Chapter 4
ENVIRONMENTAL CONSEQUENCES

4.0 INTRODUCTION

This chapter presents the potential environmental, social and economic effects from the actions described in each Alternative in Chapter 2. This chapter is organized first by Alternative and then resource in the same sequence they were discussed in Chapter 3.

The duration of the possible effects is analyzed and described as either short-term or long-term. As defined in the MT FEIS, short-term is up to 5 years and long-term is greater than 5 years.

Cumulative effects analysis considers the possible effects from each Alternative in combination with other relevant cumulative activities presented in Section 2.3.

4.1 EFFECTS FROM ALTERNATIVE A – NO ACTION

- No approvals would be issued for the PODs, the existing situation would continue and no private and federal wells or associated infrastructure would be constructed.

4.1.1 Air Quality

Direct and Indirect Effects: As no wells would be drilled and no additional compressor stations would be constructed, no additional impacts would be expected to air quality in this area.

Cumulative Effects: No wells would be drilled and no additional compressor stations would be constructed, so impacts from this action would not be cumulative. The cumulative effects associated with existing and proposed facilities would be discussed in Alternative B, refer to the cumulative effects section contained in Section 4.2.1 of this EA to review the cumulative impact analysis.

4.1.2 Cultural Resources

Direct and Indirect Effects: No new impacts to cultural resources would occur if Alternative A is selected. Approximately 43 sites were recorded in 9,820.93 acres of inventory in the Deer Creek North POD and 142 Sites were recorded or updated in the Pond Creek POD inventory of 9,945.77 acres. Two sites in the Pond Creek POD would continue to be impacted from past methane developments where wells were drilled within site boundaries.

One site initially tested as part of the Dry Creek POD would also continue to be impacted. This site is in one of the existing access routes. The portion of the site in the impact zone is not considered a contributing element to the site. No sites would be impacted by in the Deer Creek North POD where no development has occurred. Two sites in the Pond Creek POD would continue to be impacted by existing CBNG developments. Two sites previously tested for the Dry Creek POD would also continue to have impacts. Sites and areas of Traditional Native American concern would continue to be vulnerable to impacts from other activities that might be approved in the project area.

Direct and Indirect Effects to Paleontological Resources: No direct or indirect effects would occur to paleontological resources if no development takes place.

Cumulative Effects: Direct Effects would continue to occur at previously impacted sites. One site is recommended as not eligible for listing on the National Register of Historic Places. Eligibility for the site in the road access is considered unresolved since most of the site was away from the area of impact and not affected by developments in the Dry Creek POD access. The third site is considered eligible for listing on the National Register of Historic Places under Criterion D of 36 CFR 60. The well is away from the intact portion of the site. The inventories of both PODs would add 19,766.70 acres of inventory and 185 new and updated sites to the BLM and Montana SHPO databases. Field inventory failed to identify 5 previously recorded sites each in the Deer Creek North and Pond Creek PODs. These sites appear to no longer exist on the ground through collection or may have been "misplotted" by their original recorders. No sites would be added to listings on the National Register of Historic Places. A total of 11 sites are recommended as

eligible for listing on the National Register of Historic Places. The MT FEIS (BLM 2003:4-37) under Alternatives B,C,D, and E predicted that 630 sites could be identified in Coal Bed Methane Developments. The results from the two PODs would represent approximately 29.4% of the predicted total number of sites. The MT FEIS also predicted that 120 to 170 sites would be eligible for listing on the National Register of Historic Places. The 11 eligible sites in the two PODs would contribute to this total. BLM would need to take into account the impacts of previous development when approving future projects on adjacent Federal oil and gas leases and design projects to reduce impacts and/or develop appropriate mitigation strategies. No cumulative impacts would occur to paleontological resources.

4.1.3 Geology and Minerals

Direct and Indirect Effects to Coal Bed Natural Gas: No CBNG would be produced in the project area under this Alternative because no permits would be approved by BLM or MBOGC. No additional methane migration or drainage situations would result because of the denial of these projects. Choosing this alternative would severely reduce the BLM's ability to resolve presently existing drainage situations that have developed as the result of the production of gas from adjacent fee or state wells.

Direct and Indirect Effects to Coal: No impacts would occur to the coal formations in the project area under this Alternative. In addition, the potential for development conflicts of coal vs. coalbed methane in the proposed development area would not occur.

Cumulative Effects: No CBNG would be produced from the project area under this Alternative. Additional CBNG would not be available for residential and industrial uses. No additional revenues would be generated by CBNG production to State, local and Federal governments under this Alternative. CBNG in certain parts of the project area could be drained by adjacent producing wells. The cumulative potential for coalbed methane and coal mining development conflicts would be reduced under this alternative, as additional development from these proposals would not be factored in. The methane migration and drainage as the result of previous approvals would continue.

4.1.4 Hydrology

Direct and Indirect Effects to Hydrological Resources

Effects to Surface Water-CBNG Water Discharges to Surface Waters: Under the No Action alternative, no additional water would be produced by the Deer Creek North or Pond Creek PODs; however increased discharge as the wells which were approved under the Dry Creek and Coal Creek PODs would result in total water production values which are greater than at present. The water balance for this alternative was developed by assuming that the Draft Flow Based MPDES permit (MT0030457) will be approved by the MDEQ with no major modifications. The produced water could be managed via the Flow Based permit and beneficial uses (industrial uses in the Springs Creek Coal mine, drilling, construction, dust suppression, and for stock and wildlife water). No treatment, additional impoundments, or irrigation areas would be required under this alternative. Projected water management practices under Alternative A are shown on Chart Hydro-1 in the Hydrology Appendix. The maximum total volume of discharge that would occur under this alternative would be 1,858 gpm of untreated discharge in the winter of 2005-06. The maximum discharge that would occur in the spring would be 1,684 gpm of untreated discharge in 2006. The maximum discharge that would occur in the summer would be 1,472 gpm of untreated discharge in 2006. As shown on Chart Hydro-2 in the Hydrology Appendix, these discharge values would be under the limits in the Draft MPDES Flow Based permit at all times.

Following the methodology described in Chapter 3, and discussed in greater detail in the EA and supporting documents for Fidelity's Coal Creek POD (BLM, 2005) the water quality in the Tongue River, which directly results from this alternative can be determined, as shown on Table 4.2.4-1.

Table 4.1.4-1: Alternative A: No Action-Direct Impacts

	Flow Conditions	Alt. A: No Action-Winter (1858_0 gpm)			Alt. A: No Action-Spring (1684_0 gpm)			Alt. A: No Action-Summer (1484_0 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	82	1026	1.47	124	848	1.16	41	1374	1.88
	LMM	181	718	1.00	309	562	0.75	176	718	0.94
	HMM	231	643	0.89	1603	267	0.34	455	470	0.60
Tongue River Below Dam	7Q10	75	845	1.42	75	842	1.39	76	837	1.34
	LMM	176	679	1.12	226	634	1.03	274	602	0.95
	HMM	255	617	1.01	1413	396	0.62	570	499	0.78
Tongue River at Birney Day School	7Q10	80	1016	1.82	79	1013	1.78	80	1006	1.73
	LMM	180	756	1.33	231	688	1.19	241	674	1.13
	HMM	216	706	1.22	1095	393	0.65	548	504	0.84

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

The results during LMM flows at the Birney Day School station show that vs. historical conditions there would be a 2.8% increase in flow, a 3.5% increase in EC, and a 25.5% increase in SAR. During 7Q10 flows there would be an 8.7% increase in flow, a 3.1% increase in EC, and a 28.9% increase in SAR.

These results can be compared to the MDEQ and Northern Cheyenne standards for SAR and EC (see Table 3.4.1-4). During HMM and LMM flows, the mean monthly standards are not exceeded, and during 7Q10 flows the instantaneous maximum standards are not exceeded. The results of this analysis indicate this alternative would not directly cause the beneficial uses of the Tongue River to become impaired due to either SAR or EC. Due to the decreasing rate of water discharge per well vs. time, these impacts would decrease with time and be primarily short term in nature.

A complete analysis of all parameters for which surface water quality criteria exist is conducted in conjunction with the issuance of MPDES permits by MDEQ (see Fact Sheet and EA for the renewal of MT0030457). The Draft EA for the Flow Based permit concludes that "Issuance of the permits ensures that standards for water quality will be met. Standards are protective of beneficial uses. Therefore impacts are minor and non-significant." (MDEQ, 2005). It should be noted that the MDEQ analysis looked at the impacts from both the Flow Based and Treatment permits discharging at the maximum allowable rates. As such, the MDEQ analysis is more conservative than the analysis in this EA. This is due to this EA considering the volume of water that would be discharged by the PODs in question rather than maximizing the permits. Since no standards are exceeded in the MDEQ analysis, none would be exceeded by this alternative. Therefore, it is not anticipated that the No Action Alternative will directly impair the beneficial uses of the Tongue River.

Effects to Groundwater-Pumping from Coal Seams: Under the No Action Alternative, no CBNG wells would be produced from the Deer Creek North or Pond Creek PODs. As such, there would be no direct impacts to groundwater levels as a result of the No Action Alternative, and the resulting drawdown area would be the same as existing conditions (see section 3.4.2 of this EA). A summary of these impacts is provided in Table Hydro-10, and a listing of the potentially affected wells and springs is provided in Table Hydro-12.

Those wells completed in the produced coal seam and are located within the potential drawdown area, would be anticipated to have decreased yields as a result of CBNG related drawdown. Those springs which emit from the developed coal seam and are located within the potential drawdown area would be anticipated to have decreased yields as a result of CBNG related drawdown. The greater the magnitude of drawdown (such as within the producing field), the greater the decreases in yield would be. Those wells not finished within the produced coal seam would not be anticipated to be affected by the CBNG pumping since the coal seams are typically confined aquifers. Similarly, the springs which do not emit from the

developed coal seam would not be affected by the CBNG production. Of those springs which have been surveyed most receive their water from local flow systems (Wheaton and Donato, 2004b, and 2004c). Resistant clinker deposits (shales which have been baked and broken by the burning of coal seams) are common along ridge tops in this area. When infiltrated water flows downward through the clinker and encounters the less permeable units below, springs at outcrop are common.

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 adversely affected water source. 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…" As such, 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. These agreements would cover monitoring wells as well as pumped wells. Although the terms of water mitigation agreements are to be "under such conditions as the parties mutually agree upon" (Order 99-99), the replacement of water required by these agreements is anticipated to take the form of reconfiguring existing wells, re-drilling wells, or drilling new wells. These measures would be effective for replacing water sources since drawdown from CBNG activity is anticipated to be confined to the coal seam aquifers producing CBNG and to only minimally affect other aquifers (such as sandstones) within the Tongue River Member of the Fort Union Formation. Any lost or diminished water sources would be anticipated to be replaced with a permanent source before the termination of the agreement. For monitoring wells it may be necessary to plug existing wells, particularly if they are venting methane, and replace them as needed to fulfill the purpose of the monitoring networks with which they are associated. This may include the installation of replacement wells which can be shut in, and have methane pressure within the casing monitored.

The groundwater modeling conducted in support of the MT FEIS anticipated that, for a hypothetical CBNG field with 1,082 wells producing for 20 years, the produced coal seams would recover 70% of their hydrostatic head within 5-12 years after the end of production. The exact radius of the drawdown cone, and the time required for the head to recover, would depend on the site specific aquifer properties, the precise timing of the pumping of each of the wells, and the overall nature of CBNG development in this region. For additional general discussion of the anticipated drawdown related impacts, see pages 4-61 to 4-63 of the MT FEIS, and the associated groundwater modeling reports (Wheaton and Metesh, 2001, Wheaton and Metesh, 2002).

Effects from Impoundments: Under the No Action Alternative, no additional impoundments would be constructed. As discussed in section 3.4.1, off drainage impoundment 23-0299 is an existing impoundment that could be used if storage is needed. It is not anticipated this impoundment will result in noticeable impacts to hydrologic resources.

Cumulative Effects to Hydrological Resources

Effects to Surface Water-CBNG Water Discharges to Surface Waters: Under the No Action Alternative, no produced water would be discharged from the Deer Creek North or Pond Creek PODs; however increased discharge as the wells which were approved under the Dry Creek and Coal Creek PODs would result in total water production values which are greater than at present. Additionally, under the cumulative impacts analysis the PRG Coal Creek discharge is assumed to discharge at its maximum allowable discharge of 2.5 cfs. All other existing discharges are accounted for by the Existing Conditions analysis (see Table Hydro-1 in the Hydrology Appendix). The same water balance for Fidelity's discharges as was used for the direct impacts analysis is used for the cumulative analysis.

Following the methodology described for the direct impacts analysis in section 4.1.4 of this EA the water quality in the Tongue River which cumulatively results from this alternative can be determined, as shown on Table 4.1.4-2.

Table 4.1.4-2: Alternative A: No Action-Cumulative Impacts

	Flow Conditions	Alt. A: No Action-Winter (1858_0 gpm)			Alt. A: No Action-Spring (1684_0 gpm)			Alt. A: No Action-Summer (1484_0 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	82	1026	1.47	124	848	1.16	41	1374	1.88
	LMM	181	718	1.00	309	562	0.75	176	718	0.94
	HMM	231	643	0.89	1603	267	0.34	455	470	0.60
Tongue River Below Dam	7Q10	77	844	1.44	77	841	1.41	77	835	1.37
	LMM	178	680	1.14	228	635	1.04	275	602	0.96
	HMM	257	618	1.03	1415	397	0.63	571	499	0.79
Tongue River at Birney Day School	7Q10	81	1014	1.84	81	1012	1.80	82	1004	1.76
	LMM	181	757	1.35	233	689	1.21	243	675	1.15
	HMM	217	707	1.23	1097	394	0.65	550	504	0.85

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

Under the Cumulative analysis the PRG discharge is assumed to be discharging at 2.5 cfs (1122 gpm).

The results during LMM flows at the Birney Day School station show when compared to historical conditions there would be a 3.6% increase in flow, a 3.6% increase in EC, and a 27.0% increase in SAR. During 7Q10 flows there would be an 11.1% increase in flow, a 2.9% increase in EC, and a 30.4% increase in SAR.

These results can be compared to the MDEQ and Northern Cheyenne standards for SAR and EC (see Table 3.4.1-4). During HMM and LMM flows the mean monthly standards are not exceeded, and during 7Q10 flows, the instantaneous maximum standards are not exceeded. The results of this analysis indicate this alternative would not directly cause the beneficial uses of the Tongue River to become impaired due to either SAR or EC. Due to the decreasing rate of water discharge per well vs. time, these impacts would decrease with time and be primarily short term in nature.

A complete analysis of all parameters for which surface water quality criteria exist is conducted in conjunction with the issuance of MPDES permits by MDEQ (see Fact Sheet and EA for the renewal of MT0030457). The Draft EA for the Flow Based permit concludes that "Issuance of the permits ensures that standards for water quality will be met. Standards are protective of beneficial uses. Therefore impacts are minor and non-significant." (MDEQ, 2005). It should be noted the MDEQ analysis looked at the impacts from both the Flow Based and Treatment permits discharging at the maximum allowable rates. As such, the MDEQ analysis is more conservative than the analysis in this EA. This is due to this EA considering the volume of water that would be discharged by the PODs in question rather than maximizing the permits. Since no standards are exceeded in the MDEQ analysis, none would be exceeded by this alternative. Therefore, it is anticipated the No Action Alternative will not cumulatively impair the beneficial uses of the Tongue River.

Effects to Groundwater-Pumping from Coal Seams: Under the No Action Alternative, no CBNG wells would be produced from the Deer Creek North or Pond Creek PODs. Those wells which have been approved but are not currently producing are considered to be reasonably foreseeable. As such, the existing drawdown would expand cumulatively even with no further approvals. This foreseeable drawdown area is shown on Map Hydro-3 in the Hydrology Appendix. The foreseeable drawdown area has an area of approximately 348 mi^2. According to MBMG's GWIC database and the USGS's NHD dataset, there are 29 domestic or public water supply wells, 26 stock wells, 13 industrial or irrigation wells, 16 wells for which the use is not known, 354 monitoring or research wells, 21 unused wells, and 8 springs within the foreseeable 20 foot drawdown contour. These springs and wells are shown on Map Hydro-3, summarized on Table Hydro-11, and listed on Table Hydro-14 in the Hydrology Appendix.

As discussed in the direct impacts section of this alternative, those wells and springs that derive their water

from the coal seams being developed, and are located within the potential drawdown area, would be anticipated to have decreased yields as a result of CBNG related drawdown. Aquifers other than the coal seams being developed would be anticipated to be only minimally affected. However Fidelity 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. As discussed in the direct impacts section, it is anticipated that the measures required by this order would be effective for replacing water sources.

The groundwater modeling conducted in support of the MT FEIS anticipated that, for a hypothetical CBNG field with 1,082 wells producing for 20 years, the produced coal seams would recover 70% of their hydrostatic head within 5-12 years after the end of production. The exact radius of the drawdown cone, and the time required for the head to recover, would depend on the site specific aquifer properties, the precise timing of the pumping of each of the wells, and the overall nature of CBNG development in this region. For additional general discussion of anticipated drawdown related impacts, see pages 4-61 to 4-63 of the MT FEIS, and the associated groundwater modeling reports (Wheaton and Metesh, 2001, Wheaton and Metesh, 2002).

Effects from Impoundments: Under the No Action Alternative, no additional impoundments would be constructed. As discussed in section 3.4.1, off drainage impoundment 23-0299 is an existing impoundment that could be used if storage is needed. It is not anticipated that this impoundment will result in noticeable impacts to hydrologic resources.

4.1.5 Indian Trust and Native American Concerns

Direct and Indirect Effects: There would be no impact to Indian Trust Assets. There would be no impact from exploration to air quality, and no produced CBNG waters from Federal wells would be discharged into the Tongue River. There would be no impact to cultural resources, plant or wildlife resources.

Cumulative Effects: There would be no cumulative impacts created by the Fidelity Pond Creek or Deer Creek North projects affecting Indian trust assets. The cumulative impact concerns expressed by the Northern Cheyenne Tribe for regional CBNG development activities and the non-energy related development projects on trust assets would continue as described in the MT FEIS.

4.1.6 Lands and Realty

Direct and Indirect Effects: There would be no direct or indirect effects from the No Action Alternative. Surface and mineral ownership would remain the same. No change in ownership would occur as a result of implementing this alternative. There would be no effect to the intent of the KCLA Classification.

Cumulative Effects: There would be no cumulative impacts which would affect the land and mineral ownership in the Project area under this alternative. Future proposed projects may require the issuance of BLM issued rights-of-way.

4.1.7 Livestock Grazing

Direct and Indirect Effects: There would be no change in the water available for livestock from CBNG-related activities.

Cumulative Effects: There would be no additional drilling or development; there would be no cumulative effects.

4.1.8 Recreation and VRM

Direct and Indirect Effects: Any recreational opportunities that may exist would not be affected by this alternative. Visual resources would be unaffected as there would be no changes to the characteristic landscape.

Cumulative Effects: Cumulatively, the recreation and visual resources would not be affected by this alternative. The recreational use of the Tongue River Reservoir and limited big game hunting would continue, with public access continuing to be limited. The past and present activities (mentioned in

Chapter 3) that have modified the landscape from the visual Class I or II would remain. Both the Decker and Spring Creek Coal Mines would continue with their individual expansion projects. The Montana CBNG development would continue to expand, with only the Powder River Gas-Coal Creek Expansion known to date. The reasonably foreseeable Tongue River Railroad project may provide the opportunity for an increase in coal mine expansion and landscape alteration through its construction. The cumulative total of the past, present and reasonably foreseeable projects in the Decker area would be expected to alter the landscape character over time from a rural, natural setting to a more developed setting. The visual resource Management Class III may move toward a Management Class IV, providing for management activities that require major modifications to the existing character of the landscape.

4.1.9 Social and Economic Conditions

Direct and Indirect Effects: There would be no additional drilling or development, there would be no direct or indirect effects from that action. However, an effect would be the private lessees not receiving any royalties or pay production taxes on the royalties. The State would not receive any production taxes. As well as, the United States would not receive any royalty payments nor any production taxes. There would be no temporary jobs, which could enhance the social well being of those receiving this income and their communities.

Cumulative Effects: There would be no additional drilling or development from the No Action alternative. No private, state or federal royalties would be generated from CBNG development. The State of Montana would not receive any production taxes. There would be no jobs/income generated from development.

4.1.10 Soils

Direct and Indirect Effects: No wells would be drilled under the No Action Alternative; therefore, there would be no direct or indirect impacts from this action. There may be indirect impacts from incidental use due to development activities of adjacent areas.

Cumulative Effects: Cumulative effects to this area would be the result of past agricultural activities, such as cropping and grazing. These activities may have resulted in mixing of horizons and exposure of the soil to wind and water erosion. Any effects from planning efforts or development on adjacent areas would not have meaningful cumulative effects to the soils of the area.

4.1.11 Vegetation

Direct and Indirect Effects to Vegetation: There would be no impacts to vegetation in the project area.

Direct and Indirect Effects to Special Status Species: No changes to the existing vegetation community.

Direct and Indirect Effects to Invasive Species: No changes to the existing vegetation community.

Cumulative Effects: There would be no cumulative effects to area vegetation.

4.1.12 Wildlife and Fisheries/Aquatics

Direct and Indirect Effects: There would be no impacts resulting from this alternative.

Cumulative Effects Wildlife: This alternative would not add to the present cumulative effects on wildlife and wildlife habitat. Cumulative effects on wildlife within this region still occur as a result of previously approved CBNG POD's in MT and WY, existing mining operations in the area, the Tongue River Reservoir and other habitat fragmentation, such as highways, railroad, etc. Currently, it is estimated that 120,000 to 140,000 acres of wildlife habitat are directly or indirectly affected in the vicinity of the proposed project area.

Cumulative Effects Fisheries/Aquatics: The cumulative effects associated with this alternative addresses the reasonable and foreseeable activities: Tongue River Railroad proposal and approved CBNG activities.

Tongue River Railroad proposal: The Tongue River Railroad proposal would involve constructing a

railroad adjacent to the Tongue River (the railroad would be approximately 300 feet or greater from the Tongue River for the majority of its length). The main effects from this railroad are associated with the proposed Western Alignment that will cut through the Tongue River Canyon (from the Tongue River dam downstream to Four Mile Creek). The impact of this action is related to the amount of fill needed in the side drainages to construct the railroad. In a catastrophic event, a large amount of sediment could enter the Tongue River. This activity could have potential cumulative effects on habitat or populations.

Approved CBNG activities: Approved, but not yet constructed CBNG activities (Dry Creek, Coal Creek and Coal Creek Expansion PODs) are reasonable and foreseeable actions. These projects have the potential to affect aquatic species through potential erosion and changes in streamflows and water quality. These projects could increase untreated CBNG discharge by 652 gpm (1.45 cfs), 1,039 gpm (2.3 cfs), and 864 gpm (1.92 cfs) during the summer, winter and spring seasons, respectively. An additional 772 gpm (1.7 cfs) of treated discharge could occur during all seasons. In addition, CBNG infrastructure will increase over additional surface acres. Therefore, potential cumulative effects could occur to aquatic habitat or populations.

The degree of cumulative effects to aquatic species from the combination of these activities with past and ongoing activities (associated with the existing condition, see Chapter 3) depends on a variety of factors, some of which are natural. Drought conditions have affected aquatic habitat and populations within the drainage for the past several years. Local geology, severe wildfire and soil composition also influence water quality, streamflows, and erosion. Although difficult to quantify in numerical terms, it is reasonable to assume that, with the magnitude of activities, there would be some additional cumulative impacts to aquatic species from these activities.

4.2 EFFECTS FROM ALTERNATIVE B – PROPOSED ACTION

- Complete PODs implementation, including a water treatment facility, treated water discharge, untreated water discharge, three proposed lined impoundments, previous approved lined impoundments, beneficial uses and previous approved irrigation units.

4.2.1 Air Quality

Direct and Indirect Effects: Under this Alternative, 248 wells would be drilled. Pollutant emissions would occur during the exploration phase from construction and drilling activities. These emissions would potentially impact air quality in the project area. The primary pollutants emitted would be particulate matter (TSP), particulate matter with an aerodynamic diameter less than 10 microns (PM_{10}), particulate matter with an aerodynamic diameter less than 2.5 microns ($PM_{2.5}$), oxides of nitrogen (NO_X), carbon monoxide (CO), and sulfur dioxide (SO_2). Pollutant emissions from the exploration portion of Alternative B would be short-term and localized in nature. Impacts would be minimized because, although an MAQP would not be required for the exploration portion of Alternative B, Fidelity would still need to comply with opacity requirements contained in ARM 17.8.304 (20% opacity averaged over 6 consecutive minutes) and reasonable precaution requirements contained in ARM 17.8.308 (applying water and/or chemical dust suppressant as necessary to comply with opacity requirements).

TSP, PM_{10} and $PM_{2.5}$ emissions would be emitted from travel on access roads (unpaved roads), wind erosion at disturbed areas, and from the actual drilling of the wells. NO_X, VOC, CO, and SO_2 emissions would occur from drilling engine operations and testing service equipment. Air quality impacts at each well would be temporary-occurring during the average 3 days of construction, drilling, and completion activities at each of the 248 wells.

The exploration portion of the project would result in a temporary increase in fugitive dust and gaseous emissions. The potential emissions of the exploration portion of this Alternative, including secondary emissions that are not included in making a permit determination and considerations of the length of the project (hrs), are summarized in Table 4.2.1-1.

4.2.1-1 Emission Inventory – Alternative B – Exploration

	Tons/Project						
Emission Source	*TSP*	PM_{10}	$PM_{2.5}$	NO_X	VOC	CO	SO_X
Drill Rig(s) – (Engine Emissions)	0.00	0.00	1.81	25.54	2.03	5.50	1.69
Drill Rig(s) – (Drilling Emissions)	2.44	2.44	2.44	0.00	0.00	0.00	0.00
Fugitive Dust – (Disturbed Acres)	26.58	26.58	26.58	0.00	0.00	0.00	0.00
Vehicle Traffic (non-paved roads)	13.10	5.90	5.90	0.00	0.00	0.00	0.00
Total	42.12	34.91	36.72	25.54	2.03	5.50	1.69

MDEQ determined that any air quality impacts from the exploration portion of Alternative B would be minor because of the relatively small amounts of pollutants that would be emitted and because the emissions would be intermittent and short-term. The wells to be drilled would be located in an unclassifiable/attainment area, which generally reflects good dispersion characteristics and the exploration portion of the project would not exceed MAQP thresholds. Therefore, MDEQ determined that emissions from the exploration portion of this Alternative would not cause or contribute to a violation of any ambient air quality standards. Impacts would be minimized because although an MAQP would not be required, Fidelity would still need to comply with opacity requirements contained in ARM 17.8.304 (20% opacity averaged over 6 consecutive minutes) and reasonable precaution requirements contained in ARM 17.8.308 (applying water and/or chemical dust suppressant as necessary to comply with opacity requirements). The city of Lame Deer has been designated as a PM_{10} nonattainment area. However, only minor, if any impacts would occur to the Lame Deer PM_{10} nonattainment area because of the distance from the proposed project to the Lame Deer PM_{10} nonattainment area and because all PM emissions from the project would be intermittent and short-term.

Pollutant emissions would also occur from the production portion of this Alternative during extraction and transmission of the CBNG, and these emissions would potentially impact air quality in the project area. The primary pollutants emitted would be PM_{10}, NO_X, CO, VOC, and SO_2. Emissions from the 10 permitted compressor stations that would be used for Fidelity's Deer Creek North and Pond Creek PODs under this Alternative are summarized in Table 4.2.1-2.

4.2.1-2 Emission Inventory – Alternative B-Production

				Tons/Year	
Facility	PM_{10}	NO_X	VOC	CO	SO_X
BCPL Rancholme 21 Battery	0.54	24.92	16.62	32.46	0.04
BCPL Deer Creek Central Rancholme #14 Complex	1.66	50.25	54.66	90.12	0.11
BCPL Rancholme #2 Battery	0.55	33.22	16.61	33.22	0.03
BCPL Montana Royalty #3 Battery	0.55	33.22	16.61	33.22	0.03
BCPL Decker #6 Battery	0.55	33.22	16.61	33.22	0.03
BCPL CX-35 Battery	0.28	15.45	7.73	23.18	0.02
BCPL CX-24 Battery	0.65	37.87	22.59	56.79	0.05
BCPL CX-14 Battery	0.42	23.19	34.77	11.58	0.03
BCPL CX-12 Battery	0.55	33.22	16.61	33.22	0.03
BCPL Symons Central Compressor Station	4.40	115.00	74.87	228.46	0.28
Total	10.15	399.56	277.68	575.47	0.65

MDEQ requests that ambient air quality modeling be conducted for CBNG facilities that exceed the 25 tons per year MAQP threshold, regardless of the PTE of the facility, 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 the Class II NO_X increment, regardless of whether or not PSD applies to the facility. To date, no CBNG facilities applying for a MAQP have been subject to PSD. MDEQ completed an independent review of the ambient air quality modeling that was

conducted for each of the production facilities as part of the MAQP permitting process. In addition, although a PSD increment analysis was not required for any of the production facilities, the Department requested BCPL to conduct a PSD Class I and Class II NO_X increment analysis for the BCPL Symons Central Compressor Station and the Department requested BCPL to conduct a PSD Class II NO_X increment analysis for the four field compressor stations. The ambient air quality modeling results are summarized in Table 4.2.1-3.

4.2.1-3 Ambient Air Quality Modeling Results – NO_X

Facility Modeled	Avg. Period	NO_X Modeled Conc. ($\mu g/m^3$)	OLM/ARM Adjusted to NO_2 ($\mu g/m^3$)	Background Conc. ($\mu g/m^3$)	Ambient Conc. ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	MAAQS ($\mu g/m^3$)	% of NAAQS/ MAAQS
Rancholme 21 Battery	1-hr	545[a]	242	75	317	--------	564	---/56.2
	Annual	27.87[b]	20.9	6	26.9	100	94	26.9/28.6
Deer Creek Central Rancholme #14 Complex	1-hr	1,650[a]	353	75	428	----	564	---/75.9
	Annual	23[b]	17.3	6	23.3	100	94	23.3/24.8
Rancholme #2 Battery	1-hr	595[a]	247	75	322	----	564	---/57.1
	Annual	4.94[b]	3.71	6	9.7	100	94	9.7/1.03
Montana Royalty #3 Battery	1-hr	607[a]	249	75	324	----	564	---/57.5
	Annual	12.21[b]	9.20	6	15.2	100	94	15.2/16.2
Decker #6 Battery	1-hr	895[a]	277	75	352	----	564	---/62.4
	Annual	8.33[b]	6.2	6	12.2	100	94	12.2/13.0
CX-35 Battery	1-hr	No individual station modeling completed						
	Annual							
CX-24 Battery	1-hr	No individual station modeling completed						
	Annual							
CX-14 Battery	1-hr	No individual station modeling completed						
	Annual							
CX-12 Battery	1-hr	1,132[a]	301	75	376	----	564	---/66.7
	Annual	17.22[b]	12.9	6	18.9	100	94	18.9/20.1
Symons Central Compressor Station	1-hr	746.7[a]	262.5	75	339	--------	564	59.8
	Annual	31.5[b]	23.6	6	30	100	94	30 / 31.5

[a] Concentration calculated using Ozone Limiting Method
[b] Applying Ambient Ratio Method with national default of 75%

Each of the models demonstrated that neither the MAAQS nor the NAAQS would be violated.

The Class II modeling results for each facility are summarized in Table 4.2.1-4.

4.2.1-4 Class II Modeling Results – NO_X

Facility Modeled	Avg. Period	Class II Modeled Conc. ($\mu g/m^3$)	Class II Increment ($\mu g/m^3$)	% Class II Increment Consumed
Rancholme 21 Battery	Annual[b]	20.9	25	83.6

Deer Creek Central Rancholme #14 Complex	Annual[b]	17.3	25	69.2
Rancholme #2 Battery	Annual[b]	3.71	25	14.8
Montana Royalty #3 Battery	Annual[b]	9.2	25	36.8
Decker #6 Battery	Annual[b]	6.2	25	24.8
CX-35 Battery	No individual station modeling completed			
CX-24 Battery				
CX-14 Battery				
CX-12 Battery	Annual[b]	12.9	25	51.9
Symons Central Compressor Station	Annual[a]	22.6	25	88.8

[a] Concentration calculated using Ozone Limiting Method
[b] Applying Ambient Ratio Method with national default of 75%

The Class II increment analysis that was conducted as part of each MAQP application demonstrated compliance with the NO_X Class II increment.

The Class I modeling results are summarized in Table 4.2.1-5.

4.2.1-5 Class I Modeling Results – NO_X

Facility Modeled	Avg. Period	Class I Modeled Conc. ($\mu g/m^3$)	Class I Increment ($\mu g/m^3$)	% Class I Increment Consumed
Rancholme 21 Battery	Annual[a]	0.558	2.5	21.9
Deer Creek Central Rancholme #14 Complex	Annual[a]	0.519	2.5	20.8
Rancholme #2 Battery	Annual[a]	0.548	2.5	21.9
Montana Royalty #3 Battery	Annual[a]	0.548	2.5	21.9
Decker #6 Battery	Annual[a]	0.548	2.5	21.9
CX-12 Battery	Annual[a]	0.548	2.5	21.9
Symons Central Compressor Station	Annual[a]	0.0029	2.5	0.1

[a] Applying the Ambient Ratio Method with national default of 75%

In summary, the modeling that was conducted for each of the production facilities to determine compliance with the MAAQS/NAAQS demonstrated that neither the MAAQS nor the NAAQS would be violated. In addition, the PSD Class II NO_X increment analysis and the PDS Class I NO_X increment analysis that was conducted for each of the production facility's demonstrated that the Class II and Class I NO_X increment would not be exceeded.

MDEQ currently maintains a modeling database to track CBNG production activity in Montana and the model is updated with each new NO_X emitting facility that locates in the area defined by the MT FEIS and that requires a MAQP. Each model that is run for a newly proposed facility includes the emissions from the modeling database. MDEQ has recently completed a cumulative impact model for the Deer Creek North and Pond Creek PODs. The cumulative impact model that was completed for the Deer Creek North and Pond Creek PODs is summarized in the following section, "Cumulative Effects". MDEQ will continue to request MAQP applicants to model NO_X emitting units that locate in the area defined by the MT FEIS to ensure that the MAAQS and NAAQS, as well as the Class I and Class II NO_X PSD increments, are not exceeded. In addition, as CBNG development continues, or as CBNG facilities are proposed on properties closer to the Northern Cheyenne Indian Reservation, MDEQ will continue to request applicants to conduct NO_X PSD Class II increment analyses, as well as NO_X PSD Class I increment analyses. As CBNG development becomes more prevalent in Montana, MDEQ will request sources conducting ambient air quality modeling for CBNG facilities to conduct a cumulative impact model. That is, MDEQ will request sources conducting modeling for CBNG facilities to include the receptors that showed the highest impacts from previous models.

Cumulative Effects: The MT FEIS analyzed cumulative air quality impacts at Class I and Class II areas from emissions sources across Montana, and in particularly in southeastern Montana. The analysis used an

approach that included the modeling of existing and proposed regional sources at permitted and planned emission rates.

The most recent cumulative impact model was conducted by MDEQ as part of reviewing the Deer Creek North and Pond Creek PODs. The cumulative impact model that was conducted for the Deer Creek North and Pond Creek PODs is representative of the cumulative impacts of the area defined by the MT FEIS.

MDEQ conducted the modeling for the recent cumulative impact model using the EPA approved Industrial Source Complex Short Term Version (ISCST3) model, version 02035. This model is a refined dispersion model that uses detailed information regarding the region's meteorology, terrain, and local emissions sources to estimate ambient air pollutant concentrations. The ISCS3 model is used extensively for permitting and regulatory analyses and it is appropriate for use in estimating ground level ambient air concentrations resulting from non-reactive buoyant emissions from stationary sources with transport distances less than 50 km. The modeling analyses used the ISCST3 model in the regulatory default mode and EPA approved modeling options. Each emission source identified at all of the CBNG compressor stations was included in the air dispersion model as point sources. The coordinates of the emission sources are in UTM coordinates and the Montana and Wyoming sources included in the analysis are located in UTM zone 13. The stack exit height, temperature, velocity, and diameter data for each of the modeled emission sources was input into the ISCST3 model. The permitted allowable emissions were used in the model for all of the Montana and Wyoming sources, rather than the actual emissions. Typically, NAAQS/MAAQS demonstrations are conducted using permitted allowable emissions whereas PSD increment analyses are conducted using actual emissions. Actual emissions for these sources were not available; the Class I/Class II increment analysis was conducted using permitted allowable emissions instead of actual emissions. Therefore, the Class I/Class II increment analysis results would be considered conservative because the model provides a worst-case scenario.

The receptor, building, and source elevations were determined using data obtained from the USGS in the form of Digital Elevation Models. The 31 Wyoming Quadrangles used in the analysis included the following: Acme; Bar N Draw; Black Draw; Box Elder Draw; Boyd Ridge; Bull Elk Park; Cabin Creek NE; Cabin Creek NW; Cedar Canyon; Columbus Peak; Corral Creek; Dayton North; Dead Horse Lake; Homestead Draw; Hultz Draw; Jones Draw; Mexican Hill; Mitten Butte; Monarch; Nipple Butte; OTO Ranch; Ranchester; Rocky Point; Rocky Butte; Roundup Draw; Sheridan; Shuler Draw; SR Springs; West Pass; Wolf; and Wyarno. The 31 Montana Quadrangles used in the analysis included the following: Bar V Ranch; Bar V Ranch NE; Bay Horse; Bear Creek School; Bear Hole, Belle Creek South; Belle Creek SW; Biddle; Black Gulch; Bradshaw Creek; Decker; Folks Ranch; Half Moon; Holmes Ranch; Kid Creek; Lacey Gulch; Little Bear Creek; Moorhead; Pass Creek E; Pass Creek West; Pearl School; Pine Butte School; Quietus; Red Springs; Sayle Hall; Spring Gulch; Stroud Creek; Three Bar Ranch; Tongue River Dam; Wild Bill Creek; and Willow Creek Dam SW. Five years (1984, and 1987 through 1990) of meteorological data were obtained from Sheridan, Wyoming (Met Station #24029) and the upper air data was obtained from Lander, Wyoming (Met Station #24021). Wind roses for this data set show that the predominant wind comes from the northwest. Building downwash was included using the EPA approved Schulman-Scire method. The EPA approved BPIP program was used to calculate the projected building widths and heights for the following Montana sources: Consul 27 Battery; Montana State 36 Battery, Rancholme 21 Battery; Rancholme 28 Battery; Rancholme 29 Battery; Seven Brothers 35 Battery; Symons Central Compressor Station; and Visborg Battery. Building downwash information for other Montana or Wyoming sources was not available. A Cartesian receptor grid consisting of 15,413 receptors was used in this analysis. The southwest corner of 324,000E, 4,958,000N and northeast corner of 385,000E, 5,010,000, encompassed the entire grid that consisted of 3,172 km^2. Receptors were spaced at approximately 50-meters along the identified fence lines of Consul 27 Battery; Montana State 36 Battery, Rancholme 21 Battery; Rancholme 28 Battery; Rancholme 29 Battery; Seven Brothers 35 Battery; Symons Central Compressor Station; and Visborg Battery. The remaining receptors were spaced at 100-m spacing from the southwest corner of 345,000E, 4,983,000N and northeast corner of 361,000E, 4,989,000 to encompass all of the Montana Stations at 250-m spacing from the southwest corner of 344,000E, 4,982,000N and northeast corner of 362,000E, 4,990,000, at 500-m spacing from the southwest corner of 335,000E, 4,975,000N and northeast corner of 371,000E, 5,000,000 and at 1,000-m spacing from the southwest corner of 315,000E, 4,950,000N and northeast corner of 385,000E, 5,025,000. In addition, a receptor grid

consisting of 250 receptors was previously developed using USGS maps for the Northern Cheyenne Indian Reservation. The receptors were placed at an approximate spacing of 100-m.

The pollutant of concern for this analysis was NO_X. It has been found that the NO_X emissions are the limiting pollutant from the compressor stations (i.e. the most likely pollutant to violate any ambient standard or increment). Thus, only NO_X emissions were examined. The emissions of total NO_X (NO + NO_2) from each source were assumed as the basis for the model. The model was run for the years 1984 and 1987-1990. The highest modeled NO_X annual concentration and the high-second high 1 hour concentration were determined. Once the highest NO_X concentrations were determined, the Ambient Ration Method and Ozone Limiting Method were applied to the NO_X modeled concentrations in order to convert to NO_2 concentrations for comparison against the NAAQS/MAAQS and PSD increments. These two methods take into account the complexity of the chemistry affecting the formation of NO_2. The air dispersion modeling results are in terms of annual and high-second-high 1-hour results for NO_2. The results include the total modeled concentration as well as the Montana and Wyoming individual source contributions. The annual NAAQS for NO_2 is 100 $\mu g/m^3$ while the annual MAAQS is 94 $\mu g/m^3$. The 1- hour standard for NO_2 is 564 $\mu g/m^3$. The ambient air quality modeling results are summarized in Table 4.2.1-6.

4.2.1-6 Ambient Air Quality Modeling Results – NO_X

NO_X Average	Source Group	Rank	Modeled Conc. ($\mu g/m^3$)[a]	UTM East (X) (m)	UTM North (Y) (m)	ARM[b]/ OLM[c] ($\mu g/m^3$)[a]	Back-Ground ($\mu g/m^3$)	Ambient Conc. ($\mu g/m^3$)[a]	Fraction of NAAQS (%)[a]	Fraction of MAAQS (%)[a]
1984 Met Year										
ANNUAL	ALL	1ST	31.0	357800	4984100	23.3	6.0	29.3	29.3	31.2
ANNUAL	MT_SRC	1ST	26.7	357800	4984100	20.0	6.0	26.0	26.0	27.7
ANNUAL	MINE	1ST	12.9	352000	4998500	9.7	6.0	15.7	15.7	16.7
ANNUAL	WY_SRC	1ST	19.1	351000	4978500	14.3	6.0	20.3	20.3	21.6
1HR[b]	ALL	2ND	1213.0	357428	4984325	309.1	75.0	384.1	NA[d]	68.1
1HR	MT_SRC	2ND	1212.4	357428	4984325	309.1	75.0	384.1	NA	68.1
1HR	MINE	2ND	438.9	359000	4987000	231.7	75.0	306.7	NA	54.4
1HR	WY_SRC	2ND	497.8	353500	4981000	237.6	75.0	312.6	NA	55.4
1987 Met Year										
ANNUAL	ALL	1ST	29.5	357800	4984100	22.1	6.0	28.1	28.1	29.9
ANNUAL	MT_SRC	1ST	25.1	357800	4984100	18.8	6.0	24.8	24.8	26.4
ANNUAL	MINE	1ST	13.9	352000	4998500	10.4	6.0	16.4	16.4	17.5
ANNUAL	WY_SRC	1ST	20.4	351000	4978500	15.3	6.0	21.3	21.3	22.7
1HR	ALL	2ND	887.3	357428	4984350	276.6	75.0	351.6	NA	62.3
1HR	MT_SRC	2ND	885.8	357428	4984350	276.4	75.0	351.4	NA	62.3
1HR	MINE	2ND	497.3	348500	4998500	237.6	75.0	312.6	NA	55.4
1HR	WY_SRC	2ND	497.2	353500	4981000	237.6	75.0	312.6	NA	55.4
1988 Met Year										
ANNUAL	ALL	1ST	32.0	357800	4984100	24.0	6.0	30.0	30.0	31.9
ANNUAL	MT_SRC	1ST	28.3	357800	4984100	21.2	6.0	27.2	27.2	28.9
ANNUAL	MINE	1ST	12.8	353500	4995000	9.6	6.0	15.6	15.6	16.6
ANNUAL	WY_SRC	1ST	18.5	351000	4978500	13.9	6.0	19.9	19.9	21.2
1HR	ALL	2ND	651.5	357400	4984000	253.0	75.0	328.0	NA	58.2
1HR	MT_SRC	2ND	626.7	357400	4984000	250.5	75.0	325.5	NA	57.7
1HR	MINE	2ND	552.2	353500	4998500	243.1	75.0	318.1	NA	56.4
1HR	WY_SRC	2ND	486.4	353500	4981000	236.5	75.0	311.5	NA	55.2
1989 Met Year										
ANNUAL	ALL	1ST	27.5	357800	4984100	20.6	6.0	26.6	26.6	28.3
ANNUAL	MT_SRC	1ST	23.9	357800	4984100	17.9	6.0	23.9	23.9	25.4
ANNUAL	MINE	1ST	12.6	354500	4996000	9.5	6.0	15.5	15.5	16.5

ANNUAL	WY_SRC	1ST	18.5	351000	4978500	13.9	6.0	19.9	19.9	21.2
1HR	ALL	2ND	605.2	357500	4984000	248.4	75.0	323.4	NA	57.3
1HR	MT_SRC	2ND	569.1	357500	4984000	244.7	75.0	319.7	NA	56.7
1HR	MINE	2ND	214.5	349000	4998500	209.3	75.0	284.3	NA	50.4
1HR	WY_SRC	2ND	485.3	353500	4981000	236.4	75.0	311.4	NA	55.2
1990 Met Year										
ANNUAL	ALL	1ST	28.6	357800	4984100	21.5	6.0	27.5	27.5	29.3
ANNUAL	MT_SRC	1ST	24.7	357800	4984100	18.5	6.0	24.5	24.5	26.1
ANNUAL	MINE	1ST	12.9	352000	4998500	9.7	6.0	15.7	15.7	16.7
ANNUAL	WY_SRC	1ST	18.6	351000	4978500	14.0	6.0	20.0	20.0	21.3
1HR	ALL	2ND	756.1	357400	4983900	263.4	75.0	338.4	NA	60.0
1HR	MT_SRC	2ND	715.0	357603	4984346	259.3	75.0	334.3	NA	59.3
1HR	MINE	2ND	511.8	357400	4987000	239.0	75.0	314.0	NA	55.7
1HR	WY_SRC	2ND	537.8	359000	4966000	241.6	75.0	316.6	NA	56.1

[a] Variance may be due to rounding conventions
[b] Applying the Ambient Ratio Method with National Default of 75%
[c] Concentrations were calculated using the Ozone Limiting Method
[d] Not Applicable: no hourly NO_2 NAAQS exists

The annual high NO_2 concentration occurred in 1988 approximately 190-m southeast of the Symons Central Compressor Station, while the second high 1-hour modeled NO_2 concentration occurred in 1984 on the western corner of the Symons Central Compressor Station. The modeled concentrations are well below the NAAQS/MAAQS even with the added background concentrations. The background concentrations used in the analysis are the concentrations which Montana uses as default values for areas where no significant sources exist, such as in this case.

The Class I/Class II PSD increment analysis was conducted using the same sources as previously identified with the same emission rates. Class I/Class II increment analyses are normally modeled using the actual emissions from each individual source. This analysis may be considered conservative because allowable emissions were used in lieu of actual emissions for the Montana sources. It is assumed that all the sources are increment consuming-sources. The results of the Class I analysis for the Northern Cheyenne Indian Reservation are shown in Table 4.2.1-7.

4.2.1-7 Class I analysis for the Northern Cheyenne Indian Reservation

Source Group	Modeled Conc. ($\mu g/m^3$)[a]	UTM East (X) (m)	UTM North (Y) (m)	Elevation (m)	ARM[b] ($\mu g/m^3$)[a]	Class I Increment ($\mu g/m^3$)	Fraction of Class I Increment (%)[a]
1984 Met Year							
ALL	2.21	352468	5023741	1345	1.66	2.50	66.4
MT_SRC	0.16	344275	5023993	1137	0.12	2.50	4.8
MINE	0.84	352468	5023741	1345	0.63	2.50	25.2
WY_SRC	1.28	355969	5023610	1345	0.96	2.50	38.4
1987 Met Year							
ALL	2.22	351862	5023835	1354	1.67	2.50	66.8
MT_SRC	0.17	344275	5023993	1137	0.13	2.50	5.2
MINE	0.75	351820	5023758	1339	0.56	2.50	22.4
WY_SRC	1.40	354066	5023686	1416	1.05	2.50	42.0
1988 Met Year							
ALL	2.05	351862	5023835	1354	1.54	2.50	61.6
MT_SRC	0.16	344275	5023993	1137	0.12	2.50	4.8
MINE	0.86	350914	5023855	1316	0.65	2.50	26.0
WY_SRC	1.12	351862	5023835	1354	0.84	2.50	33.6

1989 Met Year							
ALL	1.88	351862	5023835	1354	1.41	2.50	56.4
MT_SRC	0.16	344275	5023993	1137	0.12	2.50	5.2
MINE	0.71	350914	5023855	1316	0.53	2.50	21.2
WY_SRC	1.10	351862	5023835	1354	0.83	2.50	33.2
1990 Met Year							
ALL	1.89	349965	5023875	1254	1.42	2.50	56.8
MT_SRC	0.16	344275	5023993	1137	0.12	2.50	4.8
MINE	0.66	351820	5023758	1339	0.50	2.50	20.0
WY_SRC	1.15	351862	5023835	1354	0.86	2.50	34.4

[a] Variance may be due to rounding conventions
[b] Applied the Ambient Ratio Method with National Default of 75%

As demonstrated by the above table, the modeling demonstrated that the Wyoming sources are the major contributor to the modeled Class I increment. The results of the Class II modeling are shown in Table 4.2.1-8.

4.2.1-8 Class II Modeling Results

Source Group	Modeled Conc. ($\mu g/m^3$)[a]	East (X) (m)	North (Y) (m)	Elevation (m)	ARM[b] ($\mu g/m^3$)[a]	Class II Increment ($\mu g/m^3$)	Fraction of Class II Increment (%)[a]
1984 Met Year							
ALL	31.0	357800	4984100	1085	23.3	25.0	93.2
MT_SRC	26.7	357800	4984100	1085	20.0	25.0	80.0
MINE	12.9	352000	4998500	1063	9.7	25.0	38.8
WY_SRC	19.1	351000	4978500	1168	14.3	25.0	57.2
1987 Met Year							
ALL	29.5	357800	4984100	1085	22.1	25.0	88.4
MT_SRC	25.1	357800	4984100	1085	18.8	25.0	75.2
MINE	13.9	352000	4998500	1063	10.4	25.0	41.6
WY_SRC	20.4	351000	4978500	1168	15.3	25.0	61.2
1988 Met Year							
ALL	32.0	357800	4984100	1085	24.0	25.0	96.0
MT_SRC	28.3	357800	4984100	1085	21.2	25.0	84.8
MINE	12.8	353500	4995000	1120	9.6	25.0	38.4
WY_SRC	18.5	351000	4978500	1168	13.9	25.0	55.6
1989 Met Year							
ALL	27.5	357800	4984100	1085	20.6	25.0	82.4
MT_SRC	23.9	357800	4984100	1085	17.9	25.0	71.6
MINE	12.6	354500	4996000	1118	9.5	25.0	38.0
WY_SRC	18.5	351000	4978500	1168	13.9	25.0	55.6
1990 Met Year							
ALL	28.6	357800	4984100	1085	21.5	25.0	86.0
MT_SRC	24.7	357800	4984100	1085	18.5	25.0	74.0
MINE	12.9	352000	4998500	1063	9.7	25.0	38.8
WY_SRC	18.6	351000	4978500	1168	14.0	25.0	56.0

[a] Variance may be due to rounding conventions
[b] Applied the Ambient Ratio Method with National Default of 75%

The peak-modeled concentration for the Class II increment occurred in 1984 approximately 190 meters southeast of the Symons Central Compressor Station, which is the same receptor where the peak modeled ambient concentration, was observed.

4.2.1-9 Impacts of Wyoming CBM Sources on the Montana Border

NO_X Average	Rank	Modeled Conc. ($\mu g/m^3$)[a]	UTM East (X) (m)	UTM North (Y) (m)	ARM[b]/ OLM[c] ($\mu g/m^3$)[a]	Back-Ground ($\mu g/m^3$)	Ambient Conc. ($\mu g/m^3$)[a]	Fraction of NAAQS (%)[a]	Fraction of MAAQS (%)[a]
1990 Met Year									
ANNUAL	1ST	5.5	348000	4984400	4.1	6.0	10.1	10.1	10.7
1HR[b]	2ND	143.4	348400	4984300	202.2	75.0	277.2	NA[d]	49.2
1990 Met Year									
ANNUAL	1ST	6.2	347900	4984400	4.7	6.0	10.7	10.7	11.4
1HR	2ND	165.2	348000	4984300	204.4	75.0	279.4	NA	49.5
1990 Met Year									
ANNUAL	1ST	5.3	347900	4984400	4.0	6.0	10.0	10.0	10.6
1HR	2ND	159.0.	348000	4984400	203.7	75.0	278.7	NA	49.4
1990 Met Year									
ANNUAL	1ST	5.3	347900	4984400	4.0	6.0	10.0	10.0	10.6
1HR	2ND	138.7	348400	4984400	201.7	75.0	276.7	NA	49.1
1990 Met Year									
ANNUAL	1ST	5.6	347900	4984400	4.2	6.0	10.2	10.2	10.9
1HR	2ND	125.4	348000	4984400	200.4	75.0	275.4	NA	48.8

[a] Variance may be due to rounding conventions
[b] Applied the Ambient Ratio Method with the National Default of 75%
[c] Concentrations were calculated using the Ozone Limiting Method
[d] NA = Not Applicable: no hourly NO_2 NAAQS exists

Wyoming CBNG facilities had about a 10% impact on the annual state and federal NO_2 standards at the border. These sources had an impact of nearly 50% on the hourly Montana standard

As the cumulative modeling analysis demonstrates, CBNG development currently complies with the MAAQS/NAAQS and the PSD Class I/Class II increments. The peak modeled concentrations are close to individual developments.

4.2.2 Cultural Resources

Direct and Indirect Effects: Both the Deer Creek North and Pond Creek PODs were inventoried for cultural resources. Portions of the proposed water systems outside the POD were inventoried as part of the Badger Hills and Coal Creek PODs or are within the block inventory areas for the Deer Creek North POD. No cultural resource locations were observed at the proposed pond locations. Inventory results for both PODs would be the same as those described in Alternative A. However, six sites in the Deer Creek North POD and 11 Sites in the Pond Creek POD would be directly impacted by existing wells or associated new infrastructure.

Direct Effects Deer Creek North: A total of four historic homestead sites, one historic road, and one prehistoric site would be impacted by proposed developments in the Deer Creek North POD. Sites 24BH3171, 24BH3188, 24BH3193, and 24BH3196 are historic homestead sites. These sites are not considered eligible for listing on the National Register. All of them generally lack integrity. Impacts would be from utility corridors. None of the features at these locations would be impacted. The proposed corridors would run through the edge and impact scattered artifacts that make up portions of the site boundaries. Site 24BH3187 is a historic road and bridge. The site is recommended as eligible for listing on the National Register. The site would be impacted by an underground powerline crossing the road. The road itself is considered a non-contributing element to the site. There would be no adverse effect to the portion of the site that is considered eligible for the National Register. Site 24BH3176 is prehistoric site

consisting of three pieces of lithic debitage (the residue of making and using stone tools) and fragments of three stone tools. A proposed utility corridor will run through the site boundaries.

Indirect Effects Deer Creek North: Indirect effects to cultural resources would include increased access which may lead to unauthorized collection and excavation. Most of the identified cultural resource locations are located on fee surface. Cultural resources are considered part of the surface estate and the ultimate disposition of cultural resources on fee lands is up to the landowner. Company policies against collection of artifacts and the lack of direct public access are likely to lessen indirect effects to cultural resources.

Direct Effects Pond Creek: A total of 11 sites within the boundaries of the Pond Creek POD would be impacted by developments within the proposed POD. Eight of the sites are prehistoric in age and three are historic. Impacts to the sites will occur from utility corridors, hooking up existing wells, and overhead powerlines. All of the prehistoric sites received some degree of testing (sub-surface excavation) either as a result of this project or the earlier Dry Creek POD. One of the prehistoric sites is recommended as eligible for listing on the National Register, seven of the sites (3 historic Sites and 4 prehistoric sites) are recommended as not eligible for the National Register, and National Register eligibility is unresolved at three sites prehistoric sites. Two of the sites are located in existing well locations that would be hooked up to powerline and pipeline systems as part of the project. One of the sites is recommended as not eligible for listing on the National Register and the other site is recommended as eligible. However, no buried cultural materials were located in the vicinity of the proposed utility corridor. The other sites would be impacted by proposed access/utility corridors and overhead powerlines. Additionally, proposed overhead powerlines and utility corridors pass within 100 feet of six other sites.

Indirect Effects Pond Creek: Indirect effects would be the same as those listed for the Deer Creek North. However, the Pond Creek Area with its higher site density is likely to be more vulnerable to unauthorized collection. As with the Deer Creek North POD, indirect effects would be lessened by company policies and a lack of public access to the POD area.

Direct and Indirect Effects to Paleontological Resources: Paleontological resources are limited in both POD areas. No known paleontological localities would be directly affected by developments in either POD location. Indirect effects would be the same as the direct effects. BLM's preferred method of mitigation is to avoid impacts to paleotological resources or require mitigation of those impacts through excavation, detailed recording, or other methods. Since no mitigation stipulations would be found in this alternative, paleontological resources would be vulnerable to direct and indirect impacts from development. Therefore, this alternative would be inconsistent with BLM's policies regarding impacts to cultural resources

Cumulative Effects: Cumulative effects would generally be the same as those outlined in Alternative A. Except that six sites in the Deer Creek North and 11 sites in the Pond Creek POD would be impacted by proposed developments. An additional six sites in the Pond Creek POD are less than 100 feet from proposed developments and are also vulnerable to direct and indirect impacts. No cumulative effects would occur to paleontological resources.

4.2.3 Geology and Minerals

Deer Creek North POD

Direct and Indirect Effects to Coal Bed Natural Gas: Under this Plan of Development, CBNG could potentially be produced from the 174 private, state and federal wells completed for production. Production of these wells is estimated to last up to 10-20 years. Production of CBNG could be an irreversible and irretrievable removal of the resource. The gas would be transported through pipelines to markets where it would be put to beneficial residential and industrial uses.

The potential for drainage of federal leases by adjacent private and state wells within and outside the project area would be reduced or eliminated by production of gas from federal leases.

Methane Migration: Domestic water wells and springs completed in a coal bed producing CBNG within the minimum radius drawdown could experience an influx of natural gas. Domestic wells potentially

affected are shown in Table 4.2.3-1.

4.2.3-1 Domestic Water Wells and Springs

Site name	Type	Township	Range	Sec	Tract	Depth
Carlat Robert (12 Miles NE Decker)	Well	08S	41E	21	NESW	99
Porter H (4.2 Miles W Pine Butte School)	Well	08S	41E	24	SWSE	42
Porter H (14 M NE Decker)	Well	08S	41E	25	SWSW	420
Holmes Ranch	Well	08S	41E	34	NWSW	181
Parker Frances (2.3 M SW Pine Butte Sch)	Well	08S	42E	29	NWSE	21
Porter H.,A.(12.3 M NE Decker).	Well	09S	41E	1	NESE	180
Holmes Ranch (7.4 M E Decker)	Well	09S	41E	8	SWNE	NR
Holmes Ranch (8.5 M E Decker)	Well	09S	41E	9	NESW	28
K-4 Kendrick Cattle	Well	09S	42E	5	NENE	120
Penson Chas & Greg	Well	08S	41E	21	SWNE	125
Penson Chas & Greg	Well	08S	41E	32	NWNW	199
Wilson Lewis & Beulah	Well	08S	41E	35	NWNW	12
Parker Francis	Well	08S	42E	29	NWSE	185
BLM Benchmark	Well	09S	41E	13	NESW	322
Wilson Lewis & Beulah	Well	08S	41E	35	NWNW	12
Home Spring	Spring	09S	42E	20	NWSE	0
Lower Home Spring	Spring	09S	42E	20	NWNW	0

Direct and Indirect Effects to Coal: Under this alternative there should not be conflicts with the Decker Coal mine over development of the coal at the Deer Creek North POD area. .

The CBNG production may also cause monitoring wells to begin to vent methane. This would be a loss of resource (methane) and would render the monitoring well less effective for monitoring purposes during the time CBNG production continues. The monitoring wells would have to be controlled to eliminate the venting of methane.

Cumulative Effects: Producing the 174 federal, state, and private wells would remove an estimated 47 BCF of CBNG, which would be in addition to gas produced by the existing 449 wells in the CX Field. Production of CBNG could be an irreversible and irretrievable removal of the resource. The gas would be transported through pipelines to markets where it would be put to beneficial residential and industrial uses. Revenue for state, county and federal governments will be generated by the sales of gas.

Areas without producing wells could be drained by adjacent producing wells. Additional wells would have to be drilled in the vacant areas or compensatory agreements established to eliminate the actual drainage or to compensate for the loss of the gas.

Methane Migration: Under this Alternative, it is assumed that the existing 449 wells in the CX Field plus the 174 private, state and federal wells would be produced. This results in the long term impact of drawdown extending approximately 1.6 miles beyond the POD boundary. This potential drawdown area is shown on Map Hydro-4 in the Hydrology Appendix. The results of this analysis listing water wells, springs and monitoring wells that are within the 20 foot drawdown area are shown in the Hydrology Appendix in Table Hydro-13.

Decker Coal will eventually request final bond release (phase IV) from the State of Montana DEQ when reclamation of the mine area is complete. According to the Administrative Rules of Montana ARM 17.24.1116 (d) (iii) phase IV reclamation will be deemed to be completed "with respect to the hydrologic balance, disturbance has been minimized and offsite material damage has been prevented in accordance with the Act, the Rules and the approved permit" Annual reports and monitoring data may be used to support the bond release application and decision. If the coal mine groundwater monitoring well system is adversely affected by CBNG development then phase IV release of Deckers' bond could be problematic.

Pond Creek POD

Direct and Indirect Effects to Coal Bed Natural Gas: Under this Plan of Development, CBNG could potentially be produced from the 91 private, state and federal wells. Production of these wells is estimated to last up to 15 years. Production of CBNG could be an irreversible and irretrievable removal of the resource. The gas would be transported through pipelines to markets where it would be put to beneficial residential and industrial uses.

The potential for drainage of federal leases by adjacent private and state wells within and outside the project area would be reduced or eliminated by production of gas from federal leases.

Methane Migration: Domestic water wells and springs completed in a coal bed producing CBNG within the minimum radius drawdown could experience an influx of natural gas. Domestic wells potentially affected are shown in Table 4.2.3-2.

4.2.3-2 Domestic Water Wells and Springs

Site name	Type	Township	Range	Sec	Tract	Depth
Consol Coal (5 M W Decker)	Well	09S	39E	14	NWSE	300
CX Ranch	Spring	09S	39E	16	NENE	0
States J Vernon	Well	09S	39E	21	SESE	615
Powers Everett	Well	09S	39E	24	NENW	235
Powers Everett	Well	09S	39E	25	SESW	244
Foss Claris W	Well	09S	39E	25		150
States Vernon	Well	09S	39E	29	SENW	64
States J. Vernon	Well	09S	39E	32	NWNE	160
Kukuchka Wm (6.5 M NE Decker)	Well	08S	40E	33	NESW	UNK
Kukuchka Wm	Well	08S	40E	34	NWNE	98
Kukuchka	Well	08S	40E	34	NWSE	40
Kukuchka (1.25 M NE TR Mine)	Well	08S	40E	34	NWSE	553
Kukuchka	Well	08S	40E	34	NWSE	98
Kukuchka (7 M N Squirrel Ck Sch)	Well	09S	40E	3	NESW	
Miner Jim(4.2 M SE Decker)	Well	09S	40E	4	SWSE	
Decker Coal Co	Well	09S	40E	5	NWNE	260
ConsolCoal	Well	09S	40E	7	SWSW	462
Powers Everett	Well	09S	40E	7	SWSW	274
Decker Coal Co	Well	09S	40E	10	SWSE	140
Decker Coal Co	Well	09S	40E	10	SWSE	160
Decker Coal Co	Well	09S	40E	10	SWSE	150
Decker Coal Co	Well	09S	40E	10	SWSE	150
Decker Coal Co	Well	09S	40E	10	SWSE	150?
Decker Coal Co	Well	09S	40E	10	SWSE	498
Decker Coal Co	Well	09S	40E	15	NWNE	300
Decker Coal Co	Well	09S	40E	15	NWNE	300
Decker Coal CO	Well	09S	40E	16	SENE	103

PKS-CX Ranch (4 M SW Decker)	Well	09S	40E	30	NENW	
Powers Everett	Well	09S	40E	30	NWNW	238

Direct and Indirect Effects to Coal: There is potential for conflicts with the Decker Coal Mine over development of the coal being mined in the North Decker mine area. This would also include potential development conflicts with the Spring Creek Coal Mine. Spring Creek currently has the state coal in Pearson Creek (Section 36, T. 8S., R. 39 E.) leased. BLM produced an EA in 2000 for a lease application made by Spring Creek Coal Company. The Reasonable Foreseeable Development Scenario (RFD) for that EA included long range plans for mining the aforementioned Section 36 as well as Federal mineral lands to the south and southeast of Section 36.

Cumulative Effects: Producing the 91 federal, state, and private wells would remove an estimated 24.6 BCF of CBNG, which would be in addition to gas produced by the existing 449 wells in the CX Field. Production of CBNG could be an irreversible and irretrievable removal of the resource. The gas would be transported through pipelines to markets where it would be put to beneficial residential and industrial uses. Revenue for state, county and federal governments will be generated by the sales of gas.

Areas without producing wells could be drained by adjacent producing wells. Additional wells would have to be drilled in the vacant areas or compensatory agreements established to eliminate the actual drainage or to compensate for the loss of the gas.

Methane Migration: Under this Alternative, it is assumed that the existing 449 wells in the CX Field plus the 91 private, state and federal wells would be produced. This results in the long term impact of drawdown extending approximately 1.6 miles beyond the POD boundary. This potential drawdown area is shown on Map Hydro-4 in the Hydrology Appendix. The results of the analysis demonstrating water wells, springs and monitoring wells located within the 20 foot drawdown area are shown in the Hydrology Appendix, Table Hydro-13.

Decker and Spring Creek Coal Companies will eventually request final bond release (phase IV) from the State of Montana DEQ when reclamation of the mine areas is complete. According to the Administrative Rules of Montana ARM 17.24.1116 (d) (iii) phase IV reclamation will be deemed to be completed "with respect to the hydrologic balance, disturbance has been minimized and offsite material damage has been prevented in accordance with the Act, the Rules and the approved permit" Annual reports and monitoring data may be used to support the bond release application and decision. If the coal mine groundwater monitoring well system is adversely affected by CBNG development then phase IV release of Decker and Spring Creek Coal Company's bonds could be problematic.

4.2.4 Hydrology

Direct and Indirect Effects to Hydrological Resources

Effects to Surface Water-CBNG Water Discharges to Surface Waters: Under Alternative B there would be in an increase in the volume of water produced due to the wells from the Deer Creek North and Pond Creek PODs coming on-line. This increase would be in addition to the increase which would occur due to the Dry Creek and Coal Creek PODs. The water balance for this alternative was developed by assuming that both the Draft Flow Based MPDES permit (MT-0030457) and the Draft Treatment MPDES permit (MT-0030724) would be approved by the MDEQ with no major modifications. The produced water could be managed via beneficial uses (industrial uses in the Springs Creek Coal mine, drilling, construction, dust suppression, and for stock and wildlife water), the Flow Based permit and the Treatment permit; however under this alternative Fidelity would also have the option to build additional impoundments and use the irrigation areas previously approved under the Badger Hills POD. Impacts to hydrological resources, from this alternative, assume the entire water management infrastructure would be used. However, impacts to surface water are based on a water balance which assumes that once the Flow Based permit and beneficial uses are exhausted, the treatment permit would be used as needed to manage the excess water. The treatment plant can operate at 850 gpm (one loop) or 1,700 gpm (2 loops). Projected water management practices under Alternative B are shown on Chart Hydro-3 in the Hydrology Appendix. The maximum total volume of discharge that would occur under this alternative would be during the winter

of 2006-07, when 2,490 gpm of untreated discharge would occur. The maximum discharge that would occur in the spring would be 2,384 gpm of untreated discharge in 2007. The maximum discharge that would occur in the summer would be 1,262 gpm of untreated discharge and 850 gpm of treated discharge in 2006. As shown on Chart Hydro-4 in the Hydrology Appendix, these discharge values would be under the limits in the Draft MPDES permits at all times.

Following the methodology described for the direct impacts analysis in section 4.1.4 of this EA the water quality in the Tongue River which cumulatively results from this alternative can be determined, as shown on Table 4.2.4-1.

Table 4.2.4-1: Alternative B: Fidelity's Proposal-Direct Impacts

	Flow Conditions	Winter (2490_0 gpm)			Spring (2384_0 gpm)			Summer (1262_850 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	1041	1.64	125	862	1.31	43	1337	1.78
	LMM	182	728	1.10	310	570	0.83	178	711	0.92
	HMM	232	652	0.97	1604	269	0.36	457	467	0.59
Tongue River Below Dam	7Q10	77	854	1.54	77	853	1.52	77	825	1.31
	LMM	178	686	1.20	228	642	1.11	275	598	0.94
	HMM	257	623	1.08	1415	399	0.65	571	497	0.77
Tongue River at Birney Day School	7Q10	81	1025	1.93	81	1024	1.91	81	994	1.70
	LMM	181	763	1.41	233	696	1.27	242	670	1.12
	HMM	217	712	1.29	1097	396	0.67	549	502	0.83

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

The results during LMM flows at the Birney Day School station show when compared to historical conditions there would be a 3.5% increase in flow, a 4.7% increase in EC, and a 33.9% increase in SAR. During 7Q10 flows there would be a 10.9% increase in flow, a 4.2% increase in EC, and a 38.4% increase in SAR when compared to historical conditions. When compared to the No Action Alternative, the LMM results represent a 0.7% increase in flow, a 1.2% increase in EC, and a 6.7% increase in SAR. The 7Q10 results represent a 2.0% increase in flow, a 1.0% increase in EC, and a 7.4% increase in SAR when compared to the No Action Alternative.

These results can be compared to the MDEQ and Northern Cheyenne standards for SAR and EC (see Table 3.4.1-4). During HMM and LMM flows, the mean monthly standards are not exceeded, and during 7Q10 flows the instantaneous maximum standards are not exceeded. The results of this analysis indicate this alternative would not directly cause the beneficial uses of the Tongue River to become impaired due to either SAR or EC. Due to the decreasing rate of water discharge per well vs. time, these impacts would decrease with time and be primarily short term in nature.

A complete analysis of all parameters for which surface water quality criteria exist is conducted in conjunction with the issuance of MPDES permits by MDEQ (see the MDEQ Draft EA for the renewal of MT0030457, and the issuance of MT-0030724, along with the Draft permits, Fact Sheet for MT0030457, and Statement of Basis for MT0030724). The Draft EA for the permits concludes that "Issuance of the permits ensures that standards for water quality will be met. Standards are protective of beneficial uses. Therefore impacts are minor and non-significant." (MDEQ, 2005). It should be noted the MDEQ analysis looked at the impacts from both the Flow Based and Treatment permits discharging at the maximum allowable rates. As such, the MDEQ analysis is more conservative than the analysis in this EA. This is due to this EA considering the volume of water that would be discharged by the PODs in question, rather than maximizing the permits. Since no standards are exceeded in the MDEQ analysis, none would be exceeded by this alternative. Therefore, it is not anticipated that Alternative B would directly impair the beneficial uses of the Tongue River.

Effects to Groundwater-Pumping from Coal Seams: All of the proposed CBNG wells would be produced from the Deer Creek North and Pond Creek PODs. As such, the area contained within the 20 foot drawdown contour would be expanded as a direct impact of this alternative. Following the methods described in the EA and supporting documents for Fidelity's Coal Creek POD, it can be calculated that for these coal seams (D1, D2, D3, Monarch and Carney) the 20 foot drawdown contour will extend up to approximately 1.6 miles from the edge of the well field over 20 years. Since the edge of the field expands out as a result of Alternative B, the area within the 20 foot drawdown contour expands as well. The direct drawdown area that results when these wells are added to the existing drawdown area has an area of approximately 268 mi^2. According to MBMG's GWIC database and the USGS's NHD dataset, there are 30 domestic or public water supply wells, 33 stock wells, 13 industrial or irrigation wells, 10 wells for which the use is not known, 372 monitoring or research wells, 21 unused wells, and 7 springs within the 20' drawdown contour which results from Alternative B. These springs and wells are shown on Map Hydro-2, summarized on Table Hydro-10, and listed on Table Hydro-13 in the Hydrology Appendix.

As discussed in Section 4.1.4 of this EA, those wells and springs that derive their water from the coal seams being developed and are located within the potential drawdown area, would be anticipated to have decreased yields as a result of CBNG related drawdown. Aquifers other than the coal seams being developed would be anticipated to be minimally affected. However, Fidelity 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. As discussed in Section 4.1.4, it is anticipated the measures required by this order would be effective for replacing water sources.

The groundwater modeling conducted in support of the MT FEIS anticipated that for a hypothetical CBNG field with 1,082 wells producing for 20 years, the produced coal seams would recover 70% of their hydrostatic head within 5-12 years after the end of production. The exact radius of the drawdown cone, and the time required for the head to recover, would depend on the site specific aquifer properties, the precise timing of the pumping of each of the wells, and the overall nature of CBNG development in this region. For additional general discussion of anticipated drawdown related impacts, see pages 4-61 to 4-63 of the MT FEIS, and the associated groundwater modeling reports (Wheaton and Metesh, 2001, Wheaton and Metesh, 2002).

Effects from Impoundments: The existing impoundment 23-0299, impoundment 44-3490 which was approved under the Badger Hills POD, one small impoundment associated with the water treatment plant (34E-3490) and three new storage impoundments to be used in conjunction with the irrigation units (23-2191, 33-2191 and 31-2991) could be constructed and used. As discussed in Section 3.4.1 impoundments 23-0299 and 44-3490 will not be analyzed in detail in this EA since they have already been analyzed, and with appropriate mitigation measures they do not have the potential to create noticeable impacts to hydrologic resources.

The new impoundments (34E-3490, 23-2191, 33-2191 and 31-2991) would be located in natural depressions that when constructed with an earthen dam, would only contain discharged water. There are no wetlands associated with these sites. The impoundments would provide for a total of approximately 425 acre-feet of storage and cover approximately 35 acres. The underlying soils mainly consist of low permeability clays; however pit tests show that permeable bedrock units are present. Fidelity proposes to seal these layers when they are encountered during construction by plating or lining them with native clay materials to reduce infiltration (i.e. putting a patch over these zones). These impoundments would be constructed to prevent any natural run-off from entering and produced water from exiting. A key way would be excavated along the centerline of the dam and then backfilled with compacted clay soil. The dam would be constructed with clay soil in compacted lifts. Low permeability clay would be compacted in lifts on the bottom and sides of each reservoir. The buried flowlines bringing water into the impoundment would be installed to discharge near the middle of the impoundment.

Since surface flow would be diverted around these impoundments they would not have the potential to flow over the burms and directly discharge to surface waters. Also, since they are located in upland areas and surface flow would be diverted around them, they would not have a noticeable affect on downstream water

rights.

If water were to infiltrate from impoundments, the infiltrated water could: (1) intersect a low permeability zone and flow to outcrops, (2) achieve saturated flow to existing groundwater, or (3) saturate a previously unsaturated zone, which is separated from underlying aquifers by aquatards, and achieve equilibrium before flow to outcrop is achieved (i.e. "parking" the water and salts).

Since the stratigraphy of this area includes many clay rich layers, it is unlikely that infiltration from off-channel impoundments would result in saturated flow to existing groundwater aquifers. Bedrock wells in this area are typically several hundred feet deep (See tables Hydro-12-14 in the Hydrology Appendix).

Studies have shown that when high SAR water is stored in an impoundment which has an appreciable clay content, it can be expected that the clays will defloculate over a short period of time, and cause infiltration to cease. However, the exact duration required for this to occur has not been quantified (Bobst and Wheaton, 2004; Wheaton and Brown, in press). If the impoundments were to seal in this manor, it would be likely that the infiltrated water would become parked in a previously unsaturated zone, since the driving force would be shut off.

It is unclear how effective lining impoundments by plating permeable zones will be. Substantially different impacts may result if plating is not effective.

If the plating of permeable zones is effective, the native clays would defloculate over time and seal off the permeable zones. The impoundments would also be lined with native clays, which should deflocculate over time. If these lining/plating measures are effective at preventing significant infiltration, only a minimal quantity of water would infiltrate beneath the proposed impoundments. In that case, the water would likely become parked in a previously unsaturated zone, and not affect existing aquifers, and would not flow to outcrop to create impacts to surface resources.

If the plating of permeable zones is not effective, or if substantial leakage occurs through the pit lining, the infiltrated water would dissolve available soluble minerals from the shallow subsurface. Such soluble minerals are common in this region due to the semi-arid climate (i.e. the salts do not get flushed to groundwater). The dissolution of these minerals will cause the salinity of the infiltrated water to increase, with sulfate (SO_4^{-2}) and magnesium (Mg^{+2}) being the ions which increase most noticeably (Wheaton and Brown, in press). In some cases the salinity of the infiltrated water can exceed 100,000 mg/L of total dissolved solids (TDS). If infiltrated water were introduced to high quality groundwater it is likely that the class of use would be diminished for the groundwater within a limited geographic area around the area in which the infiltrated water was being introduced (particularly in the down-gradient direction). The geographic extent of noticeable effects would be dependent on the groundwater gradient, the rate at which the infiltrated water was being introduced, and the concentration of salts in the infiltrated water when it is introduced. If infiltrated water were to flow to outcrop and create seeps, it is likely that within the immediate vicinity of the seep impacts to soils and vegetation would occur. Soils could become noticeably more saline. Vegetation near such seeps could also be affected by these changes in soil salinity, with less salt tolerant species being displaced by more tolerant species. The geographic extent of such impacts would be dependent on the volume of water being discharged, the soils at the point of discharge, and the duration of discharge. If the seeps were to form close to surface waters, impacts to surface water quality could occur, with the magnitude of such impacts being dependent on the ratio of the surface water to seep water, and the quality of the seep water and surface water.

In order to manage potential impacts due to the leaking of impoundments, the MDEQ has included requirements to comply with a Ground Water Monitoring Plan to the MPDES permits associated with this project (MDEQ Draft MPDES permits MT-0030457 and MT-0030724). As is stated in the permits:

> *"The purpose of monitoring the quality of the ground water at impoundments used for the storage and beneficial use (livestock and wildlife watering) of the waters produced from the extraction of CBNG gas is to ensure the natural quality of the ground water is not impaired by the infiltration of the CBNG produced water. The objectives that must be*

considered in evaluating the potential for impacts to the quality of the uppermost ground water beneath all CBNG impoundments/ponds will include:

1. *Determining the depth to the first ground water and the direction of ground water flow in the immediate vicinity of the proposed impoundment location,*
2. *Providing current ground water quality and quantity information on the nature and hydrogeologic extent of this shallow ground water zone,*
3. *Submitting current analytical data on the quality of the CBNG produced water that will be discharged to the impoundment over the life of the impoundment,*
4. *Monitoring, assessing, and reporting any changes in the quality of the shallow ground water adjacent to the impoundment for the useful life of the impoundment,*
5. *Increasing monitoring, if the baseline ground water quality in the shallow aquifer is impacted, and*
6. *Implementing corrective action(s), if any ground water quality standard (ARM 17.30.1006) is exceeded in order to protect the quality of the ground water and maintain the beneficial uses of the original/baseline ground water classification in the first ground water in the area beneath the impoundment(s)."*

The MDEQ requirements include the inventory and monitoring of springs in the area of impoundments and the installation and monitoring of monitoring wells adjacent to the impoundments. As such, the MDEQ will require assessment of the hydrologic setting (objectives 1-3), monitoring of the groundwater system (objective 4) and the institution of corrective actions if adverse monitoring results occur (objectives 5 and 6).

The MDEQ monitoring requirements provide a means to determine if substantial infiltration has occurred, and provides a means to modify management practices if needed. It should be kept in mind that such monitoring would only detect infiltration after it had occurred. Thus, the hydrologic system may be "charged" with water by the time the infiltration is detected, and all impacts could not be avoided. As such, the MDEQ requirements will help to mitigate impacts; however they would not prevent impacts entirely.

Cumulative Effects to Hydrological Resources

Effects to Surface Water-CBNG Water Discharges to Surface Waters: There would be in an increase in the volume of produced water due to the wells from the Deer Creek North and Pond Creek PODs coming on-line. This increase would be in addition to the increase which would occur due to the Dry Creek and Coal Creek PODs. Additionally, under the cumulative impacts analysis the PRG Coal Creek discharge is assumed to discharge at its maximum allowable discharge of 2.5 cfs. All other existing discharges are accounted for by the Existing Conditions analysis (see Table Hydro-1 in the Hydrology Appendix). The same water balance for Fidelity's discharges as was used for the direct impacts analysis is used for the cumulative analysis.

Following the methodology described in section 4.1.4 of this EA the water quality in the Tongue River which cumulatively results from this alternative can be determined, as shown on Table 4.2.4-2.

Table 4.2.4-2: Alternative B: Fidelity's Proposal-Cumulative Impacts

	Flow Conditions	Winter (2490_0 gpm)			Spring (2384_0 gpm)			Summer (1262_850 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	1041	1.64	125	862	1.31	43	1337	1.78
	LMM	182	728	1.10	310	570	0.83	178	711	0.92
	HMM	232	652	0.97	1604	269	0.36	457	467	0.59
Tongue River Below Dam	7Q10	79	853	1.56	78	851	1.54	79	824	1.33
	LMM	180	687	1.22	229	643	1.12	277	599	0.95
	HMM	259	624	1.09	1416	400	0.65	573	498	0.78
Tongue River at Birney Day	7Q10	83	1024	1.95	83	1022	1.93	83	993	1.72
	LMM	183	764	1.43	235	696	1.29	244	671	1.13

	HMM	219	713	1.30	1099	397	0.68	551	503	0.84

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

Under the Cumulative analysis the PRG discharge is assumed to be discharging at 2.5 cfs (1122 gpm).

The results during LMM flows at the Birney Day School station show when compared to historical conditions there would be a 4.3% increase in flow, a 4.8% increase in EC, and a 35.4% increase in SAR. During 7Q10 flows there would be a 13.2% increase in flow, a 4.0% increase in EC, and a 39.9% increase in SAR when compared to historical conditions. When compared to the No Action Alternative, the LMM results represent a 0.7% increase in flow, a 1.1% increase in EC, and a 6.5% increase in SAR. The 7Q10 results represent a 1.9% increase in flow, a 1.0% increase in EC, and a 7.2% increase in SAR when compared to the No Action Alternative.

These results can be compared to the MDEQ and Northern Cheyenne standards for SAR and EC (see Table 3.4.1-4). During HMM and LMM flows, the mean monthly standards are not exceeded and during 7Q10 flows the instantaneous maximum standards are not exceeded. The results of this analysis indicate this alternative would not directly cause the beneficial uses of the Tongue River to become impaired due to either SAR or EC. Due to the decreasing rate of water discharge per well vs. time, these impacts would decrease with time and be primarily short term in nature.

A complete analysis of all parameters for which surface water quality criteria exist is conducted in conjunction with the issuance of MPDES permits by MDEQ (see Fact Sheet and EA for the renewal of MT0030457). The Draft EA for the Flow Based permit concludes that "Issuance of the permits ensures that standards for water quality will be met. Standards are protective of beneficial uses. Therefore impacts are minor and non-significant." (MDEQ, 2005). It should be noted that the MDEQ analysis looked at the impacts from both the Flow Based and Treatment permits discharging at the maximum allowable rates. As such, MDEQ analysis is more conservative than the analysis in this EA. This is due to this EA considering the volume of water that would be produced by particular the PODs in question rather than maximizing the permits. Since no standards are exceeded in the MDEQ analysis, none would be exceeded by this alternative. Therefore, it is anticipated Alternative B will not cumulatively cause impairment of the beneficial uses of the Tongue River.

Effects to Groundwater-Pumping from Coal Seams: All of the proposed CBNG wells would be produced from the Deer Creek North and Pond Creek PODs. As such, the area contained within the cumulative 20 foot drawdown contour would be expanded as a result of this alternative. As described in the direct impacts section of this alternative, the 20 foot drawdown contour will extend up to approximately 1.6 miles from the edge of the well field over 20 years. Since the edge of the field expands out as a result of Alternative B, the area foreseen to be within the 20 foot drawdown contour expands as well. The cumulative drawdown area that results when these wells are added to the foreseeable drawdown area has an area of approximately 378 mi^2. According to MBMG's GWIC database and the USGS's NHD dataset, there are 30 domestic or public water supply wells, 34 stock wells, 13 industrial or irrigation wells, 16 wells for which the use is not known, 377 monitoring or research wells, 21 unused wells and 9 springs within the cumulative 20 foot drawdown contour which results from Alternative B. These springs and wells are shown on Map Hydro-4, summarized on Table Hydro-11, and listed on Table Hydro-14 in the Hydrology Appendix.

As discussed in section 4.1.4 of this EA, those wells and springs that derive their water from the coal seams being developed and are located within the potential drawdown area, would be anticipated to have decreased yields as a result of CBNG related drawdown. Aquifers other than the coal seams being developed would be anticipated to be only minimally affected. Fidelity has certified 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. As discussed in Section 4.1.4, it is anticipated the measures required by this order would be effective for replacing water sources.

The groundwater modeling conducted in support of the MT FEIS anticipated that for a hypothetical CBNG field with 1,082 wells producing for 20 years, the produced coal seams would recover 70% of their

hydrostatic head within 5-12 years after the end of production. The exact radius of the drawdown cone and the time required for the head to recover, would depend on the site specific aquifer properties, the precise timing of the pumping of each of the wells, and the overall nature of CBNG development in this region. For additional general discussion of anticipated drawdown related impacts, see pages 4-61 to 4-63 of the MT FEIS and the associated groundwater modeling reports (Wheaton and Metesh, 2001, Wheaton and Metesh, 2002).

Effects from Impoundments: If the plating of permeable zones is not effective at preventing infiltration, impacts may result, as discussed in the direct impacts section. These impacts would not be cumulative since they would be limited to the vicinity of each impoundment, and not overlap to create impacts.

4.2.5 Indian Trust and Native American Concerns

Deer Creek North POD

Direct and Indirect Effects: There would be no impact to Indian Trust Assets. No tribal lands or leases are present within either POD boundary. Impacts to Hydrological Resources are discussed in the Hydrology Section of this chapter.

Drainage of Indian Mineral Resources: The nearest Crow Indian minerals are more than 11 miles to the west of the POD project area. Because of the pressure drawdown mentioned below, there would be no drainage of Crow mineral resources as a result of the approval of this project.

The nearest Northern Cheyenne lands are approximately 2 miles away (N½SW¼, Section 26, T. 8 S., R. 40 E.). Figure 6 of the Groundwater Impact Analysis submitted by Fidelity for the Deer Creek North POD shows the Deitz 1 and 2 outcropping prior to reaching the Northern Cheyenne minerals. Therefore, there will be no drainage in these two coal beds (they don't exist under the Northern Cheyenne minerals).

A study completed by the Reservoir Management Group of the Casper BLM office indicated the pressure would have to decline between 10 to 40 percent before gas would begin to desorb from the coals in the Powder River Basin. The Deitz 3 coal would have an initial pressure of 61 psi to approximately 365 psi. This coal would have to be drawn down at least six psi and as much as 36 psi before gas might desorb. The Monarch coal would have an initial pressure of 112 psi to approximately 443 psi. This coal would have to be drawn down at least 11.2 psi and as much as 44.3 psi before gas might desorb. The Carney coal would have an initial pressure of 171 psi to approximately 464 psi. This coal would have to be drawn down at least 17.1 psi and as much as 46.4 psi before gas might desorb. The drawdown required in the Deitz 3 before gas might be desorbed, would be 14 feet as a minimum and it could be as much as 84 feet. The drawdown required in the Monarch before gas might be desorbed, would be 26 feet as a minimum and it could be as much as 102 feet. The drawdown required in the Carney before gas might be desorbed, would be 39 feet as a minimum and it could be as much as 107 feet. It is possible that after 20 years, there might be some drainage of Northern Cheyenne minerals in the Deitz 3 coal (if that coal exists under their lands).

Table 4.2.5-1: Expected Drawdown per Coal Zone

Coal Bed	Min. Drawdown to desorb	Radius of Min. Drawdown
Dietz 3	14 feet	1.6+ miles
Monarch	26 feet	.13 miles
Carney	39 feet	.11 miles

Pond Creek POD

Direct and Indirect Effects: Impacts would be similar to those described for the Deer Creek North POD. No Indian Trust Assets are present within the POD boundaries. No tribal lands or leases are present. Hydrological impacts are discussed in the Hydrology Section of this chapter.

Drainage of Indian Mineral resources: The nearest Crow Indian minerals are approximately 2 miles to the west of the POD project area. Based on the minimum radius of drawdown shown below no Crow minerals will be drained.

The nearest Northern Cheyenne lands are approximately 2 miles away (N½SE¼, Section 27, T. 8 S., R. 40

E. Based on the minimum radius of drawdown, no Northern Cheyenne minerals will be drained.

Table 4.2.5-2: Expected Drawdown per Coal Zone

Coal Bed	Min. Drawdown to desorb	Radius of Min. Drawdown
Dietz 3	52 feet	.095 miles
Monarch	30 feet	.13 miles
Carney	45 feet	.11 miles

Cumulative Effects: There would be no cumulative impacts created by the Fidelity Pond Creek or Deer Creek North projects affecting Indian trust assets. The cumulative impact concerns expressed by the Northern Cheyenne Tribe for regional CBNG development activities and the non-energy related development projects on trust assets would continue as described in the MT FEIS.

4.2.6 Lands and Realty

Direct and Indirect Effects: BLM would issue four rights-of-way for actions occurring on BLM surface under this Alternative. The rights-of-way would authorize a buried 8-inch steel gas line, a buried 6-inch poly water line, buried poly gas lines, buried poly water lines, 3-phase .48 kV buried power lines, two-track access roads, buried 12-inch high pressure and 16-inch low pressure steel gas lines and a buried 3-phase, 3-wire, 14.4/24.9 kV power line. Fidelity proposes to construct containment reservoirs in this alternative. Two of these reservoirs (23-2191 and 33-2191) would be located on federal surface. A right-of-way would not be issued for the reservoirs at this time. If it is determined that the reservoirs are needed, Fidelity then would provide additional information and apply for a right-of-way. The acres disturbed and the types of impacts from construction activities are described in Sections 4.2.10, 4.2.11 and 4.2.12.

Cumulative Effects: BLM issued rights-of-way under this Alternative would be in addition to one existing BLM issued right-of-way. The acres disturbed and the types of impacts from construction activities for the rights-of-way issued under this Alternative would be a part of the acres of disturbance as described in Sections 4.2.10, 4.2.11 and 4.2.12. Land and mineral ownership would not change as a result of implementing this Alternative. There would be no effect to the intent of the KCLA Classification.

4.2.7 Livestock Grazing

Direct and Indirect Effects: Disturbance to livestock operations could occur during construction and drilling activities if livestock are in the project area. Approximately 688 acres of vegetation would be removed during construction activities, reducing the amount of forage available to livestock, equaling about 137 Animal Unit Months (AUMs). Following reclamation and during the production phase, approximately 407 acres and 81 AUMs would be lost prior to the area being reclaimed. Existing livestock water sources affected by CBNG production would be repaired or replaced in accordance with agreements between Fidelity and the water source owner. Some of the water produced with CBNG would be made available for livestock and crop irrigation as described in the Water Management Plan submitted with the POD. Additional water and water sources would provide more flexibility for livestock use and distribution in the project area. Better distribution of livestock and greater flexability related to season of use would improve the vegetation available to livestock and compensate for the AUMs lost to production facilities.

Cumulative Effects: Cumulative effects from implementing this Alternative would be the long term (>5 years) of approximately 407 acres of forage and 81 AUMs. The loss of AUMs could result in a loss of income to the livestock operator if replacement grazing areas were not available. After completion of final reclamation in the project area and addition of livestock water, the forage would become available and the AUMs restored. Additional water and water sources would provide more flexibility for livestock use and distribution in the project area. Better distribution of livestock and greater flexability related to season of use would improve the vegetation available to livestock. According to the MT FEIS, over the next 20 years, disturbances from CBNG development, conventional oil and gas development and surface coal mining activities could result in approximately 6,904 AUMs becoming unavailable to livestock operators during the mineral production phases.

4.2.8 Recreation and VRM

Direct and Indirect Effects: Full development of the PODs and the associated support facilities would

not curtail the recreational use of the area, due to limited opportunity and access through private lands. CBNG development would place production facilities on the landscape; however, under a Class III Management Objective, changes would be acceptable. Visual impacts, such as color contrasts from facilities and exposed soil would be reduced through use of standard environmental colors, minimizing surface disturbance and reclaiming disturbed areas with vegetative species native to the area.

Cumulative Effects: BLM does not control access or accessible surface acreage to affect scenic values of the region. The BLM does not require mitigation of visual impacts on private surface, in areas where the land base for development is predominantly private. The landscape character would be expected to be altered over time from a rural, natural setting to a developed setting. Overall, cumulative effects would be similar to those described under Alternative A.

4.2.9 Social and Economic Conditions

Direct and Indirect Effects: Over the next three years Fidelity would drill and complete 248 CBNG wells with 160 acre well density. One hundred and twenty-two fee wells and one hundred and twenty-six federal wells would be drilled and completed. Twenty-five wells (12 fee and 13 federal) would be dry holes. In addition, seventeen existing wells (15 fee and 2 federal) would be brought into production. If production occurs, 72 BCF of CBNG would be produced, from the 240 wells, having a gross value of 288 million dollars over the life of the wells. The private lessees would receive 18.8 million dollars of royalties and pay 2.8 million dollars in production taxes on the royalties. The Federal royalties would be 17.3 million dollars. The State would receive 25 million dollars in production taxes and receive 50 percent of the Federal royalties, 8.65 million dollars. Drilling, production and abandonment of the 248 wells would provide 112 temporary jobs with an estimated income of 3.4 million dollars over the life of the wells, which would enhance the social well being of those receiving this income.

Direct and Indirect Effects to Environmental Justice: Although Native American Reservations are located near the project area, they would not be affected because project employees would likely commute from Sheridan, Wyoming, which is located in the opposite direction from the Reservations. Therefore, no adverse human health or environmental effects would be expected to fall disproportionately on minority or low income populations from this alternative.

Cumulative Effects: The project would be an incremental addition annually, and approximately a 50 percent increase in the number of producing wells over three years, to the existing CX Field and the proposed projects in southern Big Horn County. The temporary development and production jobs, and the related supplies required to service the wells over the life of the projects would likely come from the Sheridan, Wyoming area. Sheridan is home to many of the employees from the Montana coal mines and the existing CBNG development in both Montana and Sheridan County. The economic effects would be within the scope of the analysis found in the CBNG MT FEIS (2003) pages 4-116 to 4-123, which is occurring at lower rates than projected. The impacts of CBNG development in Sheridan County are described in the Buffalo Field Office Plan Amendment FEIS (2003) pages 4-340 to 4-358. The jobs would offset some of the mining jobs lost due to production declines at the Montana mines, over the longer term, as contracts expire and productivity increases. The CBNG production taxes and royalties would also offset some of the reduced coal production taxes and royalties, even if the mines expand in the near term.

4.2.10 Soils

Direct and Indirect Effects: In the Deer Creek North Area, 99 new and four existing private wells on 30 locations, and 71 federal wells at 20 locations will be drilled (see Table 2.5-1). In the Pond Creek Area, 23 new and 11 existing private wells and 55 new and two existing federal wells will be drilled at 31 locations. Three off-channel impoundments would be constructed affecting approximately 34 acres. A treatment facility covering 2.2 acres will be developed.

Surface disturbance would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (approximate size of 6 feet wide x 15 feet long x 15 feet deep), and soil disturbance and compaction from vehicles driving to or parking at the drill site. Estimated disturbance associated with these wells would involve approximately one acre at each well site location for a total of 100 acres. Approximately one quarter of this acreage would remain in use after initial reclamation. Approximately 50

miles, of existing and proposed two track trails would be used for access. Two acres may be disturbed for compressor sites. Approximately 2.2 acres may be disturbed for the water treatment facility.

The majority of proposed pipelines (gas and water) would be located in "disturbance corridors." Disturbance corridors involve the combining of two or more utility lines (water, gas, power) in a common trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. Approximately 300 acres may be disturbed through the water management and construction; including use of the land application areas, impoundments, flowlines and the water treatment facility.

Approximately 26 miles of over head and 36 miles of under ground power line will be installed the two areas. Both methods will require vehicle traffic with minor soil disturbance for emplacement of power poles or plowing in power line.

Direct and indirect effects resulting from well pad, access roads, pipelines, powerlines and other activities may include removal of topsoil, soil compaction, mixing of soil horizons, exposure of soil, loss of soil productivity and increased susceptibility of the soil to wind and water erosion. Soil productivity would be eliminated within improved road corridors and limited along two track trails.

Soil Disturbances: Soil compaction by vehicle traffic results in the collapse of soil pores reducing the transmissivity of water and air. Compaction decreases infiltration thus increasing runoff and hazard of water erosion. The potential for compaction is greatest when soils are wet. Factors affecting compaction include soil texture, moisture, organic matter, clay content and type, pressure exerted, and the number of passes by vehicles or machinery.

Reduction of water and air movement in the soil, through a reduction of pore space, may limit plant uptake of water and nutrients and affect above ground plant health and growth. Compaction affects soil temperature, effecting the activity of soil organisms, rate of decomposition of soil organic matter, and subsequent release of nutrients.

The persistence of soil compaction is determined by the depth at which it occurs, the shrink-swell potential of the soil, and the climate. As the depth of compaction increases, compaction will be more persistent. The type and amount of clay determines the shrink-swell potential. The greater the shrink-swell potential and number of wet - dry cycles or freeze-thaw cycles, the lower the duration of compaction.

In some cases, as along heavily used two track trails, compaction will severely restrict soil transmissivity. Compaction in these areas may be reduced by remedial action, such as plowing or ripping. Compaction may be released naturally over decades of climatic cycles. Compaction in other areas, such as a few passes of vehicle traffic may collapse near surface soil pores, but leave deeper pores unaltered. Compaction may return to natural conditions within a few years.

Soil horizon mixing may result where construction of impoundments, roads, pipelines or other activities occur. Mixing of horizons may result in moving organic matter and nutrients to depths out of reach of surface plants. Mixing may also bring soluble salts or unweathered material to the surface affecting soil and plant health. Soil organisms may be displaced out of their living zone or exposed to unfavorable conditions and not survive. Surface floras are often dependent on conditions created by soil organisms and their health and survivability may be impacted. Species composition, above and below ground, may be altered.

Horizon mixing may bring soil texture and structure to the surface that are more susceptible to wind and water erosion. Organic and inorganic compounds that hold soil structures together may be exposed to conditions that destroy these compounds or decrease their effectiveness to create stabile soil structure. If soil structure is destroyed, surface infiltration by water and air may be effected. When topsoil is salvaged, mechanical displacement will damage soil structure. Salvage and storage of topsoil will allow further breakdown of structure and exposure of the material to wind and water erosion. Soil organic matter may be destroyed due to exposure with a loss of available nutrients. Inorganic compounds, such as carbonates and

other salts, may be brought to the surface which effect seed germination, plant health and viability.

Mixing or disturbance of horizons or removal of vegetation will modify the spectral reflectance of a site. This may result in lighter materials being brought to or exposed on the surface resulting in greater reflectance of solar radiation and decreased soil temperature. This will affect soil organism activity, their rate of decomposition of soil organic matter, and subsequent release of nutrients. Decreased temperatures may result in later germination of plants and reduction in plant growth and production. This may result in a reduction in soil protection from erosive forces. Species composition, above and below ground would be altered due to changes in soil temperature.

Erosion: National Soils Information System (NASIS) Potential erosion hazard ratings indicate the hazard or risk of soil loss in areas after activities have disturbed or exposed the soil surface. This includes sheet and rill erosion from exposed soil surfaces caused by various practices such as grazing, mining, fire, firebreaks, etc. (NRCS, 1998). Factors used to produce the rating include slope, erodibility of the soil, and the force that natural precipitation events have to dislodge and move soil materials.

4.2.10-1 Potential Erosion Hazard

	Acres in POD	Disturbed Acres	Percent of soil rating	Percent of disturbance
Deer Creek North				
Not rated	0	0	0.0	0.0
Slight	4022	371	9.2	61.4
Moderate	3452	196	5.7	32.5
Severe	658	37	5.6	6.1
Very severe	0	0	0.0	0.0
Total	8132	604	7.4	100.0
Pond Creek				
Not rated	743	29	3.9	4.2
Slight	2306	308	13.4	44.8
Moderate	5053	343	6.8	49.9
Severe	309	7	2.3	1.0
Very severe	50	0	0.0	0.0
Total	8461	687	8.1	100.0

Not rated are those areas not considered soil (shale outcrop). Slight indicates that erosion is unlikely under ordinary climatic conditions. Moderate indicates some erosion is likely; control measures may be needed. Severe indicates erosion is very likely; control measures for vegetation re-establishment on bare areas and structural measures are advised. Very Severe indicates significant erosion is expected; loss of soil productivity and off-site damages are likely; control measures are costly and generally impractical.

Disturbance calculations were produced using a buffer of 100 feet on both sides of linear disturbances, such as gas and water lines and a 100 feet buffer for point disturbances such as well pads. A portion of the buffer calculated, extended beyond the boundary of the PODs, as some soil disturbance would be needed to connect with adjacent infrastructure. This buffer would include visible soil disturbances such as buried lines, which may be a fraction of the calculated area, but also impacts such as soil compaction or damage to biologic soil crust due to incidental traffic or activities adjacent to the visibly disturbed areas.

The majority of the soil within the PODs and those soils disturbed, rate as slight to moderate potential erosion hazard. A conscious effort was made to avoid disturbing soils with severe and very severe potential erosion hazard. Effects to slight and moderate potential erosion hazard soils can be reduced or

eliminated using measures addressed in the reclamation and mitigation section below. Disturbance of areas of with moderate and severe potential erosion hazard will be monitored to ensure mitigation measures are in place and accelerated erosion is not occurring.

Soil erosion will affect soil health and productivity. The soils in the area are moderately susceptible to wind and water erosion. The Revised Universal Soil Loss Equation-Version 2, was used to examine potential erosion in the area. Erosion rates are site specific and dependent on soil, climate, topography, and cover. Examining the Thedalund series, one of the common soils upon which activities would occur, erosion rates on 8 percent, 200 foot slopes, covered by cool season grasses is calculated at 0.0013 tons per acre per year (t/ac/yr) and could be considered a natural rate of erosion. Erosion rates on the same slope under bare ground conditions calculate to a loss of 3.2 t/ac/yr. It is not expected that any activities would result in bare ground exposed for this distance. Thedalund has a T factor of 3, which means the soil can sustain soil loss at a rate of 3.0 t/ac/yr and still maintain a medium for plant growth (see reclamation and mitigation section for further explanation of T factor). T factors for other soil series are included in the POD documents. Loss of 1/32 of an inch of soil across an acre, represents a 5 ton per acre soil loss.

Reclamation and mitigation: Reclamation and mitigation measures for soil disturbances are described in the Plan of Development. These mitigation measures include: in areas of construction, topsoil would be stockpiled separately from other material and be reused in reclamation of the disturbed areas; construction activities would be restricted during wet or muddy conditions; construction activities would be designed following Best Management Practices (BMPs) to control erosion and sedimentation; erosion control measures will be maintained and continued until adequate vegetation cover is re-established; vegetation will be removed only when necessary; and cuts and fills for new roads would be sloped to prevent erosion and to promote revegetation.

Expedient reclamation of disturbed land with salvaged topsoil, proper seedbed preparation techniques, and appropriate seed mixes, as determined by the surface owner or surface management agency, along with use of erosion control measures (e.g., waterbars, water wings, silt fences, culverts, rip-rap, gabions, etc.) would ensure soil productivity and stability would be regained in the shortest time frame. Mitigation measures would limit impacts from soil disturbances.

One method of determining reclamation and recovery of disturbed areas is to examine the T factor of the soil. The T factor is the soil loss tolerance (in tons per acre) and is the maximum amount of erosion at which the quality of a soil as a medium for plant growth can be maintained. Many of the factors used to assign a T factor are important to vegetation response. The T factor is assigned according to properties of root limiting subsurface soil layers such as depth to bedrock, gravel substrate, and depth to salts among other site characteristics (see National Soil Survey Handbook, 1996 for further parameters). As limiting or less favorable soil layers become closer to the surface, the relative ability of a soil to maintain its productivity through natural and managed processes decreases.

4.2.10-2 T Factor

T Factor	Acres in POD	Disturbed acres	Percent of soil rating	Percent of disturbance
Deer Creek North				
Not rated	0	0	0.0	0.0
1	307	28	9.1	4.6
2	2401	122	5.1	20.2
3	2375	200	8.4	33.1
4	31	0	0.0	0.0
5	3019	254	8.4	42.1
Total	8132	604	7.4	100.0
Pond Creek				

Not rated	744	29	3.9	4.2
1	1217	124	10.2	18.1
2	4550	285	6.3	41.5
3	1346	146	10.8	21.3
4	0	0	0.0	0.0
5	604	103	17.0	15.0
Total	8461	687	8.1	100.0

Within the PODs, Deer Creek North has 42 percent and Pond Creek has 15 percent of disturbed areas with a T factor of 5. These areas will be relatively easy to reclaim and a quick vegetative recovery would be expected. As the T factor decreases, those areas disturbed would require increasingly more intense management to ensure vegetative recovery and to limit erosion from the disturbed areas.

Biological soil crusts: Open spaces in this region are commonly covered by biological soil crusts, a highly specialized community of cyanobacteria, green and brown algae, mosses, lichens and other organisms. Biological soil crusts are formed by living organisms and their by-products, creating a crust of soil particles bound together by organic materials. Crust presence and composition is determined by local conditions.

Crusts contribute to a number of functions in the environment. Because they are concentrated at the top of soil, they primarily affect processes that occur at the soil surface or soil-air interface. These processes include soil stability and erosion protection, water infiltration, atmospheric nitrogen fixation, nutrient contribution, and facilitate plant germination and growth.

Crusts are well adapted to severe growing conditions, but poorly adapted to compressional disturbances such as vehicle or livestock traffic. Compressional disturbances drastically reduce the capability of the soil organisms to function, particularly in providing nitrogen and other nutrients and soil stability. Studies of disturbance have noted that when losses of moss cover, lichen cover, and cyanobacteria are severe, runoff can increase by half, and the rate of soil loss can increase six times without apparent damage to surface vegetation (USDI, 2001).

Full recovery of crusts from disturbances is a slow process, particularly for mosses and lichens. This recovery can be complete in as little as one to five years given average climate conditions. However, crust thickness can take up to 50 years to recover, and mosses and lichens can take up to 250 years to recover (USDI, 2001).

Impoundments and Treatment Facility: The existing 23-0299 impoundment, located on private surface, is enclosed in a basin underlain by low permeable clay materials. The surface and near surface clays at this location are anticipated to limit subsurface infiltration. The Renohill and Winnett soils have been mapped in the area of the impoundment. The Renohill soil is silty clay with a high shrink-swell potential and bedrock at a depth of 20 to 40 inches. The silty clay texture and shallow bedrock would be an asset for the impoundment underlain with this soil as these characteristics would tend to limit subsurface infiltration. The Winnett soil is a clay soil with a high shrink-swell potential and shallow depth to bedrock of 20 to 40 inches. It would also be suitable for the impoundment due to the shallow depth to bedrock and moderate seepage potential. The surface and near surface clays at this site are anticipated to limit subsurface infiltration. However, the impoundment would be lined to further prohibit infiltration of stored water

The site of the proposed off-channel 34-3490 impoundment, proposed in conjunction with the treatment facility, is located on private surface and is an area of Harvey series. The Harvey series 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.

The site of the proposed off-channel 44-3490 impoundment, is in an area of Midway soils. The Midway is silty clay with a moderate shrink-swell potential and bedrock at a depth of 20 inches. The surface and near surface clays at this site are anticipated to limit subsurface infiltration. However, the impoundment would be lined with impermeable clay to further prohibit infiltration of stored water.

Reservoirs 23-2191 and 31-2991 are in areas of soil series Hydro and Thedalund. The Hydro is silty clay loam with a depth to bedrock of greater than 60 inches. The Thedalund is a loam with depth to shale bedrock of 20 to 40 inches. These soils have moderate amounts of clay to limit subsurface infiltration and would require lining to prohibit infiltration of stored water.

The site of the treatment facility is on two different mapping units, both containing Midway and Thedalund series. The Midway is silty clay with a moderate shrink-swell potential and bedrock at a depth of 20 inches. The Thedalund is a loam with depth to shale bedrock of 20 to 40 inches. The amount of clay in the Midway series will result in rutting and traffic concerns when wet and runoff and erosion concerns once compacted by traffic. Graveling the surface will reduce these impacts.

Cumulative Effects: Construction activities associated with implementing this alternative would impact approximately 687 acres during the short term (<5 years) and approximately 406 acres during the long term (>5 years). These disturbed acres are part of the cumulative impact analysis found in the MT FEIS. During the next 20 years, disturbances from CBNG development, conventional oil and gas development, coal mining, and other projects considered under the cumulative effects analysis would result in the short-term disturbance of about 132,000 acres of soil. These disturbances would be reduced to about 92,200 acres during the production phase of CBNG, conventional oil and gas activities and coal mining. Cumulative effects would result in lowered soil productivity and decreased soil health on these disturbed areas. During the production phase, soils would be taken out of production and may require a longer period of time to regain productivity than soils that are quickly reclaimed.

Agriculture activities such as cropping, livestock grazing, and its ancillary components continue in the area with its effects continuing to be localized and generally not impacting adjacent resources. Decker and Spring Creek coal mines, and their attendant transportation systems have impacted soils were these activities occur. Topsoil is generally salvaged and replaced over mined or disturbed areas. However, horizons are mixed, structure is destroyed, nutrients are lost, and surface and subsurface flora and fauna are modified. Reclamation has occurred on much of the disturbed areas, but new areas are continually being disturbed by mining activities. Reclamation will occur throughout the mined area once mining is complete. Soil formation in disturbed areas must start anew and it may be some time before soils are protected from erosion and productivity levels restored. Effects to adjacent resources were not significant.

Existing ongoing CBNG activity in Montana is occurring within the CX Field and in the Powder River Gas pilot project near the Tongue River Dam. Within these areas, local soil disturbance is occurring from infrastructure requirements. Infrastructure effecting soils includes improved roads, two track trails, well drilling sites, impoundments and pipeline emplacement. Effects to the soils are generally localized and include horizon mixing, compaction, structure destruction, loss of nutrients, productivity reduced, and surface and subsurface flora and fauna modification. Reclamation of these disturbed areas occur as quickly as feasible, but some erosion and loss of productivity will occur until appropriate cover is reestablished. Effects on the soil resources by these activities are generally local and do not impact adjacent resources

Existing and ongoing CBNG activity in Wyoming would not have an effect on the Montana soils.

4.2.11 Vegetation

Direct and Indirect Effects to Vegetation: Disturbance caused from drilling and construction of access roads, pipeline corridors, compressor sites, and treatment facility would remove vegetation from 158.4 acres in the Deer Creek North POD area and 163.2 acres in the Pond Creek POD area. The water management plan, including the off-channel impoundments would affect another 365.9 acres. Removal of this vegetation would remove the soil cover in these disturbed areas and reduce the amount of vegetation available to livestock and wildlife. Compaction by equipment traffic would damage vegetation and affect productivity. Vegetative productivity would be restored through reclamation and elimination of vehicle travel. Seed mixtures used in reclamation would be determined by the surface owner or the surface management agency. It would be expected that 29.2 acres of vegetation in the Deer Creek North POD area would remain disturbed during the production phase of the project. Approximately 20 acres of vegetation in the Pond Creek POD area would remain disturbed during the production phase of the project.

Approximately 358 acres would remain disturbed in association with the water management plan's off-channel impoundments in the project area.

The stock tank proposed for BLM surface in T. 9 S., R. 41 E. Section 11 in the Deer Creek North POD will provide water for livestock in an otherwise dry pasture. The pasture was watered by a reservoir that has been dry for many years. Two stock tanks proposed for public domain surface in the Pond Creek POD (T. 9 S., R. 39 E. Sections 26 and 27) will provide water for livestock and wildlife. These tanks will disperse livestock grazing and improve utilization patterns.

Direct and Indirect Effects to Special Status Species: Though suitable habitat exists in the project area, impacts to Montana Plant Species of Special Concern are not expected from CBNG activity in the project area. Topography and slope associated with habitat for Nuttall's desert-parsley (*Lomatium nuttallii*) and Woolly twinpod (*Physaria didymocarpa var. lanata*) make it unlikely that drilling activity would occur in these areas. Wells are usually located in areas easily accessible to drilling rigs and other equipment. Where possible, pipeline corridors for water, power and gas would be located along existing two tracks. Habitat for Barr's milkvetch (*Astragalus barrii*) is more accessible and could be impacted by CBNG activity, though unlikely.

Direct and Indirect Effects to Invasive Species: Surface disturbance associated with construction of proposed access roads, pipelines and water management facilities would present opportunities for weed invasion and spread. Implementation of activities under this alternative would create a favorable environment for the establishment and spread of noxious weeds/invasive plants, such as salt cedar, Canada thistle, leafy spurge and spotted knapweed. However, implementation of reclamation measures and measures proposed in the POD(s) to control noxious weeds would ensure that potential impacts from noxious weeds and invasive plants would be minimal.

Cumulative Effects: During the production phase, 406.7 acres of vegetation would remain disturbed in addition to acres disturbed by other activities in the CX Field and the Decker and Spring Creek coal mines. Species composition of some areas may be altered as a result of produced water becoming available to livestock operations. New sources of available water could provide opportunities to rest areas currently receiving long periods of use. The health and productivity of vegetation and the vegetative community could be altered by grazing without adequate deferment in areas currently not grazed. According to the MT FEIS, approximately 74,000 acres could be disturbed as a result of future CBNG development.

4.2.12 Wildlife

Direct and Indirect Effects: The types and extent of impacts to wildlife species and habitats from CBNG development are discussed in detail in the MT EIS (Chapter 4, pages 4-160 to 4-196). Those discussions apply directly to this project and provide a basis for the site specific assessment of impacts to individual species as well as groupings of species that would occur in the Fidelity Deer Creek North and Pond Creek POD.

Direct impacts include loss of habitat from CBNG infrastructure, direct mortalities resulting from collisions with vehicles and powerlines, electrocutions from powerlines, and displacement of wildlife species as a result of initial disturbance caused by human presence. Indirect impacts would include habitat fragmentation and subsequent vehicle traffic, human presence, and other continual CBNG activities.

This alternative (both POD's combined) includes the construction of 7.2 miles of new, permanent all weather roads, 43.5 miles of new improved two-track trails and other infrastructure facilities (see Chapter 2.) The CBNG infrastructure for the entire proposal would result in the direct loss of about 406.7 acres of habitat, after reclamation occurs. Although bladed corridors would be reclaimed after the facilities are constructed, some changes in vegetation would occur along the reclaimed areas. Reclamation is an attempt to restore disturbed areas to pre-disturbed conditions and to stabilize soils. Reclamation will not always mimic pre-disturbance conditions and offer the same habitat values to wildlife species. Sagebrush obligates, including some species of songbirds and sage grouse, would be most affected by this change.

Direct impacts also include wildlife mortalities related to collisions with vehicles. Additional CBNG wells

and infrastructure would require an increase in vehicle traffic, and the potential for vehicle/wildlife collisions would also increase. Species including deer, birds, reptiles and small mammals would most likely be affected.

Overhead powerlines would be constructed with strict raptor protection guidelines, and would minimize potential electrocution areas, as well as deterring raptors from perching where electrocution may occur. However, raptor mortalities occur even with properly installed raptor protection devices. Aerial powerlines also pose a collision hazard to all avian species, especially raptors and upland game birds.

Indirect impacts may include increased displacement of wildlife species sensitive to human activities, require large blocks of uniform cover, or are displaced by other species (MT FEIS, pages 4-164, 172,and 173), species may include sage grouse, songbirds and elk. Vegetative changes from pre-disturbance conditions would also affect wildlife forage and habitat and would displace wildlife species to areas that may not provide similar habitat qualities.

Some of the well site locations and associated infrastructure for the Pond Creek POD would be adjacent to previously authorized CBNG development (Dry Creek). In addition, a portion of the Deer Creek North POD is also adjacent to previously authorized development (Coal Creek). Depending on proximity to existing disturbance and species tolerance, wildlife species within these areas would have acclimated to the surrounding conditions, previously been displaced by construction activities, or displaced to other areas with preferred habitat.

4.2.12.1 Threatened and Endangered Species

As mentioned previously in section 3.12.1, three bald eagle nests are located within a six mile radius of the Deer Creek North POD, and the same three are located within an eight mile radius of the Pond Creek POD. The nearest bald eagle nest is located approximately 4 miles to the southwest of the Deer Creek North POD, and 2.5 miles south of the Pond Creek POD. However, the water management plan for this project would tie in with other previously approved PODs. Under this alternative, a proposed water treatment facility would be located within the Coal Creek POD, approximately 1 ¼ mile from one of the active bald eagle nests. Disposal of waste from the water treatment facility would occur with truck transport. Haul trucks would most likely be within line of sight of the nest. Other current impacts within this area include existing CBNG development and a major highway located approximately 1 ¼ mile to the north of the nest. With the amount of disturbance currently ongoing within this area, it is anticipated this pair of bald eagles have habituated somewhat to these types of disturbances. It is unknown if additional vehicle traffic in this area, as a result of the water treatment facility would cause nest failure or abandonment.

Some human-related disturbance activities are located adjacent to the other active bald eagle nests within the project area. This includes existing CBNG development, a major highway, county roads, powerlines, etc. This proposal may affect bald eagles from an increase in traffic associated with additional development, increased human disturbances, and additional powerlines within each nesting bald eagle home range, as well as winter migrations. This proposal would also add additional power lines, which may increase the potential for electrocutions or collisions. BLM, in consultation with the FWS, has determined this project is “likely to adversely affect” bald eagles (see BLM’s Biological Assessment). This determination was made considering the increased vehicle traffic, addition of overhead powerlines and disturbance. The FWS’s biological opinion concurs with BLM’s assessment, which states, “It is the Services biological opinion that the direct and indirect effects of the project, as proposed, fall within the effects analyzed in the programmatic biological opinion, and are not likely to jeopardize the continued existence of the bald eagle.”

As mentioned in section 3.12.1, potential habitat does exist within both POD’s to support black-footed ferrets. BLM determined this action is “not likely to adversely affect” black-footed ferrets in the project area (BA to FWS, dated June 24, 2005, BLM files). No direct or indirect impacts to ferrets are anticipated due to the extremely low likelihood of black-footed ferret occupation of black-tailed prairie dog towns within the project area.

4.2.12.2 Big Game Species

Mule deer would be impacted by this project from habitat fragmentation and disturbance. Mule deer winter range habitat occurs within all of the Pond Creek POD, and the majority of the Deer Creek North POD. Development would affect mule deer use and access to crucial winter range in these areas. Deer would likely reduce their use of this area in the short term, and as the project moves into production and the level of human activity is reduced, some of the mule deer would be expected to become habituated to development and continue to utilize these areas.

Although pronghorn winter ranges have not been identified within the project area, pronghorn were observed within the Pond Creek POD during several winter flights conducted by HWA in 2005. Impacts, similar to those described for mule deer are expected from development activities.

Surveys have not been conducted for elk within the Deer Creek North POD, but they have been observed within this area by BLM biologists on several occasions. Anecdotal evidence also suggests elk heavily occupy this area at least during the breeding season. Elk may be the least tolerant to disturbances of all the resident big game species within this area, and impacts to elk are expected to be impacted greater than mule deer and/or pronghorn.

Under this alternative, CBNG activities would be restricted in mule deer winter range habitat from December 1 to March 31. This timing stipulation would minimize impacts during periods of extreme winter weather.

Three off channel water impoundments are proposed under this alternative, which will inundate some sagebrush habitat utilized by big game, but will also create watering sources for big game species occupying this area.

4.2.12.3 Upland Game Birds

Sage and sharp-tailed grouse would be impacted by this project from habitat fragmentation and disturbance. Vehicles and human activity during breeding and nesting seasons may negatively impact breeding activity, displace nesting hens and reduce the suitability of habitat for brood-rearing. Mortality may increase as a result of collisions with vehicles. Under this alternative, timing stipulations for protection of grouse at the lek, and protection of brood-rearing habitats would exist. Restrictions on compressor decibel levels would be set. These stipulations would help minimize impacts within key habitats for grouse.

One existing impoundment is proposed for continued use in the Pond Creek POD. This playa pond is located on private surface/private minerals and is used as part of the previously approved Dry Creek POD for discharge of water from federal CBNG wells. It will also be used for discharged water from federal wells in the Pond Creek POD. This playa pond is located approximately .14 miles from the "BI-10A" sage grouse lek. The direct effects of the existing playa pond on attendance at the lek are unknown (Brett Walker, personal communication), as is the potential for this pond to attract predators to this area. Predation may result in sage grouse abandoning or "flushing" from the lek when alarmed. This may interfere with sage grouse's ability to successfully breed. Also, the potential of this pond attracting waterbirds and the relationship to WNV is unknown.

Some compressor facilities for this project have been previously authorized, and additional compressors are proposed. Measured decibel levels from similar compressor facilities are within the decibel limits established in the MT FEIS to effectively reduce impacts of noise to susceptible wildlife species.

The three off channel impoundments proposed under this alternative are proposed within habitat suitable for sage grouse occupation. Sage grouse sign was found within two of the three impoundments. Construction of the impoundments would inundate sagebrush habitats used by grouse at least seasonally. Conversely, impoundments may also provide a potential watering source and brood rearing environment for grouse.

4.2.12.4 Raptors

As mentioned in 3.12.4, a total of 38 documented raptor nests occur within the project area. Some nests are exposed daily to varying degrees of disturbance from previous CBNG activities and vehicle traffic from

the existing CX field, as well as other activities. It is anticipated these breeding pairs of raptors have acclimated to ongoing activities and disturbances, and have tolerated this level of disturbance. However, the threshold for tolerance to additional disturbance and vehicle traffic or human activities as a result of the completion of additional federal wells is unknown. The nests which are located in relatively undisturbed areas will have the greatest chance of failure or abandonment when CBNG activities occur in these areas.

The Condition of Approval to prevent surface disturbing activities and associated disturbance around active nests, during nesting periods, would apply under this alternative. Population declines of raptor groups would occur until the thresholds for tolerance of activities increased for raptors.. Populations may not recover to pre-disturbance levels.

Several nests reported as inactive for the last two or more years are located within the project area (see Chapter 3). No mitigation is required to protect inactive nests under any of the alternatives. Depending on species tolerance to disturbance (prairie falcon vs. red-tailed hawk), the opportunity may or may not exist to re-use these nesting substrates in the future.

4.2.12.5 Prairie Dogs and Associated Species

Several black-tailed prairie dog towns exist within the project area. Approximately 57 acres are part of the federal action, all on private surface. Where possible, CBNG infrastructure is proposed to avoid prairie dog towns. Corridors were moved at least to the edge of prairie dog towns. Existing two tracks that cross prairie dog towns will be used to access well sites. Impacts that may occur to prairie dog towns include mortalities from vehicles and improved access to these areas where prairie dog shooting may occur or increase. CBNG development may increase the spread of prairie dog towns by providing short term disturbed areas such as bladed pipeline corridors and other areas conducive to prairie dog establishment.

Impacts to species associated with black-tailed prairie dogs include disturbance from vehicle traffic, human presence, and potential mortalities resulting from collisions with vehicles. Burrowing owls, a designated BLM Sensitive Species, have been documented to occupy prairie dog habitats within the project area. On the Deer Creek North POD, one planned access route to a federal well, along with the Bittercreek pipeline, will pass approximately ¼ mile from one active burrowing owl nest. Two nests are located approximately 3/8th of a mile from a proposed access route and 3/16th of a mile from a major county road. It is unknown if increased vehicle traffic and disturbance would cause burrowing owls to abandon this area.

Currently, three inactive burrowing owl nests are located on the Pond Creek POD. According to Spring Creek Mine surveys, two of the three burrowing owl nests were active until 2002, when flooding by CBNG discharge occurred on a large portion of the prairie dog colony where the nests were located. These burrowing owl nests have not been active since the creation/utilization of this playa pond impoundment. This playa pond is located on private surface/private minerals, but water produced from federal wells in the Pond Creek POD will also be discharged at this impoundment.

Like most wildlife species, burrowing owls may vary in degree of tolerance to disturbance. It is unknown if nesting burrowing owls will be able to tolerate CBNG activities associated with this proposal.

Prairie dog colonies in the area also provide potential habitat for mountain plovers. Surveys have been performed by HWA specifically for mountain plovers within the project are in 2003 and 2004, and no mountain plovers were seen or heard during the surveys. If potential suitable habitat does in fact exist for mountain plovers, then CBNG activities proposed within this area would reduce potential habitat suitability for plovers in this area.

Many other species have been documented utilizing prairie dog colonies. Impacts to those species would resemble impacts described above for other species.

4.2.12.6 Migratory Bird Species

As discussed previously, 104 species of birds were identified as inhabitants of this portion of southeast Montana and an additional 55 species are possible/probable inhabitants. With the impacts associated with CBNG development, it is reasonable to assume there would be impacts to nesting and migrating

neotropical bird species. The primary impacts to these species would include loss of or disturbance to nesting habitat, improved habitat for undesirable competitors and/or a species shift to disturbance associated species and increased vehicle collisions.

Three impoundments proposed under this alternative would create habitat for waterfowl, shorebirds, and some species of songbirds and would reduce available habitat for sagebrush obligate songbirds.

4.2.12.7 BLM Sensitive Species

Other than the BLM designated sensitive species discussed previously, current data suggests those sensitive species that could inhabit the project area either occur in low numbers or have not been documented in recent surveys. Impacts to sensitive species would be associated with habitat fragmentation, mortality related to CBNG infrastructure construction/maintenance and increased human activity, and conversion from a sagebrush/grassland/forb community to a grassland dominated vegetative community. Due to small numbers or the absence of species, the loss of habitat and the increased disturbance would not affect long term presence in the project area.

Cumulative Effects to Wildlife: Construction of roads, production well pads, and compressor sites would result in the long term (>5 years) loss of habitat and forage on approximately 612 acres in the project area. This would be in addition to acres disturbed and not reclaimed for production activities in the CX field, along with acres disturbed by the Decker and Spring Creek Coal Mines. Additional mortalities to wildlife would occur from collisions with vehicles and powerlines because of additional roads and increased vehicle traffic, and additional aerial powerlines.

Indirect impacts would occur from habitat disturbance and human presence. A ½ mile buffer around both POD boundaries was used to calculate the acres indirectly affected by implementing actions under all alternatives. Approximately 30,400 acres would be indirectly affected because human activities would disturb or inhibit wildlife in these areas, and render them less suitable to wildlife. Additionally, approximately 120,000 to 140,000 acres of wildlife habitat are indirectly impacted by existing CBNG and coal mine developments within the project vicinity in Wyoming and Montana. As new CBNG development occurs, direct and indirect impacts would continue to stress wildlife populations, most likely displacing the larger, mobile animals into adjacent habitat, and increasing competition with existing local populations. Non-mobile animals would be affected by increased habitat fragmentation and interruptions to preferred habitats.

Certain species are localized to the area and rely on key habitats during critical times of the year. Disturbance or human activities occurring on winter range for big game, nesting and brood-rearing habitat for grouse and raptors could displace some or all of the species using a particular area or disrupt the normal life cycles of species. Wildlife and habitat in and around the project would be influenced to different degrees by various human activities. Some species, such as mule deer, are better able to adapt to these human influences over time.

4.2.12.8 Fisheries/Aquatics

Direct and Indirect Effects to Fisheries and Aquatics: Potential impacts to aquatic species include: increased erosion from road, pipeline, reservoirs and well pad construction; changes in water quality and streamflows due to the discharge of produced CBNG water into the Tongue River and drawdown effects on springs. There would be “no effect” to the endangered pallid sturgeon. This is due to: (1) No habitat present in the project area (nearest habitat is located within the Yellowstone River, which is approximately 185 miles downstream) and (2) the low amount of discharged flow and drainage area affected when compared to the flow and drainage area of the Yellowstone River.

Erosion: Effects on aquatic species from increased erosion would be minor due to no on-drainage impoundments (reservoirs), design criteria for roads, pipelines and reservoir construction and mitigation measures designed to reduce erosion.

Water Quality: Effects on aquatic species from changes in water quality would be minor and not detrimental. The EC, SAR, and other water quality parameters (such as water temperature, ammonia,

calcium, etc.) would meet state water quality standards within the Tongue River (refer to Section 3.41 Hydrology). This would be accomplished by using a mixing zone within the Tongue River and/or water treatment, which would provide protection and limit effects to aquatic life.

The volume of untreated water discharged would increase by 632 gpm (1.41 cfs) in the winter, 700 gpm (1.56 cfs) in the spring, and would decrease by 210 gpm (.47 cfs) in the summer when compared to Alternative A (cumulative effects). The amount of treated discharge would increase by 850 gpm (1.89 cfs) in the summer, only. This discharge will be between 55.4 and 62 degrees F. Natural stream temperatures of the Tongue River at the state line ranged from 41.9 to 84, 32 to 57, and 32 to 46 degrees F in the summer, spring and winter months, respectively.

The MDEQ in its SOB addressed bicarbonate and determined it did not have the potential to exceed the narrative standard. A brief analysis, which uses the water quality values from the MDEQ MPDES Draft permits (discharge of 1,262 gpm (summer) of untreated CBNG water with HCO3=1405 mg/l, and discharge of 850 gpm (summer) of treated CBNG water with HCO3=290 mg/l), and 7Q10 flow at the state line station (43 cfs and HCO3=280 mg/l) indicates the resulting stream bicarbonate concentration (348 mg/l) is well below the 530 mg/L threshold recommended by Horpstead et. al (2001), which was based on the potential to cause impacts to aquatic life (Mount et al., 1997).

Streamflows: Effects from increased streamflows would be minor and not detrimental. The maximum water discharged with this alternative (1.56 cfs above the current amount of discharge (see Alternative A)) is minor when compared to the flows in the Tongue River. At the low monthly 7Q10 (43 cfs upstream of the dam at the state line), the increased discharge would only constitute 3.63 percent of the flow. These increased flows would not exceed the current amount permitted by MDEQ.

Springs: Springs provide habitat for aquatic macro-invertebrates and amphibians. There is little to no potential to affect the flow rates of springs, which are currently contained within the drawdown. It is unlikely springs are receiving water from coal seams being developed, thus it would not be impacted by drawdown (see Section 3.4.2 - Hydrology).

Determination: Impacts to aquatic species that inhabit these areas would be minor for the following reasons; (1) untreated water discharged directly into the Tongue River would not exceed the flow based permit for untreated discharge or the treated water discharge permit approved by MDEQ, (2) changes in the water quality are expected to be minor and not detrimental, due to the amount of discharged flow when compared to the flows in the Tongue River. At the low monthly 7Q10 (43 cfs upstream of the dam at the state line), the maximum increased discharge would constitute 3.63 percent of the flow, (3) mitigation measures designed to reduce potential erosion and ensure adequate water quality for aquatic life, (4) no on-drainage impoundments (reservoirs) would be constructed with this project., and (5) it is anticipated springs would not be affected by the drawdown area, since they are not receiving water from the coal seams being developed.

Cumulative effects to Fisheries/Aquatic life within the Tongue River Drainage: Potential cumulative effects could occur from the implementation of this alternative when combined with relevant/foreseeable actions (see Alternative A) and past/ongoing activities (associated with the existing condition (see chapter 3). As mentioned in the direct effects analysis, effects on aquatic species from changes in water quality would be increased for the winter and spring seasons. Effects from erosion and changes in streamflows could occur. As a result, there is an increased potential for cumulative effects on aquatic species and habitat, in addition to those identified in Alternative A.

4.2.12.9 West Nile Virus

The potential to increase mosquito habitat exists under this Alternative if impoundments are constructed. Construction of these impoundments would add more areas of standing water in the vicinity of the project area. Instances of WNV could increase. However, other factors affect the spread of the disease, such as irrigation of crops, natural wetlands, stock water impoundments and environmental influences. State and/or county health and human service and/or public pest management agencies could require some form of mosquito control.

4.3 EFFECTS FROM ALTERNATIVE C

- PODs proposal, while limiting CBNG produced water management to the use of three proposed lined impoundments, previous approved lined impoundments, beneficial uses, untreated discharge and previous approved irrigation units. Mitigating measures not already part of the operator's proposal are included as part of this alternative.

4.3.1 Air Quality

Direct and Indirect Effects: The direct and indirect effects associated with this alternative are expected to be the same as those in alternative B.

Cumulative Effects: The cumulative effects associated with this alternative are expected to be the same as those in alternative B.

4.3.2 Cultural Resources

Direct and Indirect Effects to Cultural Resources: Direct and Indirect Effects to cultural resources would be the same as those outlined for Alternative B. Both direct and indirect effects would be mitigated through monitoring requirements for APD and rights-of-ways in both PODs. Monitoring would also be stipulated for those sites within 100 feet of proposed developments. This would reduce the possibility of adverse effects to eligible sites or disturbance to sites where eligibility is not determined. Areas to be monitored in the Deer Creek North POD include the utility corridor from the 44-0491 Well to the drop point for the 24-0491 Well and the Utility Corridor from the 22-1591 Well to the Ranchholme 14 Battery. Both areas have potential for buried cultural resources. Pond Creek POD areas to be monitored include the utility corridor to the 21-1199 Well, the Utility corridor from the 34-1199 Well, the Utility Corridor to the 41-1299 Well; the utility Corridor to the 32-1199 Well; the Utility Corridor between the CX12 Battery and Well 14-1299, the utility corridor to the 32-0299 Well; the utility corridor to the 41-2299 Well and portions of the utility corridor between the CX14 Battery and the 24-1099 Well. BLM will also periodically monitor selected sites recorded in both PODs to establish long term trends in site impacts and to fulfill the monitoring requirements listed in 2003 FEIS for Coal Bed Methane Development.

Direct and Indirect Effects to Traditional Cultural Values: On-site meetings with the Northern Cheyenne THPO on April 1, 2005 for the Deer Creek North POD and on April 8, 2005 for the Pond Creek POD did not identify any areas of concern. However in the case of the Deer Creek POD, the Northern Cheyenne suggested they would withhold a determination of effect in case of unanticipated discoveries. In order to lessen possible impacts to Northern Cheyenne Cultural Resources and to address their concerns, representatives from the Tribe would be invited to participate in the monitoring outlined above.

Direct and Indirect Effects to Paleontological Resources: Direct and Indirect Effects to Paleontological Resources would be the same as those listed for Alternative B. However, if significant vertebrate fossil localities were encountered during construction, BLM requirements for dealing with paleontological resources would be followed as prescribed in BLM Manual 8270 and Handbook 8270-1.

Cumulative Effects: Cumulative Effects would be the same as those outlined for Alternatives A and B. Effects to sites would be reduced through the monitoring requirements outline above. This requirement would be consistent with BLM's policies for managing cultural resources. Cumulative Effects would be the same as Alternative B for Paleontological Resources.

4.3.3 Geology and Minerals

Direct and Indirect Effects to Coal Bed Natural Gas: Same as Alternative B.

Methane Migration: Same as Alternative B.

Direct and Indirect Effects to Coal: Same as Alternative B.

Cumulative Effects: Same as Alternative B.

4.3.4 Hydrology

Direct and Indirect Effects to Hydrological Resources

Effects to Surface Water-CBNG Water Discharges to Surface Waters: There would be in an increase in the volume water produced due to the wells from the Deer Creek North and Pond Creek PODs coming on-line. This increase would be in addition to the increase which would occur due to the Dry Creek and Coal Creek PODs. The water balance for this alternative was developed by assuming the Draft Flow Based MPDES permit (MT0030457) would be approved by the MDEQ with no major modifications. However, the Draft Treatment MPDES permit (MT0030724) would not be approved. The produced water could be managed via the Flow Based permit, beneficial uses (industrial uses in the Springs Creek Coal mine, drilling, construction, dust suppression, and livestock and wildlife water) and through the use of impoundments and irrigation areas. Projected water management practices are shown on Chart Hydro-5 in the Hydrology Appendix. The maximum total volume of discharge occurring under this alternative would be during the winter of 2006-07, when 2,500 gpm of untreated discharge would occur. The maximum discharge that occurring in the spring would be 2,172 gpm of untreated discharge in 2006. The maximum discharge occurring in the summer would be 1,600 gpm of untreated discharge in 2006. As shown on Chart Hydro-6 in the Hydrology Appendix, these discharge values would be under the limits in the Draft MPDES permits at all times.

Following the methodology described in the direct impacts analysis in section 4.1.4 of this EA, the water quality in the Tongue River which cumulatively results from this alternative can be determined, as shown on Table 4.3.4-1.

Table 4.3.4-1: Alternative C: Impoundment and Irrigation-Direct Impacts

	Flow Conditions	Winter (2500_0 gpm)			Spring (2172_0 gpm)			Summer (1600_0 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	1041	1.64	125	858	1.27	41	1377	1.93
	LMM	182	729	1.10	310	567	0.80	176	720	0.97
	HMM	232	652	0.97	1604	268	0.35	455	470	0.61
Tongue River Below Dam	7Q10	77	854	1.54	76	850	1.48	76	838	1.37
	LMM	178	686	1.20	227	640	1.08	274	603	0.97
	HMM	257	624	1.08	1414	398	0.64	570	499	0.79
Tongue River at Birney Day School	7Q10	81	1025	1.94	80	1021	1.87	80	1007	1.76
	LMM	181	763	1.42	232	693	1.25	241	675	1.15
	HMM	217	713	1.29	1096	396	0.66	548	504	0.85

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

The results during LMM flows at the Birney Day School station show when compared to historical conditions there would be a 3.3% increase in flow, a 4.3% increase in EC, and a 31.4% increase in SAR. During 7Q10 flows there would be a 10.2% increase in flow, a 3.8% increase in EC, and a 35.6% increase in SAR when compared to historical conditions. When compared to the No Action Alternative, the LMM results represent a 0.5% increase in flow, a 0.8% increase in EC, and a 4.7% increase in SAR. The 7Q10 results represent a 1.4% increase in flow, a 0.7% increase in EC, and a 5.2% increase in SAR when compared to the No Action Alternative.

These results can be compared to the MDEQ and Northern Cheyenne standards for SAR and EC (see Table 3.4.1-4). During HMM and LMM flows the mean monthly standards are not exceeded and during 7Q10 flows the instantaneous maximum standards are not exceeded. The results of this analysis indicate this alternative would not directly cause the beneficial uses of the Tongue River to become impaired due to either SAR or EC. Due to the decreasing rate of water discharge per well vs. time, these impacts would decrease with time and be primarily short term in nature.

A complete analysis of all parameters for which surface water quality criteria exist, is conducted in

conjunction with the issuance of MPDES permits by MDEQ (see the MDEQ Draft EA for the renewal of MT0030457, and the issuance of MT0030724, along with the Draft permits, Fact Sheet for MT0030457, and Statement of Basis for MT0030724). The Draft EA for the permits concludes that "Issuance of the permits ensures that standards for water quality will be met. Standards are protective of beneficial uses. Therefore impacts are minor and non-significant." (MDEQ, 2005). It should be noted the MDEQ analysis looked at the impacts from both the Flow Based and Treatment permits discharging at the maximum allowable rates. As such, the MDEQ analysis is more conservative than the analysis in this EA. This is due to this EA considering the volume of water discharged by the PODs in question, rather than maximizing the permits. Since no standards are exceeded in the MDEQ analysis, none would be exceeded by this alternative. Therefore, it is not anticipated that Alternative C would directly impair the beneficial uses of the Tongue River.

Effects to Groundwater-Pumping from Coal Seams: Impacts to groundwater from the removal of water from coal seams would be the same as described under Alternative B since the same number of wells at the same locations would come on line at the same time.

Effects from Impoundments: Impacts from impoundments would be the same as under Alternative B, except the impoundment associated with the water treatment plant (34E-3490) would not be constructed under Alternative C. This would reduce the total disturbance by approximately 1.25 acres, and reduce the avalible storage by approximately 17 acre-feet.

Cumulative Effects to Hydrological Resources

Effects to Surface Water-CBNG Water Discharges to Surface Waters: There would be in an increase in the volume of water produced due to the wells from the Deer Creek North and Pond Creek PODs coming on-line. This increase would be in addition to the increase which would occur due to the Dry Creek and Coal Creek PODs. Additionally, under the cumulative impacts analysis the PRG Coal Creek discharge is assumed to discharge at its maximum allowable discharge of 2.5 cfs. All other existing discharges are accounted for by the Existing Conditions analysis (see Table Hydro-1 in the Hydrology Appendix). The same water balance for Fidelity's discharges as was used for the direct impacts analysis, is used for the cumulative analysis.

Following the methodology described in section 4.1.4 of this EA, the water quality in the Tongue River which cumulatively results from this alternative can be determined, as shown on Table 4.3.4-2.

Table 4.3.4-2: Alternative C: Impoundment and Irrigation-Cumulative Impacts

	Flow Conditions	Winter (2500_0 gpm)			Spring (2172_0 gpm)			Summer (1600_0 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	1041	1.64	124.7	858	1.27	41	1377	1.93
	LMM	182	729	1.10	310	567	0.80	176	720	0.97
	HMM	232	652	0.97	1604	268	0.35	455	470	0.61
Tongue River Below Dam	7Q10	79	853	1.56	78	848	1.50	78	837	1.39
	LMM	180	687	1.22	229	641	1.10	276	604	0.98
	HMM	259	624	1.09	1416	399	0.65	572	500	0.80
Tongue River at Birney Day School	7Q10	83	1024	1.96	82	1019	1.90	82	1006	1.78
	LMM	183	764	1.43	234	694	1.26	243	676	1.16
	HMM	219	713	1.30	1098	396	0.67	550	505	0.86

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

Under the Cumulative analysis the PRG discharge is assumed to be discharging at 2.5 cfs (1122 gpm).

The results during LMM flows at the Birney Day School station show when compared to historical conditions there would be a 4.1% increase in flow, a 4.5% increase in EC, and a 32.9% increase in SAR. During 7Q10 flows there would be a 12.6% increase in flow, a 3.7% increase in EC, and a 37.0% increase

in SAR when compared to historical conditions. When compared to the No Action Alternative, the LMM results represent a 0.5% increase in flow, a 0.8% increase in EC, and a 4.6% increase in SAR. The 7Q10 results represent a 1.3% increase in flow, a 0.7% increase in EC, and a 5.1% increase in SAR when compared to the No Action Alternative.

These results can be compared to the MDEQ and Northern Cheyenne standards for SAR and EC (see Table 3.4.1-4). During HMM and LMM flows, the mean monthly standards are not exceeded, and during 7Q10 flows the instantaneous maximum standards are not exceeded. The results of this analysis indicate this alternative would not directly cause the beneficial uses of the Tongue River to become impaired due to either SAR or EC. Due to the decreasing rate of water discharge per well vs. time, these impacts would decrease with time and be primarily short term in nature.

A complete analysis of all parameters for which surface water quality criteria exist is conducted in conjunction with the issuance of MPDES permits by MDEQ (see Fact Sheet and EA for the renewal of MT0030457). The Draft EA for the Flow Based permit concludes that "Issuance of the permits ensures that standards for water quality will be met. Standards are protective of beneficial uses. Therefore impacts are minor and non-significant." (MDEQ, 2005). It should be noted the MDEQ analysis looked at the impacts from both the Flow Based and Treatment permits discharging at the maximum allowable rates. As such, the MDEQ analysis is more conservative than the analysis in this EA. This is due to this EA considering the volume of water produced by particular the PODs in question rather than maximizing the permits. Since no standards are exceeded in the MDEQ analysis, none would be exceeded by this alternative. Therefore, it is not anticipated that Alternative C will cumulatively cause impairment of the beneficial uses of the Tongue River.

Effects to Groundwater-Pumping from Coal Seams: Impacts to groundwater from the removal of water from coal seams would be the same as described under Alternative B since the same number of wells at the same locations would come on line at the same time.

Effects from Impoundments: Impacts from impoundments are anticipated to be limited to the vicinity of each impoundment, and as such they would not contribute to cumulative impacts.

4.3.5 Indian Trust and Native American Concerns
Direct and Indirect Effects: Same as Alternative B.

Cumulative Effects: Same as Alternative B.

4.3.6 Lands and Realty
Direct and Indirect Effects: The impacts would be the same as Alternative B. The acres disturbed and the types of impacts from construction activities are described in Sections 4.3.10, 4.3.11 and 4.3.12.

Cumulative Effects: The impacts would be the same as Alternative B. The acres disturbed and the types of impacts from construction activities for the rights-of-way issued under this Alternative would be a part of the acres of disturbance as described in Sections 4.3.10, 4.3.11 and 4.3.12.

4.3.7 Livestock Grazing
Direct and Indirect Effects: Same as Alternative B, except 677.6 acres of vegetation would be removed during construction activities, which would reduce the amount of forage available to livestock and wildlife, equaling about 136 Animal Unit Months (AUMs). Following reclamation and during the production phase, 403.2 acres and 81 AUMs would be lost prior to the area being reclaimed.

Cumulative Effects: Cumulative effects from implementing this Alternative are the same as Alternative B except in the long term (>5 years) 403.2 acres of forage and 81 AUMs would be removed.

4.3.8 Recreation and VRM
Direct and Indirect Effects: Direct and Indirect effects would be similar to those described in Alternative B.

Cumulative Effects: Cumulative effects would be similar to those described in Alternatives A and B.

4.3.9 Social and Economic Conditions
Direct and Indirect Effects: The same as described in Alternative B.

Direct and Indirect Effects to Environmental Justice: The same as described in Alternative B.

Cumulative Effects: The same as described in Alternative B.

4.3.10 Soils
Direct and Indirect Effects: Direct and indirect effects to the soil resource would essentially be the same as Alternative B except in this alternative; no water treatment facility would be built.

Cumulative Effects: Cumulative effects to the soil resource would be the same as Alternative B.

4.3.11 Vegetation
Direct and Indirect Effects to Vegetation: Same as Alternative B, except for the acreage affected by the Water Management Plan. Approximately, 356 acres of vegetation would be disturbed as a result of the Water Management Plan, including the off-channel impoundments. Approximately 354 acres would remain disturbed during the production phase of the project.

Direct and Indirect Effects to Special Status Species: Same as Alternative B.

Direct and Indirect Effects to Invasive Species: Same as Alternative B.

Cumulative Effects: Cumulative effects from implementing this Alternative are the same as Alternative B, except during the production phase, 403.2 acres of vegetation would remain disturbed in addition to acres disturbed by other activities in the CX Field and the Decker and Spring Creek coal mines.

4.3.12 Wildlife and Fisheries/Aquatics
Direct and Indirect Effects to Wildlife: Direct and indirect effects to wildlife would be similar to those described in Alternative B. This proposed alternative also requires the implementation of the Wildlife Monitoring and Protection Plan (WMPP), which requires additional monitoring, mitigation and stipulations on development activities to minimize impacts on wildlife species.

4.3.12.1 Threatened and Endangered Species
Effects on T&E species and habitats would be similar to those described in Alternative B. Two protective measures to minimize risks to bald eagles are also offered under this alternative. Powerlines would be required to be constructed according to Aviation and Powerline Interaction Committee (APLIC) standards, and this alternative would require special terms and conditions as outlined in the biological opinion, provided by the FWS, implemented as extra protection measures to minimize the risk of incidental take of bald eagles.

A water treatment facility (potential additional impacts to the active bald eagle nest discussed in 4.2.12.1) would not be included under this alternative, which may reduce disturbance to the active bald eagle nest located 1 ¼ mile from the proposed facility.

4.3.12.2 Big Game Species
Impacts would be similar to those described under Alternative B as a result of CBNG activities, and stipulations protecting crucial winter ranges for big game would apply. In this area, mule deer winter ranges would be protected from initial CBNG activities from December 1 to March 31, unless operations were allowed through a request for an exception to this stipulation, by the operator. This stipulation does not apply to the operation and maintenance of facilities after the project is in production.

These mitigation/stipulation measures would restrict activities during potentially severe winter weather,

which would allow mule deer to utilize preferred habitats with minimum disturbance.

4.3.12.3 Upland Game Birds
The types of impacts to upland game birds and their habitats would be similar to those described under Alternative B. Stipulations would offer protective measures for grouse leks and nesting habitats. A no surface occupancy stipulation would prohibit development within ¼ mile of sage grouse and sharp-tailed grouse leks active at least one out of the last five years. The other stipulation prohibits activities within two miles of a lek, from March 1 through June 15.

4.3.12.4 Raptors
The types of impacts to raptors would be similar to those described under alternative B. Stipulations would prohibit CBNG infrastructure within ¼ mile of raptor nests active within the last two years. Timing restrictions would also prohibit development within ½ mile of active raptor nests, from May 1 to August 1.

4.3.12.5 Prairie Dogs and Associated Species
Impacts would be similar to those described under Alternative B. No additional stipulations protecting prairie dog colonies would apply under this alternative, although protective measures are offered for certain species associated with prairie dog colonies. Disturbance would be minimized due to stipulations in place. Stipulations offer two protective measures for raptors, including burrowing owls. A No Surface Occupancy stipulation prohibits any CBNG infrastructure within ¼ mile of active burrowing owl nests. The other stipulation prevents surface use from March 1 through August 1, up to ½ mile from the nest and would prevent disturbances around active raptor nests during the nesting period.

4.3.12.6 Migratory Bird Species
The types of impacts to migratory bird species would be similar to those described under Alternative B. No additional stipulations would apply that directly affect migratory birds.

4.3.12.7 BLM Sensitive Species
Impacts would be similar to Alternative B. This alternative would offer some protective measures for those BLM sensitive species described above (i.e. sage grouse, burrowing owls).

Cumulative Effects to Wildlife: Cumulative effects to wildlife would be similar to those described under Alternative B. Stipulations and mitigation for wildlife would reduce impacts to those species offered protection through the stipulation process.

4.3.12.8 Fisheries/Aquatics
Direct and Indirect Effects to Fisheries/Aquatics: Potential impacts to aquatic species from would be similar to Alternative B. The potential for erosion and drawdown effects to springs would be the same as Alternative B. However, increased effects to water quality could occur over Alternative B.

Effects on aquatic species from changes in water quality would be increased for winter and summer over Alternative B, but still is considered minor and not detrimental. The untreated water discharge would increase (over alternative B) by 10 gpm (.02 cfs) in the winter and 338 gpm (.75 cfs) in the summer. Untreated discharge would decrease in the spring by 212 gpm (.47 cfs). The EC, SAR, and other water quality parameters (such as water temperature, ammonia, calcium, etc.) would still meet state water quality standards within the Tongue River (refer to Section 3.41 Hydrology). Bicarbonate levels would be slightly increased over Alternative B (total of 366 mg/l (18 mg/l increase) in the summer months, but still at levels well below the 530 mg/L threshold recommended by Horpstead et. al (2001). This would be accomplished by using a mixing zone within the Tongue River, which would provide protection and limit effects to aquatic life.

Effects from increased streamflows would be minor and not detrimental. The amount of water discharged would actually decrease when compared to Alternative B (212 gpm in the spring and 512 gpm in the summer), except for the winter months (increased by 10 gpm (.02 cfs). The water discharged with this permit would not exceed the amount permitted by MDEQ. Therefore, a decreased effect on aquatic species from increased streamflows in relation to Alternative B would occur.

Cumulative Effects to Fisheries/Aquatics: The major difference between this alternative and Alternative B is the lack of treated water discharge. As mentioned in the direct effects analysis, effects on aquatic species from changes in water quality would be increased for winter and summer over Alternative B, but still minor and not detrimental. As a result, there is a slight increased potential for cumulative effects on aquatic species and habitat above those identified in Alternative B.

4.3.12.9 West Nile Virus

The potential to increase mosquito habitat with this alternative would be similar to Alternative B, minus the water treatment facility and associated impoundment. The WNV potential from the remaining reservoirs would remain.

4.4 EFFECTS FROM ALTERNATIVE D – AGENCIES PREFERRED ALTERNATIVE

- PODs proposal including a water treatment facility, while limiting CBNG produced water management to the use of treated water discharge, untreated discharge and existing water management. Mitigating measures not already part of the operator's proposal are included as part of this alternative.

4.4.1 Air Quality

Direct and Indirect Effects: The direct and indirect effects associated with this alternative are expected to be the same as those in alternative B.

Cumulative Effects: The cumulative effects associated with this alternative are expected to be the same as those in alternative B.

4.4.2 Cultural Resources

Direct and Indirect Effects to Cultural Resources: Direct and Indirect Effects to Cultural Resources would be the same as those described under Alternative C. Implementation of monitoring requirements as conditions of approval for two utility corridors in the Deer Creek North POD and 16 overhead powerline/utility corridors in Pond Creek POD would reduce direct effects to cultural resources and the possibility of impacting buried cultural resources at or near sites where eligibility is unresolved or sites determined to be eligible.

Direct and Indirect Effects to Traditional Cultural Values: Direct and Indirect Effects would be same as those listed for Alternative C.

Direct and Indirect Effects to Paleontological Resources: Direct and Indirect Effects to Paleontological Resources would be the same as those described in Alternative B. Mitigation measures would follow those outlined under Alternative C.

Cumulative Effects: Cumulative Effects would the same as those outlined in Alternative C.

4.4.3 Geology and Minerals

Direct and Indirect Effects to Coal Bed Natural Gas: Same as Alternative B.

Methane Migration: Same as Alternative B.

Direct and Indirect Effects to Coal: Same as Alternative B.

Cumulative Effects: Same as Alternative B.

4.4.4 Hydrology

Direct and Indirect Effects to Hydrological Resources

Effects to Surface Water-CBNG Water Discharges to Surface Waters: There would be in an increase in the volume water produced due to the wells from the Deer Creek North and Pond Creek PODs coming on-line. This increase would be in addition to the increase occurring due to the Dry Creek and Coal Creek PODs. The water balance for this alternative was developed by assuming that both the Draft Flow Based

MPDES permit (MT0030457), and the Draft Treatment MPDES permit (MT0030724) would be approved by the MDEQ with no major modifications. The produced water could be managed via the Flow Based permit, the Treatment permit and beneficial uses (industrial uses in the Springs Creek Coal mine, drilling, construction, dust suppression, and livestock and wildlife water). Impacts to surface water are based on a water balance which assumes the Treatment permit, the Flow Based permit and beneficial uses would be used to manage produced water. The treatment plant can operate at 850 gpm (one loop) or 1,700 gpm (2 loops). This alternative differs from Alternative B in that the impoundments and irrigation areas would not be approved for the management of water produced from federal wells, and once the treatment plant is constructed to the degree needed (one loop with an 850 gpm capacity), it would continue to be operated at that capacity, so long as enough water is available after beneficial uses. Projected water management practices are shown on Chart Hydro-7 in the Hydrology Appendix. The maximum total volume of discharge occurring under this alternative would be during the winter of 2006-07, when 1,640 gpm of untreated discharge and 850 gpm of treated discharge would occur. The maximum discharge occurring in the spring would be 1,534 gpm of untreated discharge and 850 gpm of treated discharge in 2007. The maximum discharge occurring in the summer would be 1,262 gpm of untreated discharge and 850 gpm of treated discharge in 2006. As shown on Chart Hydro-8 in the Hydrology Appendix, these discharge values would be under the limits in the Draft MPDES permits at all times.

Following the methodology described for the direct impacts analysis in section 4.1.4 of this EA, the water quality in the Tongue River which cumulatively results from this alternative can be determined, as shown on Table 4.4.4-1.

Table 4.4.4-1: Alternative D: Emphasize Treatment-Direct Impacts

	Flow Conditions	Winter (1640_850 gpm)			Spring (1534_850 gpm)			Summer (1262_850 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	1008	1.42	125.2	838	1.14	43	1337	1.78
	LMM	182	711	0.97	310	559	0.74	178	711	0.92
	HMM	232	637	0.86	1604	267	0.34	457	467	0.59
Tongue River Below Dam	7Q10	77	834	1.39	77	832	1.37	77	825	1.31
	LMM	178	673	1.10	228	631	1.02	275	598	0.94
	HMM	257	613	1.00	1415	396	0.62	571	497	0.77
Tongue River at Birney Day School	7Q10	81	1005	1.78	81	1003	1.76	81	994	1.70
	LMM	181	750	1.31	233	684	1.18	242	670	1.12
	HMM	217	702	1.20	1097	393	0.64	549	502	0.83

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

The results during LMM flows at the Birney Day School station show when compared to historical conditions there would be a 3.5% increase in flow, a 2.9% increase in EC, and a 24.5% increase in SAR. During 7Q10 flows there would be a 10.9% increase in flow, a 2.0% increase in EC, and a 27.2% increase in SAR when compared to historical conditions. When compared to the No Action Alternative, the LMM results represent a 0.7% increase in flow, a 0.5% decrease in EC, and a 0.8% decrease in SAR. The 7Q10 results represent a 2.0% increase in flow, a 1.0% decrease in EC, and a 1.3% decrease in SAR when compared to the No Action Alternative.

These results can be compared to the MDEQ and Northern Cheyenne standards for SAR and EC (see Table 3.4.1-4). During HMM and LMM flows, the mean monthly standards are not exceeded, and during 7Q10 flows, the instantaneous maximum standards are not exceeded. The results of this analysis indicate this alternative would not directly cause the beneficial uses of the Tongue River to become impaired due to either SAR or EC. Due to the decreasing rate of water discharge per well vs. time, these impacts would decrease with time and be primarily short term in nature.

A complete analysis of all parameters for which surface water quality criteria exist is conducted in

conjunction with the issuance of MPDES permits by MDEQ (see the MDEQ Draft EA for the renewal of MT0030457, and the issuance of MT0030724, along with the Draft permits, Fact Sheet for MT0030457, and Statement of Basis for MT0030724). The Draft EA for the permits concludes that "Issuance of the permits ensures that standards for water quality will be met. Standards are protective of beneficial uses. Therefore, impacts are minor and non-significant." (MDEQ, 2005). It should be noted the MDEQ analysis looked at the impacts from both the Flow Based and Treatment permits discharging at the maximum allowable rates. As such, the MDEQ analysis is more conservative than the analysis in this EA. This is due to this EA considering the volume of water that would be discharged by the PODs in question, rather than maximizing the permits. Since no standards are exceeded in the MDEQ analysis, none would be exceeded by this alternative. Therefore, it is not anticipated that Alternative D would directly impair the beneficial uses of the Tongue River.

Effects to Groundwater-Pumping from Coal Seams: Impacts to groundwater from the removal of water from coal seams would be the same as described under Alternative B, since the same number of wells, at the same locations, would come on line at the same time.

Effects from Impoundments: Impacts from impoundments would be the same as under Alternative B, except only the impoundment associated with the water treatment plant (34E-3490) would be constructed. The total disturbance from this impoundment would be approximately 1.25 acres and its storage capacity would be approximately 17 acre-feet.

Cumulative Effects to Hydrological Resources

Effects to Surface Water-CBNG Water Discharges to Surface Waters: There would be in an increase in the volume water produced due to the wells from the Deer Creek North and Pond Creek PODs coming on-line. This increase would be in addition to the increase occurring due to the Dry Creek and Coal Creek PODs. Additionally, under the cumulative impacts analysis the PRG Coal Creek discharge is assumed to discharge at its maximum allowable discharge of 2.5 cfs. All other existing discharges are accounted for by the Existing Conditions analysis (see Table Hydro-1 in the Hydrology Appendix). The same water balance for Fidelity's discharges as was used for the direct impacts analysis is used for the cumulative analysis.

Following the methodology described in section 4.1.4 of this EA, the water quality in the Tongue River which cumulatively results from this alternative can be determined, as shown on Table 4.4.4-2.

Table 4.4.4-2: Alternative D: Emphasize Treatment-Cumulative Impacts

	Flow Conditions	Winter (1640_850 gpm)			Spring (1534_850 gpm)			Summer (1262_850 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	1008	1.42	125	838	1.14	43	1337	1.78
	LMM	182	711	0.97	310	559	0.74	178	711	0.92
	HMM	232	637	0.86	1604	267	0.34	457	467	0.59
Tongue River Below Dam	7Q10	79	832	1.41	78	831	1.39	79	824	1.33
	LMM	180	674	1.12	229	632	1.03	277	599	0.95
	HMM	259	614	1.01	1416	397	0.63	573	498	0.78
Tongue River at Birney Day School	7Q10	83	1003	1.80	83	1002	1.78	83	993	1.72
	LMM	183	751	1.33	235	685	1.20	244	671	1.13
	HMM	219	703	1.22	1099	394	0.65	551	503	0.84

Values in parentheses represent the rate of discharge under MPDES permit MT0030457 (untreated) followed by the Amount to be discharged under MT0030724 (treated).
Under the Cumulative analysis the PRG discharge is assumed to be discharging at 2.5 cfs (1122 gpm).

The results during LMM flows at the Birney Day School station show when compared to historical conditions there would be a 4.3% increase in flow, a 3.1% increase in EC, and a 26.0% increase in SAR. During 7Q10 flows there would be a 13.2% increase in flow, a 1.9% increase in EC, and a 28.7% increase in SAR when compared to historical conditions. When compared to the No Action Alternative, the LMM

results represent a 0.7% increase in flow, a 0.5% decrease in EC, and a 0.8% decrease in SAR. The 7Q10 results represent a 1.9% increase in flow, a 1.0% decrease in EC, and a 1.3% decrease in SAR when compared to the No Action Alternative.

These results can be compared to the MDEQ and Northern Cheyenne standards for SAR and EC (see Table 3.4.1-4). During HMM and LMM flows, the mean monthly standards are not exceeded, and during 7Q10 flows the instantaneous maximum standards are not exceeded. The results of this analysis indicate this alternative would not directly cause the beneficial uses of the Tongue River to become impaired due to either SAR or EC. Due to the decreasing rate of water discharge per well vs. time, these impacts would decrease with time and be primarily short term in nature.

A complete analysis of all parameters for which surface water quality criteria exist is conducted in conjunction with the issuance of MPDES permits by MDEQ (see Fact Sheet and EA for the renewal of MT0030457). The Draft EA for the Flow Based permit concludes that "Issuance of the permits ensures that standards for water quality will be met. Standards are protective of beneficial uses. Therefore impacts are minor and non-significant." (MDEQ, 2005). It should be noted the MDEQ analysis looked at the impacts from both the Flow Based and Treatment permits discharging at the maximum allowable rates. As such, the MDEQ analysis is more conservative than the analysis in this EA. This is due to this EA considering the volume of water produced by particular PODs in question, rather than maximizing the permits. Since no standards are exceeded in the MDEQ analysis, none would be exceeded by this alternative. Therefore, it is not anticipated Alternative D will cumulatively cause impairment of the beneficial uses of the Tongue River.

Effects to Groundwater-Pumping from Coal Seams: Impacts to groundwater from the removal of water from coal seams would be the same as described under Alternative B since the same number of wells at the same locations would come on line at the same time.

Effects from Impoundments: Impacts from impoundments are anticipated to be limited to the vicinity of each impoundment, and they would not contribute to cumulative impacts.

4.4.5 Indian Trust and Native American Concerns
Direct and Indirect Effects: Same as Alternative B.

Cumulative Effects: Same as Alternative B.

4.4.6 Lands and Realty
Direct and Indirect Effects: The impacts would be the same as Alternative B, except reservoirs 23-2191 and 33-2191 would not be considered for location on federal surface The acres disturbed and the types of impacts from construction activities are described in Sections 4.4.10, 4.4.11 and 4.4.12.

Cumulative Effects: The impacts would be the same as Alternative B. The acres disturbed and the types of impacts from construction activities for the rights-of-way issued under this Alternative would be a part of the acres of disturbance as described in Sections .4.10, 4.4.11 and 4.4.12.

4.4.7 Livestock Grazing
Direct and Indirect Effects: Same as Alternative B, except approximately 348 acres of vegetation would be removed during construction activities, which would reduce the amount of forage available to livestock and wildlife, equaling about 69 AUMs. Following reclamation and during the production phase, 69.2 acres and 14 AUMs would be lost prior to the area being reclaimed.

Cumulative Effects: Cumulative effects from implementing this Alternative are the same as Alternative B except in the long term (>5 years) 69.2 acres of forage and 14 AUMs would be removed.

4.4.8 Recreation and VRM
Direct and Indirect Effects: Direct and Indirect effects would be similar to those described in Alternative B.

Cumulative Effects: Cumulative effects would be similar to those described in Alternatives A and B.

4.4.9 Social and Economic Conditions
Direct and Indirect Effects: The same as described in Alternative B.

Direct and Indirect Effects to Environmental Justice: The same as described in Alternative B.

Cumulative Effects: The same as described in Alternative B.

4.4.10 Soils
Direct and Indirect Effects: Direct and indirect effects to the soil resource would essentially the same as Alternative B, except the proposed impoundments would not be built.

Cumulative Effects: Cumulative effects to the soil resource would be the same as Alternative B.

4.4.11 Vegetation
Direct and Indirect Effects to Vegetation: Same as Alternative B except for the acreage affected by the Water Management Plan. Approximately, 27 acres of vegetation would be disturbed from the Water Management Plan and 20.3 acres would remain disturbed during the production phase of the project.

Direct and Indirect Effects to Special Status Species: Same as Alternative B.

Direct and Indirect Effects to Invasive Species: Same as Alternative B.

Cumulative Effects: Cumulative effects from implementing this Alternative are the same as Alternative B, except during the production phase, 95.9 acres of vegetation would remain disturbed in addition to acres disturbed by other activities in the CX Field and the Decker and Spring Creek coal mines.

4.4.12 Wildlife and Fisheries/Aquatics
Direct and Indirect Effects to Wildlife: Direct and indirect effects to wildlife would be similar to those described in Alternative B &C.

In alternatives B, C & D, mitigation measures and stipulations would apply, therefore somewhat minimizing direct and indirect impacts to those wildlife species afforded special protection measures. This proposed alternative requires the Wildlife Monitoring and Protection Plan (WMPP) to be implemented, which requires additional monitoring, mitigation and stipulations on development activities to minimize impacts on wildlife species.

Compared to Alternative C, Alternative D would not authorize the construction of three proposed water impoundments. These impoundments are proposed within sagebrush habitats and would fragment additional habitat within this area, considered important to sagebrush obligate wildlife species.

4.4.12.1 Threatened and Endangered Species
Effects to T&E species would be similar to those described in Alternative B and C. The main difference between Alternatives C & D as it relates to T&E species, is that under Alternative D, a water treatment facility would be proposed, located approximately 1¼ mile to the southeast of an active bald eagle nest, located along the Tongue River. Disposal of waste from the water treatment facility would occur with truck transport. Haul trucks would likely be within line of sight of the nest. Other impacts within this area include existing CBNG development and a major highway located approximately 1¼ mile to the north of the nest. It is unknown if additional vehicle traffic as a result of the water treatment facility, would cause nest failure or abandonment.

4.4.12.2 Big Game Species
Effects to big game species would be similar to those described in Alternative B and C. The water treatment facility proposed under this alternative would not affect big game species, other than adding a

small amount of additional disturbance to big game utilizing the Tongue River corridor.

4.4.12.3 Upland Game Birds
Effects to upland game birds would be similar to those described in Alternative B and C. The water treatment facility proposed would not be located near any identified crucial habitat for sage grouse.

4.4.12.4 Raptors
Effects to raptors would be similar to those described in Alternative B and C. The water treatment facility proposed would be located approximately ½ mile from an active red-tailed hawk nest, located on the Tongue River. It is unknown if additional disturbances from the facility would result in nest abandonment.

4.4.12.5 Prairie Dogs and Associated Species
Effects to prairie dogs and associated species would be similar to those described in Alternative B and C.

4.4.12.6 Migratory Bird Species
Impacts to migratory birds would be similar to those described in Alternative B and C.

4.4.12.7 BLM Sensitive Species
Impacts to BLM Sensitive Species would be similar to those described in Alternative B and C.

Cumulative Effects to Wildlife: Cumulative effects to wildlife species would be similar to those described under Alternative B and C.

4.4.12.8 Fisheries/Aquatics
Direct and Indirect Effects to Fisheries/Aquatics: Potential impacts would be similar to Alternative B. The drawdown effects to springs and effects from changes in streamflows on aquatic species would be the same as Alternative B. The potential for erosion would slightly decrease, due to no construction of additional reservoirs.

Effects on aquatic species from changes in water quality would decreased over Alternative B, but still be considered minor and not detrimental. The untreated water discharge would decrease (over Alternative B) by 850 gpm (1.89 cfs) in the winter and spring and remain the same in the summer months. Treated water discharge would increase (over Alternative B) by 850 gpm (1.89 cfs) in the winter and spring months. The EC, SAR, and other water quality parameters (such as water temperature, ammonia, calcium, etc.) would meet state water quality standards within the Tongue River (refer to Section 3.41 Hydrology). Bibcarbonate levels would be reduced in the winter and spring months in comparison with Alternative B. This would be accomplished by using a mixing zone within the Tongue River and/or water treatment, which would provide protection and limit effects to aquatic life.

Cumulative Effects to Fisheries/Aquatics: The main difference from Alternative B and this alternative is treated discharge will be used during the winter and spring seasons and no construction of additional reservoirs will occur. Both of these activities will slightly decrease the potential effects compared to Alternative B. Resulting in less potential for cumulative effects, on aquatic species and habitat, than those identified in Alternative B.

4.4.12.9 West Nile Virus
The potential to increase mosquito habitat compared with Alternative B would decrease. There are three proposed reservoirs associated with Alternative B, not constructed with this alternative. Therefore, it is expected there would be a decreased potential for mosquito habitat over Alternative B.