine soils consist of very deep, well-drained soils that formed in alluvium. These soils are on terraces. Slopes are 0 to 8 percent.

Alice soils consist of very deep, well drained, moderately rapidly permeable soils on upland hillslopes and river valley terraces. They formed in moderately coarse textured alluvium and windblown material. Slopes range from 0 to 15 percent.

Arvada soils consist of very deep, well drained soils formed in alluvium and colluvium derived from sodic shale. These soils are on alluvial fans, fan remnants, fan terraces and hillslopes. Slopes are 0 to 25 percent.

Busby soils consist of very deep, well drained soils that formed in sandy alluvium, eolian material, or residuum derived from semiconsolidated sandstone. These soils are on stream terraces, alluvial fans, sedimentary plains, and hills. Slopes are 0 to 45 percent.

Cushman soils consist of well drained soils that are moderately deep to bedrock. These soils formed in slopewash alluvium and residuum from interbedded shales and siltstone and fine-grained argillaceous sandstone. Cushman soils are on buttes, fan remnants, hills, piedmonts, ridges and terraces. Slopes are 0 to 20 percent.

Fort Collins soils consist of very deep, well drained soils that formed in mixed eolian sediments and alluvium. Fort Collins soils are on terraces, hills, plains, and alluvial fans and have slopes of 0 to 10 percent.

Frazer soils consist of deep, well drained soils that formed in alluvium. These soils are on stream terraces. Slopes are 0 to 4 percent.

Haverson soils consist of very deep, well drained soils that formed in alluvium from mixed sources. These soils are on floodplains and low terraces and have slopes of 0 to 9 percent.

Heldt soils consist of very deep, moderately well drained, moderately slow to slowly permeable soils that formed in fine textured alluvium on fans, terraces and piedmonts. Slopes are 0 to 25 percent.

Hydro soils are very deep, well drained soils on terraces and footslopes. Slopes are 0 to 15 percent.

Hysham soils consist of deep, moderately well drained, moderately slow to slowly permeable soils developed in calcareous, very strongly alkaline alluvial of mixed mineral origin. These soils are on level to sloping alluvial fans and stream terraces with slopes up to 15 percent.

Korchea soils consist of very deep, well drained, moderately permeable soils that formed in stratified alluvium. These soils are on flood plains and low stream terraces and have slope ranging from 0 to 6 percent.

Lavina soils consist of shallow on upland bedrock plains with slopes of 0 to 30 percent. They formed in calcareous, fine-loamy, transported materials or residuum of mixed rock sources overlying hard sandstone.

Lismas soils consist of shallow, well drained soils formed in residuum weathered from clay shale on ridges and hills. Permeability is very slow. Slopes range from 3 to 100 percent.

Lohmiller soils consist of very deep, well drained soils formed in alluvium. Permeability is slow or moderately slow. Slopes range from 0 to 8 percent.

Mcrae soils consist of deep, well drained soils formed are in calcareous loam alluvium over sedimentary rocks. These soils are found on terraces of rivers and streams, alluvial fans in valleys and footslopes in the uplands. Slopes range from 0 to 12 percent.
Midway soils are shallow, well drained soils that formed in residuum and slope alluvium from calcareous platy shale. Theses soils formed on ridge crests, mesas, plains and hills in shale uplands. Slopes range from 0 to 40 percent.

Morton soils consists of moderately deep, well drained, moderately permeable soils that formed in material weathered from soft calcareous silty shales, siltstones and fine grained sandstones. These soils are on uplands and have slopes of 0 to 15 percent.

Nelson soils are moderately deep, well drained soils that formed in residuum from soft, calcareous sandstone. These soils formed on hill sides and ridges with slopes from 2 to 12 percent.

Olney soils consist of very deep, well drained soils that formed in eolian material. Olney soils are on hills and plains and have slope gradients of 0 to 15 percent.

Pierre soils are moderately deep, well drained soils formed in clayey residuum weathered from shale bedrock on uplands. Permeability is very slow. Slopes range from 0 to 30 percent.

Spearman soils are moderately deep, well drained soils formed in loamy materials weathered from underlying hard red clinker. Spearman soils are on nearly level to rolling uplands with slopes of 0 to 45 percent.

Renohill soils are well drained soils that are moderately deep to soft bedrock. These soils formed in alluvium, colluvium and residuum. Renohill soils are on bedrock controlled plateaus, hills and ridges. Slopes are 0 to 30 percent.

Terry soils consists of moderately deep, well drained rapidly permeable soils that formed in parent sediments weathered residually from underlying soft sandstone. Terry soils are on hills and ridges and have slopes of 0 to 30 percent.

Thedalund soils are moderately deep, well drained, moderately permeable soils formed in thick calcareous alluvial materials. Thedalund soils are on hills and ridges and have slopes of 0 to 30 percent.

Thurlow soils are very deep, well drained soils that formed in calcareous clay loam unconsolidated materials. These soils formed in valleys on river and stream terraces with slopes from 0 to 15 percent.

Travessilla soils are shallow to very shallow, well drained soils that formed in calcareous eolian sediments and material weathered from sandstone. These soils are on hills, cuestas, scarps and mesas with slopes ranging from 0 to 75 percent.

Wibaux soils consist of very deep, well drained soils formed in colluvium and alluvium derived from porcelanite. Wibaux soils are on hillslopes, knolls and ridges. Slopes range from 0 to 75 percent.

Winnett soils consist of deep, well drained soils that formed in alluvium derived dominantly from shale. Winnett soils are on alluvial valley floors with slopes from 1 to 3 percent.

Hydrologic groups range from A to C indicating low runoff potential, however rutting hazard is high due to low soil strength.

Fort Collins loam, 2 to 4 percent slopes, Haverson loam, 0 to 2 percent slopes are considered prime farmland if irrigated. There are no hydric soils in the area. There is no flooding or ponding hazard for these soils.

Impoundments:
Permeability, depth classes and drainage classes and other classifications are defined in National Soil Survey Handbook available at: http://soils.usda.gov/technical/handbook/.

Surface soils are described below for the existing impoundment. Soils are commonly described and characterized to five feet. While surface soils are a good indicator of subsurface lithology, further

investigation must occur to determine impoundment site suitability. Soil parent material in this region can change rapidly both horizontally and vertically. Impoundment suitability must ultimately be determined by excavation and analysis.

34E-3490
The existing impoundment, 34E-3490, was constructed in conjunction with the treatment facility; located on private surface. The impoundment is underlain by the Harvey soils, which is loam to gravelly loam with a depth greater than 60 inches. This soil has insufficient clay to limit subsurface infiltration and would require lining to prohibit infiltration of stored water.

12-3490
The existing impoundment, 12-3490, was constructed in conjunction with the treatment facility; located on private surface. The impoundment is underlain by the Olney soils, which is a fine sandy loam with a depth greater than 60 inches. This soil has insufficient clay to limit subsurface infiltration and would require lining to prohibit infiltration of stored water.

3.10 VEGETATION

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 Other species such as cheatgrass and Japanese brome (Bromus tectorum and Bromus japonicas) along with crested wheatgrass (Agropyron cristatum) are scattered throughout the site.* Differences in dominant species within the project area vary with soil type, aspect and topography. The vegetation has been influenced by factors such as grazing and fire.

There are no known threatened or endangered plant species in the project area. However, three plant species identified on the Montana Plant Species of Concern list have been recorded in outlying areas (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.

Habitat for Barr's milkvetch consists of heavy clay (gumbo) knobs, badlands, buttes, and barren hilltops. Typically there is sparse shrub cover and sometimes scattered ponderosa pine and Rocky Mountain juniper. Habitat for Nuttall's desert-parsley consists of open rocky slopes of sandstone, siltstone or clayey shale in open pine woodlands with sparse vegetation. Habitat for Woolly twinpod consists of sandstone outcrops, scoria-shale slopes with a sparse cover of ponderosa pine and Rocky Mountain juniper. Common species found in association with the three plant species of concern include blue bunch wheatgrass, western wheatgrass, big sagebrush and rabbitbrush (*Chrysothamnus spp.),* ponderosa pine, Rocky Mountain juniper. Habitat for all three plant species of concern exist in the project area. Surveys conducted by the Montana Natural Heritage Program indicate that these species do not occur predictably and regularly in apparently suitable habitat and that additional populations likely exist for all three species (Barton & Crispin, 2003).

3.10.1 Invasive Species

Noxious weed infestations were discovered by a search of inventory maps and/or databases or during subsequent field investigation by the proposed project proponent on the Decker Mine East Project. Leafy spurge (*Euphorbia esula*) is common in the area and is spreading rapidly. Currently occupying one known site, it is reasonable to expect this species could occur in other areas of the Decker Mine East Project. It is possible for any weed species to invade in any of the areas of surface disturbance.

3.11 WILDLIFE

Wildlife habitat within the Decker Mine East Project consists of ponderosa pine, juniper, mixed grasses, and various shrub species including big sagebrush and sumac. Topography generally consists of rough terrain in the uplands and transitions to open, gentle topography adjacent to Deer Creek. Deer Creek also provides some riparian habitat (see fisheries/aquatics section).

Current or historic land uses include ranching, hunting, and energy development. CBNG development has previously occurred in adjacent areas to the north, east, and south of the POD. In addition, a portion of this area has been previously mined for coal resources and reclaimed. These activities have been expected to reduce habitat suitability for some species of wildlife intolerant to these types of human activities, and will be discussed further in the impacts section.

Wildlife species and habitat surveys have been conducted throughout the project area from 2004 through 2008 by Hayden-Wing Associates (HWA). Other surveys that have been conducted in this area include raptor and prairie dog colony surveys (Greystone Environmental Consultants, 2004) big game surveys (MTFWP, 2008) and potential sage grouse nesting habitat (HWA, 2006).

3.11.1 Threatened and Endangered Species

No threatened or endangered species are known to occupy or utilize habitats in or adjacent to the POD.

The potential for black-footed ferret habitat within the project area has been assessed. According to United States Fish and Wildlife Service (USFWS) guidelines for determining suitable black-footed ferret habitat (USFWS, 1989), a black-tailed prairie dog complex suitable to support ferrets is defined as an aggregation of two or more neighboring prairie dog towns separated by a distance of less than 4.34 miles and totaling 80 acres or more. The combination of black-tailed prairie dog burrow site density per acre and the acreage of prairie dog towns within the project area have been determined as potential habitat for black-footed ferrets.

Surveys for black-footed ferrets have been conducted within a portion of Fidelity Exploration and Production Company's POD's. From July 16, 2003 through August 24, 2004, nine prairie dog colonies, totaling approximately 550 acres, were surveyed. No black-footed ferrets or their sign were observed during the surveys. (Hayden-Wing Associates, 2004) One of the nine prairie dog colonies surveyed, totaling 67.2 acres, is located within the Decker Mine East POD.

3.11.2 Big Game Species

Mule deer may be found year round in the project area. Approximately 320 acres in the northeast corner of the POD is located within identified mule deer winter range. Mule deer were not observed within this POD during winter season surveys for big game on January 9th, 30th, and February 19th, 2007 by HWA.

Spring surveys were also conducted in April, 2008 by MTFWP. The results from this survey include 39 mule deer distributed across 5 locations along the northern boundary of this POD (Windy Davis, personal communication)

In addition, spring surveys were conducted in 2004 and 2005, approximately 20 miles north of the project area, along 5 to 6 mile belts on both sides of the Northern Cheyenne Reservation boundary. This survey encompassed approximately 250 square miles and was designed to obtain mule deer estimates, although observations of other game species were also recorded. Within this survey area, the observed density of mule deer averaged approximately 1.0 per square mile (Mackie, 2004). Densities varied locally from less than 1.0 to 3.0 per square mile. Comparatively similar observations were recorded in 2005.

A total of 51 pronghorn were observed within the POD at three locations during the February 19th survey. Pronghorn winter range has not been delineated in this area.

The entire Decker Mine East POD is considered to be located within the basic distribution range of elk. Elk surveys were also conducted in the winter of 2007 in conjunction with the other big game species, and none were observed.

White-tailed deer use the Tongue River corridor and associated side drainages with preferred habitat. Approximately 160 acres of white-tailed deer winter range is identified in the southwest corner of the POD boundary; however, no wells or infrastructure are proposed within this polygon. Within the POD, preferred habitat for white-tailed deer is considered limited, although occasional use is possible.

Limited potential exists for other big game species to occupy these areas. These may include black bear, mountain lion, and moose, although most likely this would occur in transition to preferred habitats elsewhere.

The potential for big game movements or migrations through this area are not fully understood. At a local level, it is reasonable to assume mule deer may move seasonally from areas of higher elevation into low elevation winter range along the Tongue River Corridor.

3.11.3 Upland Game Birds

The Decker Mine East POD contains habitat for sage grouse, sharp-tailed grouse, and turkeys.

Two sage grouse leks considered "historic" (BI-12A, BI-13) are located within the POD boundary. No records of lek attendance at the BI-12A lek have been documented.

Due to mining activity in the 1970's, Decker Mine representatives re-established BI-13 at the current location of BI-14, approximately 1 ¾ miles to the southeast of the original lek, and ½ mile south of the POD boundary. Sage grouse were documented attending BI-14 until 1994. (John Berry, personal communication) The last known observation of lek attendance at BI-14 occurred in 2000, when 5 male sage grouse were observed. No other sage grouse leks are located within the Decker Mine East POD boundary; however, active leks exist approximately 6.4 miles east (BI-16), 7.14 miles SE (BI-26), and 8.74 miles east (BI-17). Other leks classified as inactive/historic have also been identified within several miles of the POD. The BLM recently delineated a polygon identified as "crucial sage grouse habitat" within the MT portion of the Powder River Basin. None of this polygon exists within this POD.

Potential sage grouse nesting habitat has also been identified within this POD. (Hayden-Wing, 2006) Approximately 30-40% of the vegetation within this POD consists of stands of sagebrush that would be considered suitable for nesting by sage grouse according to guidelines outlined in the Montana State Sage Grouse Working Group Management and Conservation Plan. (MSGWG, 2005)

Two active sharp-tailed grouse leks, (HW-1, HW-40) are located within the POD. In addition, one active sharp-tailed grouse lek, (HW-2) is located immediately adjacent to the POD boundary. The HW-1 lek contained a maximum of 8 males during 2007. The HW-40 lek is a new location created by 3 males that were observed strutting one time during the 2006 season. They were not observed attending this location in 2007. 10 males and 2 hens were observed attending the HW-2 lek. Several other sharp-tailed grouse leks of both active and inactive status are scattered across the area to the south and east.

Wild turkeys may also use some riparian and/or upland habitats within this area.

3.11.4 Raptors

The project area provides habitat for several species of raptors. Eight raptor nests have been documented within the Decker Mine East POD boundary. (HWA, 2007) Three nests were documented as active in 2007, including two red-tailed hawk nests and one great horned owl nest. Those nests considered inactive in 2007 include two burrowing owl nests, a red-tailed hawk nest, and two other "unknown" species. Other species that have been documented to nest within nearby adjacent areas include ospreys, golden eagles, and great horned owls.

The Tongue River corridor is considered important bald eagle habitat. Currently, the stretch of the Tongue River from just south of the Montana/Wyoming border up to Birney, MT supports five active bald eagle nests. Bald eagle nests have not been found within the immediate project area, although three bald eagle nests are located within a seven mile radius of the Decker Mine East POD. The closest bald eagle nest is located approximately 2.92 miles southwest of this POD.

Bald eagles also winter within the Tongue River corridor. From January 2003 through February 2008, flights have been conducted by HWA, Western Land Services, and BLM biologists to inventory potential winter roost sites and identify winter roost habitat. All or portions of the Tongue River from the Montana/Wyoming state line to Birney, MT has been the survey area. Up to 50 bald eagles have been observed along this stretch of the Tongue River.

Although no bald eagle nest sites or winter roost sites were identified within the Decker Mine East POD, this area may be used occasionally by bald eagles for foraging and during migration.

3.11.5 Prairie Dogs and Associated Species

The black-tailed prairie dog is a designated BLM sensitive species. Black-tailed prairie dog towns have also been documented to provide habitat for many other wildlife species including raptors, Bureau sensitive species, (mountain plovers and burrowing owls) endangered black-footed ferrets, and numerous other non-sensitive wildlife species.

According to HWA surveys, one black-tailed prairie dog colony is located within the Decker Mine East POD, totaling 62.7 acres in size. This colony is located on private surface.

One area of potential mountain plover habitat was identified within the Decker Mine East POD. Surveys were conducted within the POD in 2007, and no plovers were observed or heard. Surveys have also been conducted within Fidelity's POD's in 2004, 2005, and 2006. Mountain plovers have not been documented within this area since survey efforts began.

Surveys for mountain plovers have also been conducted on 29 colonies scattered across 12 townships in this portion of Big Horn County. In addition, potential mountain plover habitat was identified and evaluated. No plovers were documented during these efforts, and habitat evaluations suggest very little potential plover habitat exists (Greystone, 2004).

As stated in the raptor section, two burrowing owl nests have been identified within this POD. The last documented activity of these two nests occurred in 2004.

3.11.6 Migratory Bird Species

The Montana Natural Heritage Program conducted baseline bird surveys and identified 104 species of birds as inhabitants of this portion of southeast Montana, and another 55 species as probable/possible inhabitants (Carlsen and Cooper, 2003). The BLM commissioned 2 separate breeding bird surveys (unpublished reports by USGS and University of Montana) in the project area and surrounding areas in 2001 and 2003. In addition, migratory bird surveys were again conducted within selected habitats in adjacent areas in 2007. This ongoing survey documented 70 migratory bird species in the survey areas. Those migratory bird species of concern identified during survey efforts include sage thrashers and Brewer's sparrows. Brewer's sparrows have been documented within the POD. (MTNHP, 2008) Appendix B includes a summary of all Montana BLM bird species of special concern, including analysis of potential habitat and possible occurrences of these species in the project area. These may include, but not limited to, ferruginous and swainson's hawks, hairy woodpecker, loggerhead shrike, and others (see Appendix B).

3.11.7 BLM Sensitive Species

BLM uses the term Special Status Species (SSS) 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. Each BLM State Director has the authority to identify a list of state Sensitive Species for which additional management concern is directed. The Montana/Dakotas Sensitive Species List was issued July 28, 2004 (Instruction Memorandum No. MT-2004-082).

In addition to those species discussed above (prairie dogs, eagles, burrowing owls, sage grouse, sage thrashers, brewer's sparrows.) there are several BLM sensitive species of mammals that may occur in the

area, but most 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 SSS-listed species.

3.11.8 West Nile Virus

West Nile Virus (WNV) is a mosquito-borne disease that can cause encephalitis and other brainstem diseases in humans and a major impact on vertebrate wildlife populations. WNV has been identified as a mortality factor in a sage grouse population in the Powder River Basin, as well as in other areas. WNV is spread when mosquitoes feed on infected birds, and then people and 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 4 days. Surface water availability has increased with CBNG development in the Powder River Basin, which includes the proposed project area. WNV has been identified in mosquitoes trapped in and around CBNG produced water reservoirs in the vicinity of 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 irrigation practices adjacent to the Tongue River, stock water reservoirs and troughs, natural wetlands and various environmental influences.

3.11.7 Fisheries/Aquatics

The main streams and rivers within the Decker Mine East POD and associated water management areas (i.e. – discharge, reservoirs, and irrigation) include the Tongue River upstream of the reservoir, Coal Creek and Deer Creek. All of these streams contain aquatic species. The Tongue River Reservoir is located directly downstream of water discharge sites on the Tongue River. Coal Creek and Deer Creek flow into the Tongue River Reservoir. Other intermittent and ephemeral streams are located within the project area, but for the most part; do not contain aquatic dependent species, except for a few isolated springs and reservoirs.

An amphibian and reptile baseline survey was conducted within the project area by Maxim Technologies (2005). Sensitive aquatic species found included the northern leopard frog, spiny soft shell, and Great Plains toad. Other sensitive species, snapping turtle and Plains spade foot, are known to or may exist in the project area. In addition to the above aquatic species, there are other amphibians and aquatic invertebrates that are common in and along the Tongue River and many of its tributaries.

The amphibian and reptile baseline survey (Maxim Technologies, 2005) found no apparent relationship between water quality parameters and amphibian and reptile detections from the data collected. Higher pH and EC values for certain sample sites did not appear to preclude the presence of herptiles. However, the six sites that were chosen as exhibiting high-quality structural or vegetative habitat characteristics, such as shallows and good vegetative cover, exhibited: the highest diversity of aquatic species, the widest range of life stages, and the most individuals. Conversely, sites that were lacking these high quality characteristics produced fewer, and sometimes zero, herptile observations. This suggests that wetland structure and vegetative cover may currently be as strong an indicator of herptile presence and population viability as water quality parameters within the study area. However, insufficient water quality and quantity data was collected to assess any effects of water quality on herptiles within the study area. Future baseline monitoring will be conducted in 2008 by Montana Natural Heritage.

Tongue River (upstream of the reservoir): The Tongue River upstream of Tongue River Reservoir supports a major recreational fishery. Key species include smallmouth bass, sauger, channel catfish, white and black crappie. There were 21 fish species identified in the river upstream of the Tongue River Reservoir (RM 200.7 to RM 224.1) through electro shocking from 2003 – 2006 (refer to: http://maps2.nris.state.mt.us/scripts/esrimap.dll?name=MFISH&Cmd=Main&Pck=Stream&Sel=False&Inst=254349&WCmd=Stream&Trb=Yellowstone+River&Str=Tongue+River). The sauger is the only

sensitive fish species within and immediately downstream of the project area. According to MT FWP biologist Vic Riggs (2008), the sauger population continues to persist in the river upstream of the reservoir. However, downstream of the reservoir (no fish passage occurs upstream of the Tongue River dam), the sauger population has been dwindling. The cause for this population decrease could be a variety of factors, which may include drought, fish migration barriers, irrigation withdrawals, hybridization, etc. New efforts are occurring to alleviate fish migration barriers. A bypass channel has been created around the T&Y irrigation diversion dam and MT FWP is currently working on removing 2 other irrigation diversion barriers on the Tongue River.

Sampling for aquatic invertebrates was completed by the USGS on the Tongue River at the state line (upstream of the reservoir) in 2003. The Tongue River at the State Line site consisted of Ephemeroptera (62%), Miscellaneous Diptera (aquatic flies) (12%) and Coleptera (aquatic beetles) (11%).

Macro-invertebrates, fish, periphyton, instream habitat, and riparian habitat were surveyed for existing baseline condition at two sites on the Tongue River (in between the reservoir and the state line) on July 26-27, 2004, (Confluence Consulting, Inc, 2006). These two sites are located on the Tongue River at the state line (T. 9 S., R. 40 E., Section 31) and Tongue River near Badger Creek (T. 9 S., R. 40 E., Section 27). The survey noted that both sites indicated good conditions. Macro-invertebrate sampling indicated slight impairment and was rated (good) according to Wyoming bio criteria. The Tongue River at the state line site consisted of: Ephemeroptera (mayflies) (60%), Miscellaneous Diptera (aquatic flies) (3%), Coleptera (aquatic beetles) (15%), and Tricoptera (caddis flies) (20%). The Tongue River at Badger Creek consisted of: Ephemeroptera (50%), Miscellaneous Diptera (21%) and Coleptera (4%), Tricoptera (23%). The summary determination for rating streams (BLM, 1998) indicated that the above sites surveyed were functioning at risk in an upward trend. The upward trend was evident through revegetating streambanks and new shrub/tree recruitment. The impacts that attributed to the functioning at risk rating were unstable streambanks and lack of riparian vegetation in some areas.

USGS (2005-2007) has continued to sample the Tongue River upstream of the reservoir for fish, macro-invertebrates and habitat. This data is preliminary and under scientific review and will not be final until 2009. However, the fish data above includes USGS sampling surveys.

Tongue River Reservoir: The Tongue River Reservoir is located directly downstream of current discharge. Key species include black crappie, white crappie, walleye, smallmouth bass, largemouth bass, sauger, northern pike, and channel catfish. Twenty fish species have been identified (refer to: http://maps2.nris.state.mt.us/scripts/esrimap.dll?name=MFISH&Cmd=Main&Pck=Stream&Sel=False&Inst=254349&WCmd=Stream&Trb=Yellowstone+River&Str=Tongue+River) in the reservoir.

FWP has completed fish population, abundance and diversity surveys on the Tongue River Reservoir for the past 40 years. Personal communication with Vic Riggs (2005) (MT FWP Fish biologist) indicated that there have been cyclic patterns in fish populations, abundance and diversity over the past 40 years. Currently, these cyclic patterns cannot be attributed to coal bed natural gas development or other activities within the Tongue River Watershed. Annual reports are available at MT FWP.

Coal Creek: Coal Creek is an intermittent stream with perennial pools (the stream may not always flow, but has perennial water in pools in some portions of the stream) and is a tributary to the Tongue River Reservoir.

Deer Creek: Deer Creek is an intermittent stream with perennial pools (the stream may not always flow, but has perennial water in pools in some portions of the stream) and is a tributary to the Tongue River Reservoir. General observations were conducted by the BLM on Deer Creek in March, 2005. The entire stream was walked within and downstream of the POD boundary. No official surveys were completed. Current land management within the POD boundary, prior to POD development, consists of ranching and the Decker Coal mine. A total of eight fords, one reservoir on an ephemeral draw, one windmill with trough, two culverts, one pipeline, and one blown-out dike across Deer Creek were located within the floodplain of Deer Creek. In addition, there were wells or test holes located in various locations within the floodplain, of which were distinguished by white plastic pipe and/or corrugated culvert placed vertically.

Contour spreader dikes were present within close vicinity to Deer Creek downstream of the residence, Ranch Holme. Riparian vegetation primarily consisted of sedges, rushes and cattails. However, there were a few locations with cottonwoods, Russian olive, box elder, snowberry, choke cherry, snow berry, and wild rose. There were approximately 3.5 stream miles of wetted channel within the Deer Creek North POD boundary in March of 2005 (which also includes a portion of Deer Creek that runs through Decker Mine East Pod boundary). Wetland plants and animal species present indicated that for the most part, the wetted portions do not completely dry up in the summer. Aquatic species observed were painted turtles and dead smallmouth bass. Further sampling from FWP (2005) indicated no fish species present. Therefore, the dead smallmouth bass found were most likely winter-killed.

Springs: The 20 foot drawdown contour that would be expected to result from existing CBNG fields and coal mines in this area contains three springs (see Section 3.4.2). These springs would only be affected if a substantial portion of their flow is obtained from the regional rather than local flow systems. It has been noted that most springs in areas of the PRB that have been surveyed obtain their water from local flow systems (Donato and Wheaton, 2004). Donato, T.A., and Wheaton, J.R., 2004, Spring inventory and other water data, Custer National Forest-Ashland Ranger District, Montana, MBMG OFR 493A. These springs have not been surveyed for aquatic species; however, it is reasonable to assume that various aquatic macroinvertebrates and amphibians use these springs to rear and reproduce.

Existing habitat and populations of aquatic species: The existing environment to fisheries/aquatics have occurred or may occur from the following current and past activities: Decker Coal Mine, Montana and Wyoming CBNG development, livestock grazing, agriculture/irrigation, Tongue River dam and reservoir, residential areas, and existing roads. Additionally, some of the influences to aquatic life have been natural; such as drought conditions, local geology, severe wildfire, and soil composition. These actions have occurred or are occurring in various degrees throughout the Tongue River Drainage, which influences the magnitude aquatic life is affected. These influences, although difficult to quantify in numerical terms, have had an effect on water quality, erosion and stream flow; which are identified as the parameters having the most potential to affect aquatic life. This results in most aquatic species being affected, creating the existing environment.