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. Existing roads run through sites 24BH3367, 24BH3370, and 24BH3371. This impact would continue. All three sites are the remains of historic homesteads/ranches. None of the site is recommended as eligible for listing on the National Register of Historic Places. There would be no direct impacts to eligible or unevaluated sites in the East Decker POD Boundaries. Indirect impacts to cultural resources would include increased access to adjacent PODs where historic properties are present. Indirect impacts would lessened by implementation of the Conditions of Approval for the Federal wells in adjacent PODs.

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. No sites would be added to listings on the National Register of Historic Places. No 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 Decker Mine East POD would represent approximately 1% 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 Decker Mine East POD would not 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 Federal CBNG would be produced in the project area under this Alternative because no permits would be approved by BLM. No additional methane migration or drainage caused by Federal wells would result because of the denial of these projects. Choosing this alternative would severely reduce the BLM's ability to resolve presently existing or future

drainage situations that have or may be 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 from Federal CBNG development. In addition, the potential for development conflicts of coal vs. coalbed methane in the proposed development area would be less.

Cumulative Effects: No Federal CBNG would be produced from the project area under this Alternative. Additional Federal CBNG would not be available for residential and industrial uses. No additional revenues would be generated by Federal 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 Federal wells in the Decker Mine East POD. However due the development of other existing or approved CBNG wells in the Tongue River development area, and the decline of water production rates over time, future discharges will be somewhat different than existing. The peak rate of water production for Fidelity's Tongue River project would be approximately 2,931 gpm in September, 2008. This is the same as existing conditions, since water production rates would decrease from present levels under the no action alternative. The water balance for this Alternative is based on the Water Management Plan (WMP) submitted by Fidelity. Following this approach beneficial uses (including industrial uses in the Spring Creek and Decker Coal mines, drilling, construction, dust suppression, and for stock and wildlife water) would be satisfied first, then 1,430 gpm of water would be treated and discharged under MPDES permit MT 0030724, then the remainder would be discharged untreated under MPDES permit MT0030457.

The maximum volume of untreated discharge that would occur under this Alternative would be during December 2008, when 1,162 gpm of untreated discharge would occur. This is despite the decrease in water production rates, since the potential for beneficial uses is less in the winter. The maximum untreated discharge that would occur in the Spring would be 1,036 gpm in March 2009. The maximum untreated discharge that would occur in the Summer would be 1,046 gpm in September 2008. These discharge values would be under the limits in the MPDES permits at all times.

Following the methodology described in section 3.4.1 of this EA the water quality in the Tongue River, which results from this Alternative can be determined, as shown on Table 4.1.4-1.

The maximum calculated change in water quality would occur during the winter of 2009. The results during LMM flows at the Birney Day School station show that vs. historical conditions there would be a 3.8% increase in flow, a 3.4% increase in EC, and a 20.6% increase in SAR. During 7Q10 flows there would be a 8.5% increase in flow, a 2.9% increase in EC, and a 21.7% increase in SAR vs. historical conditions.

When compared to existing conditions the winter LMM results at Birney Day School represent a 0.2% increase in flow, a 0.1% decrease in EC, and a 1.2% increase in SAR. The 7Q10 results represent a 0.3% increase in flow, a 0.03% decrease in EC, and a 1.2% increase in SAR relative to existing conditions.

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 that this Alternative would not directly cause the beneficial uses of the Tongue River to become impaired due to either SAR or EC.

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

	Flow Conditions	Alt. A: No Action-Winter (1,430_1,162 gpm)			Alt. A: No Action-Spring (1,430_1,036 gpm)			Alt. A: No Action-Summer (1,430_1,046 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	84	1021	1.31	125	835	1.03	43	1336	1.66
	LMM	179	725	0.91	304	562	0.68	174	721	0.88
	HMM	225	653	0.83	1587	268	0.32	443	475	0.58
Tongue River Below Dam	7Q10	81	828	1.25	92	791	1.16	63	871	1.29
	LMM	174	680	1.01	222	634	0.91	269	603	0.86
	HMM	251	619	0.91	1406	397	0.56	565	500	0.70
Tongue River at Birney Day School	7Q10	80	1006	1.68	91	949	1.56	54	1152	1.87
	LMM	172	763	1.27	221	692	1.13	230	682	1.10
	HMM	208	712	1.17	1116	390	0.63	536	506	0.82

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

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

A complete analysis of all surface water quality criteria in place at the time of permit issuance was conducted by the MDEQ in conjunction with the issuance of the MPDES permits. This analysis included a non-degradation analysis. This is discussed in the Statements of Basis for MPDES permits MT0030457 and MT0030724. The EA for these 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, 2006). 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 anticipated to be discharged based on the water balance 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 discharges associated with this Alternative will directly impair the beneficial uses of the Tongue River.

Effects to Surface Water from Disturbance: Since no additional wells or infrastructure would be constructed under this Alternative, there is not anticipated to be a direct effect on surface water from disturbance.

Effects to Groundwater-Pumping from Coal Seams: Under the No Action Alternative, no CBNG wells would be produced from the Decker Mine East POD. As such, there would be no direct or indirect impacts to groundwater levels as a result of the No Action Alternative. No wells or springs would be affected by the No Action Alternative. The resulting groundwater conditions would be the same as existing conditions (see section 3.4.2 of this EA).

Effects from Impoundments: Under the No Action Alternative no CBNG water would be produced from the Federal Wells in the Decker Mine East POD. As such, there would be no impacts from the management of this water, including from the use of the existing lined off drainage impoundments 34E-3490 and 12-3490. The conditions would be the same as existing conditions under this Alternative (see section 3.4.1 of this EA).

Effects from Beneficial Use: Under the No Action Alternative no CBNG water would be produced from the Federal Wells in the Decker Mine East POD. As such, there would be no direct or indirect impacts from the beneficial use of this water. It is anticipated that sufficient water would still be produced from the Tongue River project for these uses; however it would not come from the proposed Federal Decker Mine East wells.

Effects to Surface Water from Disturbance: Since no additional wells or infrastructure would be constructed under this alternative, there is not anticipated to be a direct effect on surface water from disturbance.

Effects to Groundwater-Pumping from Coal Seams: Under the No Action Alternative, no CBNG wells would be produced from the Decker Mine East POD. As such, there would be no direct or indirect impacts to groundwater levels as a result of the No Action Alternative. No wells or springs would be affected by the No Action Alternative. The resulting groundwater conditions would be the same as existing conditions (see section 3.4.2 of this EA).

Effects from Impoundments: Under the No Action alternative no CBNG water would be produced from the Federal Wells in the Decker Mine East POD. As such, there would be no impacts from the management of this water, including from the use of the existing lined off drainage impoundments 34E-3490 and 12-3490. The conditions would be the same as existing conditions under this alternative (see section 3.4.1 of this EA).

Cumulative Effects to Hydrological Resources
Cumulative Effects to Surface Water-CBNG Water Discharges to Surface Waters: Under the No Action Alternative, no additional water would be produced by Federal wells in the Decker Mine East POD. Since there are no direct or indirect impacts, there are no impacts to overlap with the impacts of other actions to create cumulative impacts.

Cumulative Effects to Surface Water from Disturbance: Since there would be no additional disturbance from this alternative there are no impacts to overlap with the impacts of other actions to create cumulative impacts.

Cumulative Effects to Groundwater-Pumping from Coal Seams: Under the No Action Alternative, no Federal CBNG wells would be produced from the Decker Mine East POD. Since there are no direct or indirect impacts, there are no impacts to overlap with the impacts of other actions to create cumulative impacts.

Cumulative Effects from Impoundments: Under the No Action Alternative no CBNG water would be produced from the Federal Wells in the Decker Mine East POD. As such, there would be no direct or indirect impacts from the management of this water. Since there are no direct or indirect impacts, there are no impacts to overlap with the impacts of other actions to create cumulative impacts.

Effects from Beneficial Use: Under the No Action Alternative no CBNG water would be produced from the Federal Wells in the Deer Creek North POD. As such, there would be no direct or indirect impacts from the beneficial use of this water and so there could be no cumulative impacts.

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, so 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: There would be no additional drilling or development; there would be no cumulative effects to the recreation and visual resources of the area.

4.1.9 Social and Economic Conditions
Direct and Indirect Effects: There would be no additional drilling or development; therefore there would be no direct or indirect effects from this action. No private, state or federal royalties, state production taxes or jobs/income would be generated.

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 State and fee CBNG development and 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. It is estimated that 128 acres were disturbed during the State and fee development of the Deer Creek North PODs. Approximately 45 acres remain unreclaimed during the production phase of the PODs. 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 not be any 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 not be any 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, the existing mining operations in the area, the Tongue River reservoir, and other habitat fragmentation such as highways, railroad, etc.

Cumulative Effects Fisheries/Aquatics: The cumulative effects have been identified for current and past activities. Refer to Affected Environment in Chapter 3.12.7.

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, 14 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 14 wells.

The exploration portion of the project would result in a temporary increase in fugitive dust and gaseous emissions. The PTE of this Alternative is summarized in Table 4.2.1-1.

Table 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)	3.85	0.00	3.85	54.31	4.33	11.70	3.59
Drill Rig(s) – (Drilling Emissions)	0.23	0.23	0.23	0.00	0.00	0.00	0.00
Well Testing (Gas Flaring)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fugitive Dust – (Disturbed Acres)	22.48	22.48	22.48	0.00	0.00	0.00	0.00
Vehicle Traffic – (non-paved roads)	11.34	5.10	5.10	0.00	0.00	0.00	0.00
TOTAL	37.90	27.81	31.66	54.31	4.33	11.70	3.59

MDEQ determined that any air quality impacts from the drilling and initial production 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 and posting speed limits 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 two permitted field compressors and one permitted sales compressor that would be used for Fidelity's Decker Mine East project area under this Alternative are summarized in Table 4.2.1-2.

4.2.1-2 Emission Inventory – Alternative B – Production

Tons/Project					
Facility	PM_{10}	NO_x	VOC	CO	SO_x
BCPL Holmes 29 Battery	0.54	24.92	16.62	32.46	0.04
Decker 17 Battery	0.54	24.92	16.62	32.46	0.04
BCPL Symons Central Compressor Station	4.31	115.45	75.02	228.69	0.27
TOTAL	5.39	165.29	108.26	293.61	0.35

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 two field and one sales 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 29 Battery	1-hr	934[a]	281	75	356	----	564	---/63.1
	Annual	28.24[b]	21.2	6	27.2	100	94	27.2/28.9
Decker 17 Battery	1-hr	355[a]	223	75	298	----	564	---/53
	Annual	15.4[b]	11.6	6	18	100	94	18/19
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 29 Battery	Annual[b]	21.2	25	84.8
Decker 17 Battery	Annual[b]	11.6	25	46
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 29 Battery	Annual[a]	0.558	2.5	21.9
Decker 17 Battery	Annual[a]	0.0648	2.5	2.6
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 PSD Class I NO_X increment analysis that was conducted for each of the production facilities 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 completed a cumulative impact model for the Badger Hills POD. The cumulative impact model that was completed 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 Badger Hills POD. The cumulative impact model that was conducted 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, 5,010,000N, 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, 4,989,000N 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, 4,990,000N, at 500-m spacing from the southwest corner of 335,000E, 4,975,000N and northeast corner of 371,000E, 5,000,000N, and at 1,000-m spacing from the southwest corner of 315,000E, 4,950,000N and northeast corner of 385,000E, 5,025,000N. 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 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 modeled. Once the highest NO_X concentrations were modeled, the Ambient Ratio 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 $\mu g/m^3$ (MAAQS). 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
ANNUA	WY_SRC	1ST	18.5	351000	4978500	13.9	6.0	19.9	19.9	21.2

L										
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 – NO2

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– NO2

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 calculated.

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 Montana 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

Alternative B is Fidelity's submitted Proposed Action. This alternative would analyze the complete implementation of Fidelity's Decker Mine East POD proposal including:

- construction, drilling, production and reclamation of federal CBNG wells
- use of existing compression and sales facilities
- CBNG produced water management using existing MPDES Permits for treated and untreated water discharge, previous approved impoundments, and beneficial uses

Direct and Indirect Effects: Direct impacts to cultural resources would be similar to those outlined in Alternative A. Existing roads run through three historic site boundaries but do not impact features. These roads are proposed for use as infrastructure corridors to Federal Wells. None of the sites are recommended as eligible for listing on the National Register of Historic Places. Fidelity's proposed actions would not change the National Register eligibility of the sites. Indirect effects would be similar to those outlined in Alternative A. Impacts would be dealt with through implementation of Conditions of Approval for APDs in adjacent PODs.

Cumulative Effects: Cumulative Effects would be the same as those outlined in Alternative A for both cultural and paleontological resources.

4.2.3 Geology and Minerals

Decker Mine East POD

Direct and Indirect Effects to Coal Bed Natural Gas: Under this Plan of Development, CBNG could potentially be produced from the 14 federal wells completed for production. 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.

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 the Hydro appendix in Figure Hydro-3.

Direct and Indirect Effects to Coal: Under this alternative any conflicts with the Decker Coal mine over development of the coal at the Decker Mine East POD area would be resolved using the guidance in Washington Office IM 2006-153.

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 14 federal wells (the federal wells are monobore wells producing all coal beds in a single wellbore) would remove an estimated 7 BCF of CBNG, which would be in addition to gas produced by the other 569 existing wells (719 total producing wells) in the CX Field. Using the FEIS assumptions, two of the federal wells would be dry holes. If production occurs, it is estimated that the commingled wells would produce 6 BCF of CBNG, from the 12 federal wells (personal communication with Mike Keller 2008). 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.

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 856 wells in Montana plus the 14 federal wells would be produced. This results in the long term impact of drawdown extending approximately 1.5 miles beyond the POD boundary. This potential drawdown area is shown on Map Hydro-3 in the Hydrology Appendix. 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. Domestic water wells and springs completed in a coal bed producing CBNG within the minimum radius drawdown could experience an influx of natural gas. Water sources potentially affected are shown in Hydro 1 and Hydro 2.

Methane migration to water wells, springs or monitoring wells: Based on the water draw down analysis for the project, the 20 foot drawdown for the Decker Mine East POD would extend approximately 1.5 miles from the exterior boundary of the POD. The ongoing CBNG production and the 30 years of coal mining in the area have drawn down the potentometric pressure within the producing area (see Section 3.4.2)

especially in the coal bed mined at East Decker. A drawdown of 20 feet would be equivalent to a pressure reduction of 8.7 psi in each coal. The gas in the coal requires 10 to 40 percent in pressure reduction before desorbtion begins; the radius of pressure reduction sufficient to cause gas to desorb is much smaller than the 20 foot drawdown radius. The pressure in the Dietz 1, 2 and 3 coals are estimated at 70 psi to 364 psi. To enable gas to desorb from this coal would require a reduction of a minimum of 7 psi. This would translate to a water drawdown of at least 15 feet. The East Decker mine has mined the shallowest Dietz coals, therefore, it is likely that this pressure has been reached already and any wells/springs/monitoring wells in the Dietz 1 & 2 may already be affected. This may require Fidelity to replace the affected wells/springs/monitoring wells and plug any that are venting gas (as part of their monitoring agreements).

In the Monarch coal, the formation pressure is estimated to be from 112 psi to 443 psi. This coal would require a minimum of 11 psi reduction of pressure before gas would begin to desorb. This translates to a water drawdown of 26 feet.

In the Carney coal, the formation pressure is estimated to be from 171 psi to 464 psi. This coal would require a minimum of 17 psi reduction of pressure before gas would begin to desorb. This translates to a water drawdown of 39 feet.

The coal bed outcrops and faulting are shown in the "Groundwater Impact Analysis, Decker Mine East Plan of Development" which is an appendix to the Decker Mine East POD. The maps are figures 1 thru 6 and detail the drawdown for each coal bed that will be produced. The maps also show the extent of the coal beds.

Based on the Hydrology section (3.4.2), there are monitoring wells, water wells or springs within this area that may be affected by methane migration. The wells or springs would have to be completed or producing from a coal bed and within the minimum drawdown area to cause desorbtion. The minimum drawdown is shown above for each coal. The wells and springs near the Decker Mine East POD are listed in Table Hydro-1 and Hydro- 2 in the hydrology appendix.

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. 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

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 water produced due to the wells from the Decker Mine East POD coming on-line. The peak rate of water production for Fidelity's Tongue River project would be approximately 2,931 gpm in September, 2008. This is the same as the existing rate since the decline of existing non-project wells in the Tongue River project will more than offset the production from these 14 wells. The water balance for this alternative is based on the Water Management Plan (WMP) submitted by Fidelity. Following this approach beneficial uses (including industrial uses in the Spring Creek and Decker

Coal mines, drilling, construction, dust suppression, and for stock and wildlife water) would be satisfied first, then 1,430 gpm of water would be treated and discharged under MPDES permit MT 0030724, then the remainder would be discharged untreated under MPDES permit MT0030457.

The maximum volume of untreated discharge that would occur under this alternative would be during May, 2009, when 1,163 gpm of untreated discharge would occur. The maximum untreated discharge that would occur in the Winter would be 1,162 gpm in December, 2008. The maximum untreated discharge that would occur in the Summer would be 1,046 gpm in September, 2008, which is the existing rate. The difference between the timing of the peak production and peak untreated discharge is due to the difference in the potential for beneficial uses by season. These discharge values would be under the limits in the MPDES permits at all times.

Following the methodology described in section 3.4.1 of this EA the water quality in the Tongue River which results from this alternative can be determined, as shown on Table 4.2.4-1.

The greatest calculated change in water quality would occur during the winter of 2008. The results during LMM flows at the Birney Day School station show that vs. historical conditions there would be a 3.8% increase in flow, a 3.4% increase in EC, and a 20.6% increase in SAR. During 7Q10 flows there would be a 8.5% increase in flow, a 2.9% increase in EC, and a 21.7% increase in SAR vs. historical conditions.

Relative to existing conditions the results during LMM flows at Birney Day School show a 0.2% increase in flow, a 0.1% decrease in EC, and a 1.2% increase in SAR. During 7Q10 flows there would be a 0.03% decrease in flow, a 2.9% increase in EC, and a 1.2% increase in SAR.

Table 4.2.4-1: Alternative B: Proposed Action-Direct Impacts

	Flow Conditions	Winter (1,430_1,162 gpm)			Spring (1,430_1,163 gpm)			Summer (1,430_1,046 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	84	1021	1.31	126	838	1.06	43	1336	1.66
	LMM	179	725	0.91	305	563	0.69	174	721	0.88
	HMM	225	653	0.83	1588	269	0.33	443	475	0.58
Tongue River Below Dam	7Q10	81	828	1.25	92	795	1.18	63	871	1.29
	LMM	174	680	1.01	222	637	0.93	269	603	0.86
	HMM	251	619	0.91	1406	399	0.56	565	500	0.70
Tongue River at Birney Day School	7Q10	80	1006	1.68	91	953	1.58	54	1152	1.87
	LMM	172	763	1.27	221	695	1.15	230	682	1.10
	HMM	208	712	1.17	1116	392	0.63	536	506	0.82

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

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

The maximum change in water quality relative to the no action alternative occurs in the spring. When compared to projected conditions under Alternative A in the spring LMM results at Birney Day School represent a 0.1% increase in flow, a 0.4% increase in EC, and a 1.0% increase in SAR. The 7Q10 results represent a 0.3% increase in flow, a 0.4% increase in EC, and a 1.1% increase in SAR relative to Alternative A.

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 that this alternative would not directly cause the beneficial uses of the Tongue River to become impaired due to either SAR or EC.

A complete analysis of all surface water quality criteria in place at the time of permit issuance was conducted by the MDEQ in conjunction with the issuance of MPDES permits. This analysis included a non-degradation analysis. This is discussed in the Statements of Basis for MPDES permits MT0030457 and MT0030724. The EA for these 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, 2006). 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 anticipated to be discharged based on the water balance 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 discharges associated with the No Action Alternative will directly impair the beneficial uses of the Tongue River.

Effects to Surface Water from Disturbance: During construction and drilling operations there will be an increase in soil erosion rates at each well site and along roads and pipeline routes due to the disturbance of vegetation. These effects will be of short duration since pads will be pulled back and reclaimed immediately following well completion. Erosion rates will return to natural levels once vegetation is reestablished. Due to the diffuse nature of the construction activities, the presence of sediment filtering vegetation between most of the disturbed areas and live waters, and the requirements of the MPDES storm water permit for this area, effects on surface water quality are expected to be unnoticeable.

Effects to Groundwater-Pumping from Coal Seams: Under Alternative B all 14 of the proposed Federal CBNG wells would be produced from the Decker Mine East POD. As such, groundwater levels in the coal seams would be directly drawn down as a result of this alternative. As described in section 3.4.2 of this EA, monitoring data indicates that the 20 foot drawdown contour can be expected to extend up to approximately 1.5 miles from the edge of the well field over the life of the project. The proposed Decker Mine East CBNG wells are surrounded by CBNG wells and the coal mines. As such, the area contained within the 20' drawdown contour is unchanged relative to the No Action Alternative. The area contained within the 20' drawdown contour remains 97.8 mi^2. The magnitude of drawdown within 1.5 miles of the proposed wells will increase; however it would be greater than 20feet with or without these wells (see Figure Hydro-3 in the Hydrology Appendix). No water sources would be added to the drawdown area as a direct result of the proposed action (see Figure Hydro-3 in the Hydrology Appendix).

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 "are in place with all owners of water wells or springs of record within one mile of proposed Federal wells. These agreements also include measure[s] to remedy methane-related impacts and baseline and periodic monitoring". These water mitigation agreements are a requirement of Montana Law (MCA 82-11-175). This law requires that CBNG operators "…offer a reasonable mitigation agreement to each appropriator of water who holds an appropriation right or a permit to appropriate under Title 85, chapter 2, that is for ground water and for which the point of diversion is within 1 mile of the coal bed methane well; or one-half mile of a well that is adversely affected by the coal bed methane well. The mitigation agreement must address the reduction or loss of water resources and must provide for prompt supplementation or replacement of water from any natural spring or water well adversely affected by the coal bed methane well." These agreements would apply to water sources which experience an impact to their use whether it is due to decreased yields, the migration of methane, or a change in water quality. Although the terms of water mitigation agreements are "under such conditions as the parties mutually agree upon" (MBOGC 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 the major drawdown from CBNG activity is anticipated to be confined to the coal seam aquifers producing CBNG and 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. Since these agreements also include measures to remedy methane-related impacts, it is anticipated that these measures will be effective for maintaining water supplies.

Based upon the anticipated water production rates for this project it is anticipated that the total volume of water that would be produced from the proposed 14 Federal CBNG wells over a 20 year life of well would be approximately 2,223 acre-feet. This represents approximately 5% of the groundwater currently contained in the coal seams proposed for development in the POD area (BLM, 2006).

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 to 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. Along the western side of the CX Field monitoring has shown that after CBNG wells have been shut-in for 4.5 years recovery has reached 71-87% of baseline levels (Wheaton et al., 2008).

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 Alternative B the existing impoundments associated with the water treatment plant (34E-3490 and 12-3490) would be the only impoundments used. These impoundments are located off drainage. Each impoundment is lined with a 20 mil liner with an 8-oz underlayment. These impoundments are monitored in accordance with the requirements of MPDES permit MT0030724. This monitoring was specifically designed by the MDEQ to "…ensure the natural quality of the ground water is not impaired by the infiltration of the CBNG produced water" (MPDES permit MT0030724). As such, this monitoring functions as a leak detection system, and therefore it is not anticipated that these impoundments will result in noticeable impacts to groundwater resources. Since these impoundments are located off drainage, with no spillway, and are not designed to intercept overland flow, it is not anticipated that they will affect surface water resources.

Effects from Beneficial Use: The beneficial use of the water by the Spring Creek mine, Decker mine, and Fidelity, is not anticipated to result in noticeable impacts. These beneficial uses would be for dust suppression, construction and drilling water. As such, these uses will be dispersed such that saturated flow to groundwater will not occur, and these uses will not result in discharges to surface waters. The beneficial use of the water for livestock and wildlife water is also not anticipated to result in noticeable impacts since the CBNG water is typically similar to or of better quality than is currently being used for these purposes. Fidelity has obtained a water marketing agreement water right from the Montana Department of Natural Resource Conservation (DNRC) for the CX field which allows for the beneficial use of produced water.

Cumulative Effects to Hydrological Resources

Cumulative Effects to Surface Water-CBNG Water Discharges to Surface Waters: Under Alternative B there would be in an increase in the volume water produced due to the federal wells from the Decker Mine East POD coming on-line. Additional CBNG wells have been proposed under the Deer Creek North and Corral Creek PODs. These wells would also discharge under the same MPDES permits used by this project (MT0030457 and MT0030724). The water balance submitted for this project showed a lack of water management capacity during July through October of 2009. The Corral Creek POD Federal CBNG wells were not included in the submitted water balance, and when they are included in the cumulative analysis there is also a lack of capacity during July and August, 2010. Fidelity has indicated that they will manage these deficits by "reducing water flows from select wells and project areas, and/or utilize the remaining treated discharge capacity (approximately 270 gpm) available under MPDES Permit MT0030724". Calculations indicate that the use of the remaining capacity available under this MPDES permit would be more than adequate to make up for water management deficits identified when adding in the foreseeable Decker Mine East and Corral Creek PODs. As such, it is assumed for this cumulative analysis that Fidelity would treat 1,700 gpm during the summers or 2009 and 2010, and then treat 1,430

gpm for the remainder of the time. The maximum volume of untreated discharge that would occur under the cumulative water balance for this alternative would be during December 2009, when approximately 2,372 gpm of untreated discharge would occur. The maximum untreated discharge that would occur in the spring would be 2,229 gpm in March 2009. The maximum untreated discharge that would occur in the summer would be 1,580 gpm in July 2009. These discharge values would be under the limits in the MPDES permits at all times.

Following the methodology described in section 3.4.1 of this EA the water quality in the Tongue River which results from this alternative can be determined, as shown on Table 4.2.4-2.

The maximum calculated cumulative change in water quality would occur during the winter of 2010. The results during LMM flows at the Birney Day School station show that vs. historical conditions there would be a 5.4% increase in flow, a 5.2% increase in EC, and a 34.0% increase in SAR. During 7Q10 flows there would be a 12.1% increase in flow, a 4.4% increase in EC, and a 36.0% increase in SAR.

When compared to existing conditions the LMM results represent a 1.7% increase in flow, a 1.6% increase in EC, and a 12.4% increase in SAR. The 7Q10 results represent a 3.7% increase in flow, a 1.5% increase in EC, and a 13.2% 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 that this alternative would not directly cause the beneficial uses of the Tongue River to become impaired due to either SAR or EC.

Table 4.2.4-2: Alternative B: Proposed Action-Cumulative Impacts

	Flow Conditions	Winter (1,430_2,372 gpm)			Spring (1,430_2,229 gpm)			Summer (1,700_1,580 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	86	1045	1.61	128	857	1.26	45	1339	1.84
	LMM	181	742	1.09	307	574	0.80	176	727	0.97
	HMM	227	668	0.98	1590	270	0.35	445	478	0.62
Tongue River Below Dam	7Q10	84	843	1.45	95	806	1.35	65	878	1.39
	LMM	177	693	1.15	225	646	1.04	271	610	0.92
	HMM	254	631	1.03	1409	402	0.60	567	505	0.74
Tongue River at Birney Day School	7Q10	83	1021	1.88	94	964	1.75	56	1159	1.97
	LMM	175	776	1.41	224	704	1.26	232	689	1.16
	HMM	211	723	1.29	1119	395	0.67	538	511	0.85

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

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

Foreseeable Actions include the Decker Mine East and Coral Creek PODs

A complete analysis of all surface water quality criteria in place at the time of permit issuance was conducted by the MDEQ in conjunction with the issuance of MPDES permits. This analysis included a non-degradation analysis. This is discussed in the Statements of Basis for MPDES permits MT0030457 and MT0030724. The EA for these 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, 2006). 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 anticipated to be discharged based on the water balance 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 Fidelity's Proposed Action Alternative will cumulatively impair the beneficial uses of the Tongue River.

Cumulative Effects to Surface Water from Disturbance: During construction and drilling operations there will be an increase in soil erosion rates at each well site and along roads and pipeline routes due to the disturbance of vegetation. These effects are cumulatively considered along with the disturbance related effects from coal mining, livestock grazing, other CBNG PODs in both Montana and Wyoming in the Tongue River Watershed, and the Tongue River Railroad. The effect of any one of these is anticipated to be unnoticeable due to the diffuse nature of the construction activities, the presence of sediment filtering vegetation between most of the disturbed areas and live waters, and the requirements of the MPDES storm water permit; however the cumulative effect of all of these actions may cause a noticeable increase in suspended sediment loads relative to historical conditions. Since many of these activities precede monitoring data it is not possible to compare the effects to a "baseline" sediment load. Due to the high variability of the existing record it is also difficult to evaluate if changes are in fact occurring. It is noteworthy that MDEQ has not identified any beneficial uses of the Tongue River or the tributaries affected by this action as being impaired due to suspended sediment loads, and any future actions will need to operate under MPDES storm water permits. It should also be noted that the Tongue River Reservoir removes suspended sediment from the river. As such, while it is anticipated that if all of these activities occur there may be a noticeable increase in suspended sediment loads, it is not anticipated that this increase would impact beneficial uses or contribute to the impairment of any stream.

Cumulative Effects to Groundwater-Pumping from Coal Seams: Under Alternative B all 14 of the proposed Federal CBNG wells would be produced from the Decker Mine East POD. Additional CBNG wells have also been proposed under the Deer Creek North and Corral Creek PODs. As described in section 3.4.2 of this EA, monitoring data indicates that the 20foot drawdown contour can be expected to extend up to approximately 1.5 miles from the edge of the CBNG well fields over the life of the project. The addition of the foreseeable PODs will cause an expansion of the area contained within the 20foot drawdown contour, with the resulting area anticipated to be 107.4 mi^2. As such, the implementation of all of these projects results in an expansion of the area contained within the 20foot drawdown contour by 9.6 mi^2 over the area which results existing activities; however expansion is due to the Deer Creek North and Corral Creek PODs rather than this POD. According to MBMG's GWIC database, three water wells is added to the drawdown area as a result of this expansion (see Figure Hydro-4 and Table Hydro-2 in the Hydrology Appendix). These additional water sources are the "MONTAYLOR *SEWER SITE" well in T. 8 S., R. 40 E., Section 23; the "PORTER H * 14 M NE DECKER MT *" well in T. 8 S., R. 41 E., Section 25; and the "PORTER H.A. * 12.3 MI NEW OF DECKER MT." well in T. 9 S., R. 41 E., Section 1. Of these, only the Montaylor well bore intersects the coals proposed for development in this POD. As such, this well has the potential to be impacted by foreseeable CBNG drawdown.

As discussed under the direct impacts section of this alternative, those wells and springs that obtain 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 that water mitigation agreements have been reached with all potentially affected owners of wells and springs in accordance with the requirements of Montana Law (MCA 82-11-175). Fidelity has also certified that "[t]hese agreements also include measure[s] to remedy methane-related impacts". As discussed under the direct impacts section of this alternative, it is anticipated that these measures will be effective for protecting 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. Along the western side of the CX Field monitoring has shown that after CBNG wells have been shut-in for 4.5 years recovery has reached 71-87% of baseline levels (Wheaton et al., 2008)

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).

Cumulative Effects from Impoundments: Any impacts that could result from the use of the lined off-channel impoundments would be limited to the immediate vicinity of each impoundment, and as such they would not contribute to cumulative impacts.

Cumulative Effects from Beneficial Uses: Any impacts that could result from the beneficial use of the water would be limited to the immediate vicinity of the use. As such it would not contribute to cumulative impacts.

4.2.5 Indian Trust and Native American Concerns

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 2.8 miles away (N½SW¼, Section 26, T. 8 S., R. 40 E.). The Deitz 1 and 2 are cut by the Tongue River valley before reaching the Northern Cheyenne minerals. There will be no drainage in these 2 coal beds since they have been eroded off or burned on the Northern Cheyenne minerals.

In addition, there are faults between the Decker Mine East POD and the Northern Cheyenne minerals that restrict the area of drainage from the deeper coals (D3, Monarch, Carney and Wall).

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.

Table 4.2.5-1: Expected Drawdown per Coal Zone

Coal Bed	Min. Drawdown to desorb	Radius of Min. Drawdown
Dietz 3	14 feet	1.9 miles
Monarch	26 feet	0.9 miles
Carney	39 feet	0.5 miles

4.2.6 Lands and Realty

Direct and Indirect Effects: BLM would issue one ROW to Fidelity for "off-lease" facilities on federal surface under this Alternative. The proposed ROW would be a total of 2,205 feet long and 50 feet wide, consisting of approximately 2.53 acres, more or less, with a total disturbed area of approximately .55 acre. The ROW would authorize 2,205 feet of 4-inch gas line and 4-inch water line to be installed in trench 18 to 36-inch wide and 188 feet of .48 kV power line to be plowed in a 4-inch wide trench, alongside and 10 feet from the pipeline trench. No temporary work areas would be required. 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: The BLM issued ROW under this Alternative would be in addition to five existing BLM issued rights-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 524.3 acres of vegetation would be removed during construction activities, which would reduce the amount of forage available to livestock equaling about 105 Animal Unit Months (AUMs). Following reclamation and during the production phase, approximately 387 acres and 77 AUMs would be lost due to a permanent reduction in available forage. 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. Addition water and water sources would provide more flexibility for livestock use and distribution in the project area. Additional water could improve weight gains and health for calves. Better distribution of livestock and season of use would improve the vegetation available to livestock and replace the AUMs lost to production facilities.

Cumulative Effects: Cumulative effects from implementing this Alternative would be the long term (>5 years) of approximately 387 acres of forage and 77AUMs. The loss of AUMs could result in a loss of income to the livestock operator if a replacement grazing area was not available. After completion of final reclamation in the project area and addition of livestock water, the forage would become available and the AUMs would be restored. Additional water and water sources would provide more flexibility for livestock use and distribution in the project area. Additional water could improve weight gains and health for calves. Better distribution of livestock and 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 has limited 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. 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 would remain. Both the Decker and Spring Creek Coal Mines would continue with their individual expansion projects. The Montana and Wyoming CBNG development would continue to expand. 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.

4.2.9 Social and Economic Conditions

Direct and Indirect Effects: Fidelity would drill and complete 14 CBNG wells with 80 acre well density. Fourteen federal wells would be drilled and completed. One well would be a dry hole. If production occurs, 7 BCF of CBNG would be produced, from the 14 wells, having a gross value of 28 million dollars over the life of the wells. The Federal royalties would be 3.5 million dollars. The State would receive 2.42 million dollars in production taxes and receive 50 percent of the Federal royalties, 1.75 million dollars. Drilling, production and abandonment of the 14 wells would provide 2 temporary jobs with an estimated income of 64 thousand 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 two 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 Decker Mine East project area, 14 federal wells would be drilled and associated infrastructure would be installed (see Table 2.5-1). An estimated 26.7 acres of disturbance would be required to conduct these drilling and construction activities; with about 3.5 acres remaining unreclaimed during production.

Surface disturbance for drilling activities would include 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 (monobore) would be less than 1/3 acre at each well site location for a total of around 4.6 acres. Approximately 1/4 of an acre per loctions would remain in use after interim reclamation.

The majority of the proposed pipelines and access roads would be located in "disturbance corridors." Disturbance corridors involve the combining of two or more utility lines (water, gas, power) in a common right-of-way, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. Approximately 4.22 miles of proposed disturbance corridors would be used for access and utility line placement. During initial construction of the corridors, 15.3 acres of disturbance is projected to occur.

Approximately 2.09 miles of over head power line would be installed, located outside of disturbance corridors. Construction methods would require vehicle traffic with minor soil disturbance for emplacement of power poles; accounting for about 2.5 acres of temporary disturbance.

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 upgraded 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 reserve pits, 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. Soils 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 would damage soil structure. Salvage and storage of topsoil would 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 would 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 would 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.

Not rated are those areas not considered soil (shale outcrop); 0 acres in the project area. Slight indicates that erosion is unlikely under ordinary climatic conditions; 2,526 acres in the project area. Moderate indicates

some erosion is likely, control measures may be needed; 1,132 acres in the project area. Severe indicates erosion is very likely, control measures for vegetation re-establishment on bare areas and structural measures are advised; 0 acres in the project area. Very Severe indicates significant erosion is expected; loss of soil productivity and off-site damages are likely, control measures are costly and generally impractical; 0 acres in the project area.

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 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.

Reclamation and mitigation: Reclamation and mitigation measures for soil disturbances are described in the POD. 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.

Impoundments: The existing 34E-3490 impoundment, constructed for the water treatment facility and located in a natural depression on private surface, is in 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 required lining to prohibit infiltration of stored water.

The existing 12-3490 impoundment, constructed for the water treatment facility and located on private surface, is in an area of Olney soils. The Olney series is a fine sandy loam with a depth greater than 60 inches. This soil has insufficient clay to limit subsurface infiltration and required lining to prohibit infiltration of stored water.

Fidelity's off-channel impoundments, 12-3490 and 34-3490 have been approved by MBOGC, and are lined with a 20-mil polyethylene liner with an 8-ounce geotextile underlayment, with 12-inch anchor trenches used to secure the liners. Monitoring of these impoundments is conducted in accordance with the requirements identified by MDEQ in MPDES permit MT0030724.

Cumulative Effects: Construction and drilling activities associated with implementing this Alternative would impact approximately 26.7 acres during the short term (<5 years) and approximately 3.5 acres during the long term (>5 years); along with approximately 8.5 acres from non-federal CBNG development. These estimated 12 acres of long term disturbance 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 on private land and minerals in Montana is occurring within the area of the Decker Mine East project area. 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 would 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, construction of access roads, pipeline corridors, and compressor sites would remove vegetation from approximately 26.7 acres in the Decker Mine East POD area. 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 owner. It would be expected that approximately 3.5 acres of vegetation in the Decker Mine East POD area would remain disturbed during the production phase of the project.

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 that are 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.

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 in areas of surface disturbance. However, implementation of reclamation measures and measures proposed in the POD to control noxious weeds would ensure that potential impacts from noxious weeds and invasive plants would be minimal.

Cumulative Effects: Under this Alternative, during the production phase 387 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 opportunity to rest areas currently receiving constant use because it is the sole water source. The health and productivity of vegetation, and the vegetative community could be altered by grazing without adequate deferment in areas that are 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 FEIS (Chapter 4, pages 4-159 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 from the Fidelity Deer Creek North POD.

Direct impacts include loss of habitat from CBNG infrastructure, direct mortalities resulting from collisions with vehicles and power lines, electrocutions from power lines, and displacement of wildlife species from 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 includes the construction of 6.44 miles of new, improved roads, 6.44 miles of new improved two-track trails, and other infrastructure facilities (see Chapter 2). The total amount of CBNG infrastructure for the entire proposal would result in the direct loss of about 26.7 acres of habitat, and 3.5 acres after interim reclamation occurs. All development combined (with existing fee and state) result in approximately 12 acres total after reclamation. 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, although 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 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 that are sensitive to human activities, require large blocks of uniform cover, or are displaced by other species, which may include sage grouse, some songbird species, and elk. Vegetative changes from the previous conditions would also affect wildlife forage and habitat, and would displace wildlife species to areas with preferred habitat.

Some of the proposed well site locations and associated infrastructure analyzed under this alternative would be adjacent to previously authorized CBNG development that has occurred on fee and state lands. In addition, a portion of the POD is also adjacent to previously authorized federal development (Coal Creek). Depending on proximity to existing disturbance and species tolerance, wildlife species within these areas would either have acclimated to the surrounding conditions, previously been displaced by construction activities, or may be caused to be displaced to other areas with or without preferred habitat.

The compressor facilities for this project have been previously authorized. 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.

This alternative would not require the implementation of a WMPP.

4.2.12.1 Threatened and Endangered Species

As mentioned in section 3.12.1, potential habitat exists within this POD to support black-footed ferrets. 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. BLM determined this action is "not likely to adversely affect" black-footed ferrets.

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 has been identified on approximately 360 acres within the Decker Mine East POD. The entire delineation of this mule deer winter range polygon in Montana consists of 35,581 acres. The Decker Mine East POD would then encompass approximately 1% of this polygon.

This polygon is generally 3 to 7 miles wide, and extends in a north and south direction for approximately 13 miles. The Decker Mine East POD would overlap the west edge of the polygon, at approximately the middle of its length. In addition, fee development has already occurred over approximately 6,000 acres of the polygon, and additional similar acreages would be affected by the concurrently proposed Deer Creek North POD.

Development is expected to affect mule deer use of winter range habitat in this area. Studies conducted in the Pinedale anticline of Wyoming found that mule deer avoided areas in close proximity to well pads with no evidence of well-pad acclimation during 3 out of 4 years. During year 4 of development habitat selection patterns were influenced more by road density, and not proximity of well pads. The authors attributed this to an unusually severe winter, where movement options and available habitat was limited. Densities of mule deer decreased by an estimated 46% within the developed area over the four years, and indirect impacts were observed out to 2.7-3.7 km of well sites. Mule deer distribution shifted toward less preferred and presumably less suitable habitat. (Sawyer et al, 2005) Similar impacts would be expected from development with this proposal. It is anticipated that previous fee development within this POD has already affected the distribution and abundance of mule deer within this area, and that impacts from this project will be additive.

Although pronghorn winter ranges have not been identified within the project area, pronghorn were documented within the POD during one winter season big game flight in 2008. Preliminary studies in the upper green river basin in Wyoming report that some pronghorn exhibit movement patterns that suggest almost complete avoidance of gas field areas of intensive development in the Jonah field during the winter, whereas pronghorn in the PAPA (Pinedale Anticline Project Area) apparently have not been avoiding human activities. It is speculated that the difference may exist due to different levels in well densities, as the Jonah field was reported as 1 well/57 acres, and the PAPA at 1 well/124 acres (Berger et al., 2007) . As discussed, elk habitat also exists within this area. A recent literature review on the effects of energy development on ungulates (Hebblewhite, 2008) documents varying negative impacts to elk from energy development and other human activities. Research in the sage-steppe ecosystem of the Jack Marrow Hills of Wyoming found that elk avoided roads, and active oil and gas wells, between <500 to 2000m, dependent upon time of year (Powell, 2003). In a separate study on two elk ranges that were developed for oil and gas in southwestern WY, elk avoided areas during the construction phase on the winter and calving ranges, but reoccupied these areas after intense construction ended, although variation in the degree of avoidance was high over time (Hayden-Wing, 1990). Hebblewhite recognized that generally, elk avoid human activity in forested environments, and speculates that these impacts may be greater in open environments. It is expected that preferred habitat for elk has already been reduced because of previous and ongoing development on fee lands within this POD. This proposal is also expected to be additive regarding impacts to elk habitat.

4.2.12.3 Upland Game Birds

As noted, 30-40% of the vegetation within the POD boundary would be classified as potential sage grouse nesting habitat. The current level of human activity in the form of previously approved wells, a county road, and other disturbances associated with CBNG development would be expected to have greatly reduced the likelihood of occupation of this area by sage grouse. Research conducted in the Powder River Basin document numerous impacts of CBNG development to grouse populations. Sage grouse were shown to avoid energy development in otherwise suitable habitat in winter, (Doherty et al., 2007) and energy development was contributed to localized population declines in the Powder River Basin (Walker, et al., 2007). Based on this research, it is expected that sage grouse would avoid any potential available habitat within this POD during and after development occurs.

Additional development would be expected to further reduce the likelihood that sage grouse would utilize these habitats. Research conducted in the Powder River Basin document numerous impacts of CBNG development to grouse populations. Sage grouse were shown to avoid energy development in otherwise suitable habitat in winter, (Doherty et al., in press) and energy development was contributed to localized population declines in the Powder River Basin (Walker, et al., in press) Based on this research, it is expected that sage grouse would avoid any potential available habitat within this POD during and after development occurs.

Sharp-tailed grouse would also be impacted by this project from habitat fragmentation and disturbance. Vehicles and human activity during breeding and nesting seasons may reduce breeding activity, displace nesting hens and reduce the suitability of habitat for brood-rearing. Mortality may increase as a result of collisions with vehicles. Well 22-1891is proposed just over ¼ mile from the HW-40 lek. The proposed gathering infrastructure and access for this well would be located approximately 1/8 mile from the lek. This corridor would be placed adjacent to an existing overhead powerline. Additional infrastructure including a water main and gathering facilities for other wells are proposed to the south of the lek site on an existing two-track road. As discussed, this lek has been documented to have been attended only once in the last two years, and it is unknown if this location would be utilized in future years. Some habitat will be disturbed in close proximity to this lek, and may further decrease the likelihood of potential attendance.

4.2.12.4 Raptors

As mentioned in 3.12.4, a total of eight documented active or historic raptor nests occur within the project area. A total of three nests were active in 2007. These nests would have been previously exposed to varying degrees of disturbance from prior CBNG activities. It is anticipated that the breeding pairs of raptors would have acclimated to those disturbances to some degree, and tolerated that level of disturbance during that nesting season. However, the threshold for tolerance to additional disturbance and vehicle traffic or human activities as a result of the completion of additional wells is unknown.

Well 13D-1791 is proposed approximately 0.2 miles to the west of a red-tailed hawk nest that was active in 2007. The well and access road would be located within line of sight of this nest. This nest is also located within line of sight of a short stretch of heavily used county road, and obviously was tolerant to that level of vehicle traffic in 2007. Additional CBNG infrastructure and an access road are also proposed from this well to well 24D-1791, which would be located to the south of the nest. Portions of this access road would also be within line of sight of this nest. It is anticipated that this nest would most likely be inactive after development occurs within this area.

Well 22-0791 is proposed approximately ½ mile west of a red-tailed hawk nest that was active in 2006, but not in 2007. A separate nest located east of this nest approximately 0.14 miles was active in 2007. These two nests would be considered 1 territory. Previously approved fee development has occurred adjacent to this territory in all directions. Because of the existing level of disturbance combined with the distance to the proposed federal wells, these wells would only be expected to minimally increase the cumulative disturbance to this territory. If the territory continues to be utilized, then the pair of red-tails would be considered to have a high tolerance level to development.

Well 42D-1791 and associated infrastructure is proposed within .07 miles of an "unknown" raptor nest. This nest has had no record of activity, although is reported to be in good condition, and would be considered potentially useable. It is anticipated that this nest would remain inactive with this proposal.

Certain species of raptors are more tolerant than others to human activities. Additionally, line of sight to the disturbance combined with the available security cover would affect raptor species future utilization at these nests. Generally, it is anticipated that most of the nests will become or remain inactive as a result of this proposal; however, it is also reasonable to believe a few nests will remain active.

The Condition of Approval to prevent surface disturbing activities and associated disturbance around active nests during nesting periods would not apply under this alternative, and population declines of raptor groups would occur. The diversity and populations of raptors utilizing this area would be expected to be well below pre-disturbance levels.

Several nests which have been reported as inactive for the last two years or more are also 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.

As mentioned previously in section 3.12.1, three bald eagle nests are located within a six mile radius of the Decker Mine East POD. The nearest bald eagle nest is located approximately 2.92 miles to the southwest of this POD. However, the water management plan for this project would tie in with other previously approved POD's. Under this proposal, some water produced will go to the water treatment facility that is 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 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 that this pair of bald eagles have habituated to these types of disturbances, because this nest has remained active during the course of CBNG development.

Some human-related disturbances are currently located adjacent to each of the other bald eagle nests active within the project area, including 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 pair of nesting bald eagles home range as well as wintering migrations. This proposal would also add additional power lines, which may increase the potential for electrocutions or collisions.

Because the bald eagle has been de-listed, the BLM does not officially consult under section 7 of the Threatened and Endangered Species Act. However, bald eagles are still protected under the Bald and Golden Eagle Protection Act (BGEPA), as well as the Migratory Bird Treaty Act. BLM, in consultation with the USFWS and the Montana Bald Eagle Management Plan guidelines, (MBEWG, 1994) has determined that this project will not "wound, kill, or disturb" bald eagles as prohibited by BGEPA.

4.2.12.5 Prairie Dogs and Associated Species

As previously discussed, one black-tailed prairie dog colony exists within the project area, located on fee surface. Developments in the form of wells, overhead powerlines, access roads, and gathering facilities have previously been constructed on or within this 68.6 acre colony. No federal action is proposed on or adjacent to this colony. Impacts that may occur to prairie dog towns include mortalities from vehicles, and improved access to these areas where prairie dog shooting may occur.

Impacts to associated species include disturbance from vehicle traffic, human presence, and potential mortalities from vehicles. Burrowing owls, a designated BLM sensitive species, have been documented to nest on this prairie dog colony. These nests have not been occupied since 2004, and likely went inactive due to intolerance of the level of CBNG activity. It is unlikely burrowing owls will re-occupy habitat within this POD.

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 area from 2004-2007 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 would reduce potential habitat suitability for plovers in this area.

Many other species have been documented to utilize prairie dog colonies. Impacts to those species would mirror 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 as 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 disturbance of preferred nesting habitats, improved habitat for undesirable competitors and/or a species shift to disturbance associated species, and increased vehicle collisions.

Research in Sublette County, Wyoming on the effects of natural gas development on sagebrush steppe passerines documented negative impacts to sagebrush obligates such as Brewer's sparrows, sage sparrows, and sage thrashers. (Ingelfinger, 2001) The impacts were reported greatest along roads where traffic volumes are high and within 100m of these roads. Sagebrush obligates were reduced within these areas by as much as 60%. Sagebrush obligate density was reduced by 50% within 100m of a road even when traffic volumes were less than 12 vehicles /day. It would be expected that similar population declines would occur to this guild of species from this proposal within sagebrush habitats.

4.2.12.7 BLM Sensitive Species

Other than the BLM designated sensitive species discussed previously, current data suggests that those sensitive species that could be in the project area either occur in very 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. .

Cumulative Effects to Wildlife:

Construction of roads, production well pads, and other facilities would result in the long term (>5 years) loss of habitat over approximately 12 acres in the project area under this alternative. This would be in addition to acres disturbed and not reclaimed for production activities in other adjacent areas 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 over a much larger area from habitat disturbance and human presence. Utilizing a ½ mile buffer around the POD boundary, approximately 7,680 acres would be indirectly affected because human activities would disturb or inhibit wildlife occupation in these areas. Additional 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 nesting habitats.

Certain species are localized to the area and rely on very key habitats during critical times of the year. Disturbance or human activities that would occur in 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 and/or a few individuals from a species group may be able to adapt to these human influences over time.

Cumulative Effects to Fisheries/Aquatics:

Potential effects to fisheries/aquatics have occurred or may occur from the following current and past activities: Decker Coal Mine, Montana and Wyoming CBNG development, livestock grazing, agriculture/irrigation, Tongue River dam and reservoir, residential areas, and existing roads. These actions occur in various degrees throughout the drainage which influences the degree at which aquatic life is affected. Water quality, erosion and streamflows are identified as parameters that could be changed or impacted and subsequently result in potential effects to aquatic life.

Decker Coal Mine: Coal mining has the potential to affect water quality, erosion, and streamflows. This activity consists of 11,400 surface acres. This is equal to .3 % of the area within the Tongue River drainage (3,458,832 acres). Due to mitigation requirements, these activities would be minor and not detrimental to

aquatic species in relation to effects from erosion. The Decker Mine discharges 3.74 cfs into the Tongue River Reservoir, which is approximately 5.3 percent of the flow at the low monthly 7Q10 (70 cfs) below the dam. This project could have potential effects on habitat or populations.

CBNG development: Past and ongoing CBNG activities have the potential to affect water quality, erosion and streamflows. CBNG development in Montana presently encompasses 35,840 acres (1% of the Tongue River drainage). Currently, in Montana, there is one permit for the discharge of untreated CBNG water. The volume that can be discharged under this permit varies seasonally with 2,500 gpm allowed in the "winter" (November 1 to February 28), 2,375 gpm allowed in the "spring" (March 1 to June 30) and 1,600 gpm allowed in the "summer" (July 1 to October 31). This discharge occurs upstream of the Tongue River Reservoir. There are two MPDES permits for the discharge of treated water in Montana. The one which would discharge downstream of the Tongue River Dam (the Powder River Gas permit) is not in use at this time. The other treated discharge permit authorizes the discharge of up to 1,700 gpm upstream from the Tongue River Reservoir. Effects to aquatic species are possible from these CBNG activities, due to potential water quality impacts, changes in streamflows, and erosion.

Within Wyoming (the upper portions of the Tongue River watershed), existing CBNG activities are occurring. Treated discharge is currently permitted at 600 gpm (1.34 cfs). Untreated discharge is currently permitted at 175 gpm (0.39 cfs). Therefore, this activity could have potential effects on habitat or populations. This activity will be included in the Fisheries/Aquatics analysis (see chapter 4).

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

Agriculture/irrigation: Potential impacts from agriculture/irrigation are decreased streamflows, changes in water quality, erosion, and migration barriers. Agriculture is primarily limited to dry land farming or irrigated farmland adjacent to perennial streams and rivers. This area is limited primarily by terrain. The amount of flow removed from the Tongue may vary per day based on irrigation needs. However, the most impacted portion of the Tongue River from irrigation withdrawal is downstream of the T&Y diversion at 12 mile dam (approx. 165 miles downstream of the project area). The river is almost de-watered during a portion of the irrigation season. This can have an effect on spawning fish, such as the sauger, and affect the fish and aquatic habitat and populations within the river. However, work has been completed on T&Y diversion dam to allow for fish passage. Additional work is planned for the S&H and Mobly Diversions which are located upstream of T&Y and downstream of Ashland. These improvements will improve native fish populations within the Tongue River. Potential effects could occur to aquatic habitat or populations.

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

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

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

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

Of the above activities, present CBNG development, the Decker Coal mine, agriculture/irrigation, residential areas, livestock grazing, the Tongue River dam and reservoir, and existing roads indicate potential effects to aquatic habitat and populations. Although difficult to quantify in numerical terms, it is reasonable to assume that, with the magnitude of activities there would be some impacts to most aquatic species residing in the area.

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

Alternative C would analyze the implementation of Fidelity's Decker Mine East POD proposal as submitted; while applying mitigating measures, not already part of the operator's proposal, as part of this alternative. The incorporation of mitigating measures identified during project review would avoid or reduce impacts to cultural, social and natural resources. Based on public comment and issues, Alternative C is the agencies' preferred alternative.

Direct and Indirect Effects: Direct effects would be similar to those outlined in Alternatives A and B. Based on the lack of direct impacts to cultural resources, no monitoring requirements would be included in the 14 APDS for Federal wells. Unanticipated discoveries of cultural resources during construction of the wells and associated infrastructure would be dealt with through implementation of Conditions of Approval attached to the APDs. Indirect effects to sites in adjacent PODS would be dealt with in the same manner as those identified in Alternatives A and B. Direct and indirect impacts to Paleontological resources would the same as those identified in Alternative A.

Cumulative Effects: Cumulative Effects would be the same as those outlined in Alternatives A and B.

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: The mitigation developed for this alternative does not alter the water management plan. As such the impacts to surface water resources from CBNG discharges under this alternative would be the same as under Alternative B.

Effects to Surface Water from Disturbance: The mitigation developed for this alternative does not alter the amount of disturbance that would result. As such the impacts to surface water resources from disturbance under this alternative would be the same as under Alternative B.

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: Since the same impoundments would be used to manage the same volume of water under this alternative as under Alternative B the impacts from impoundments would be the same as under Alternative B.

Effects from Beneficial Uses: Impacts from the beneficial use of the CBNG water would be the same as described under Alternative B.

Cumulative Effects to Hydrological Resources

Cumulative Effects to Surface Water-CBNG Water Discharges to Surface Waters: The mitigation developed for this alternative does not alter the water management plan. As such the impacts to surface water resources from CBNG discharges under this alternative would be the same as under Alternative B.

Cumulative Effects to Surface Water from Disturbance: The mitigation developed for this alternative does not alter the amount of disturbance that would result. As such the impacts to surface water resources from disturbance under this alternative would be the same as under Alternative B.

Cumulative 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.

Cumulative 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.

Cumulative Effects from Beneficial Uses: Any impacts that could result from the beneficial use of the water would be limited to the immediate vicinity of the use. As such it 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 right-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.

Cumulative Effects: Same as Alternative B.

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, apart from additional mitigation being applied to specific locations for erosion control. The application of specific erosion control to these locations would generally lessen the potential for topsoil displacement, exposure of soil, loss of soil productivity and increased susceptibility of the soil to wind and water erosion. Soil erosion would be minimized, thus less of an effect to soil health and productivity. Appropriate erosion control to disturbed locations will reduce any chances of accelerated erosion.

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

4.3.11 Vegetation
Direct and Indirect Effects to Vegetation: Same as Alternative B

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: Same as Alternative B.

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, although in this alternative, mitigation measures and stipulations would apply, therefore somewhat minimizing direct and indirect impacts to those wildlife species that can be afforded special protection measures. This proposed alternative requires the Wildlife Monitoring and Mitigation Plan (WMPP) to be implemented, which requires additional monitoring, mitigation and stipulations on development activities to try 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.

4.3.12.2 Big Game Species
Impacts would be similar to those described under Alternative B as a result of CBNG activities. No federal actions are proposed within identified big game winter ranges.

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. However, two stipulations would apply under this alternative, which would offer more

protective measures for sharp-tailed grouse leks and nesting habitats. A no surface occupancy stipulation would restrict development within ¼ mile of th7e sharp-tailed grouse lek identified as HW-40. The other stipulation would prohibit activities within a two mile radius of an active lek from March 1 through June 15, which include all wells in this proposal.

These mitigation/stipulation measures would restrict activities during breeding, nesting, and early brood-rearing stages. The applied NSO offers some protection of the lek site; however, based on those impacts identified in Alternative B, timing stipulations would not protect grouse after the infrastructure is in place, and displacement to other undisturbed habitats and/or a reduction in population attendance at the lek site would be expected within a few years.

No additional stipulations or protection measures are applicable for sage grouse under this alternative; therefore, impacts would be similar to Alternative B.

4.3.12.4 Raptors
The types of impacts to raptors would be similar to those described under Alternative B. However, stipulations and mitigation would help to reduce these impacts. Construction timing stipulations would prohibit development within ½ mile of raptor nests from March 1 to August 1. Timing stipulations are designed to protect against disturbances that may result in the abandonment of a potential nest site, eggs, or young at the nest during the nesting season, as well as ensure that "take" as defined by the Migratory Bird Treaty Act would not occur. Timing stipulations only protect raptors during the initial construction phase, and do nothing to protect the nest site outside of those dates. CBNG development and infrastructure can be placed anywhere within the ½ mile from August 1 to March 1, and will be permanent thereafter until abandonment and reclamation. If these actions were to occur, the probability of nest abandonment would be expected to increase. Those timing stipulations would apply to wells 44D-1891, 13D-1791, 24D-1791, and 22M-0791.

The BLM has applied a ¼ mile no surface occupancy mitigation measure around nests on previous CBNG projects. This mitigation would provide some undisturbed habitat between development and the nest, which would be expected to increase the likelihood that the nest sites protected, would remain active, or at least would not become inactive due to anthropogenic disturbance associated with development. Those wells that would not be authorized in the proposed locations utilizing this mitigation measure, under this alternative, include 13D-1791. In addition, the access road and infrastructure to well 24D-1791 would not be authorized. Although both timing and ¼ mile NSO mitigation will reduce impacts, full field development is still expected to reduce population levels of raptor groups within the development area.

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.

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. No additional stipulations apply.

Cumulative Effects to Wildlife:
Cumulative effects to wildlife would be similar to those described under Alternative B; however, stipulations and mitigation for wildlife would reduce impacts during the construction phase to those species that are offered some protection through the stipulation process.