

APPENDIX U

Cumulative Impacts Analysis

Contents

List of Tables	iii
List of Figures.....	vi
List of Acronyms and Abbreviations.....	vii
Appendix U Cumulative Impact Analysis	U-1
U.1 Introduction to Cumulative Impacts Analysis	U-1
U.2 Applicable Regulations	U-1
U.3 Affected Environment	U-1
U.3.1 Methods.....	U-4
U.3.2 Cumulative Impacts Study Area.....	U-4
U.3.3 Projects Analyzed.....	U-5
U.3.4 Projects Considered but Not Included in the Analysis.....	U-14
U.4 Environmental Consequences	U-15
U.4.1 Transportation	U-16
U.4.2 Air Quality	U-34
U.4.3 Greenhouse Gases and Climate Change	U-74
U.4.4 Coal Dust.....	U-74
U.4.5 Noise and Vibration	U-75
U.4.6 Biological Resources	U-76
U.4.7 Water Resources.....	U-123
U.4.8 Visual Resources	U-163
U.4.9 Cultural Resources	U-169
U.4.10 Land Resources.....	U-180
U.4.11 Geology, Soils, and Paleontological Resources	U-196
U.4.12 Energy Resources	U-210
U.4.13 Socioeconomics.....	U-227
U.4.14 Environmental Justice	U-247
U.5 References.....	U-248
U.5.1 Introduction to Cumulative Impacts Analysis.....	U-248
U.5.2 Affected Environment.....	U-249
U.5.3 Rail Operations and Rail Safety.....	U-249
U.5.4 Grade-Crossing Delay.....	U-250
U.5.5 Grade-Crossing Safety.....	U-250
U.5.6 Navigation.....	U-250
U.5.7 Air Quality	U-250
U.5.8 Greenhouse Gases and Climate Change	U-254
U.5.9 Coal Dust.....	U-254
U.5.10 Noise and Vibration.....	U-254

U.5.11	Vegetation	U-254
U.5.12	Wildlife	U-255
U.5.13	Fish	U-256
U.5.14	Special-Status Species	U-257
U.5.15	Surface Water.....	U-258
U.5.16	Groundwater	U-259
U.5.17	Floodplains	U-260
U.5.18	Wetlands	U-260
U.5.19	Visual Resources.....	U-261
U.5.20	Cultural and Historical Resources.....	U-261
U.5.21	Land Use	U-261
U.5.22	Recreation	U-262
U.5.23	Section 4(f) and 6(f) Resources	U-262
U.5.24	Hazardous Waste Sites	U-262
U.5.25	Geology and Soils	U-262
U.5.26	Paleontological Resources.....	U-262
U.5.27	Energy Resources	U-262
U.5.28	Socioeconomics.....	U-264
U.5.29	Environmental Justice	U-264

Tables

Table U-1. Build Alternative Construction Periods.....	U-5
Table U-2. Proposed and Potentially Induced Mine Construction Schedules Assuming Winter Construction	U-5
Table U-3. Projected Future Fluid Mineral Wells in Four-County Area.....	U-12
Table U-4. Road Disturbance for Coal Bed Natural Gas Well Development by County.....	U-21
Table U-5. Cumulative Grade-Crossing Safety Impact of Paving Tongue River Road plus Build Alternative, Low Production Scenario (7.4 trains per day).....	U-30
Table U-6. Cumulative Grade-Crossing Safety Impact of Paving Project plus Build Alternative, Medium Scenario (11.9 trains per day)	U-31
Table U-7. Cumulative Grade-Crossing Safety Impact of Paving Project plus Build Alternative, High Scenario (18.6 trains per day)	U-32
Table U-8. Permit Limits for Criteria Air Pollutant Emissions from Colstrip Energy Limited Partnership Power Plant.....	U-35
Table U-9. Rosebud Mine Permitted Criteria Air Pollutant Emissions ^a	U-36
Table U-10. Spring Creek Mine Permitted Criteria Air Pollutant Emissions ^a	U-37
Table U-11. 24-Hour PM ₁₀ Modeling Results – Spring Creek Mine.....	U-38
Table U-12. Annual PM ₁₀ Modeling Results – Spring Creek Mine	U-38
Table U-13. 1-Hour NO ₂ Modeling Results – Spring Creek Mine.....	U-38
Table U-14. Annual NO ₂ Modeling Results – Spring Creek Mine	U-39
Table U-15. Decker Mine Permitted Criteria Air Pollutant Emissions ^a	U-39
Table U-16. Existing Coal Mine and Power Plant Permitted Criteria Air Pollutant Emissions	U-40
Table U-17. Criteria Air Pollutant Emissions from Fuel Consumption for Existing Mine Operations.....	U-40
Table U-18. Hazardous Air Pollutant Emissions from Fuel Consumption for Existing Mine Operations.....	U-41
Table U-19. Fugitive PM Emissions from Construction of Proposed and Potentially Induced Mines	U-42
Table U-20. Criteria Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – All Build Alternatives, Low Production Scenario	U-43
Table U-21. Criteria Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – All Build Alternatives, Medium Production Scenario	U-43
Table U-22. Criteria Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – Northern Alternatives, High Production Scenario	U-44
Table U-23. Hazardous Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Construction – Northern and Southern Alternatives, Medium Production Scenario.....	U-44

Table U-24. Fugitive PM Emissions for Proposed and Potentially Induced Mine Operations – All Build Alternatives, Low Production Scenario	U-45
Table U-25. Fugitive PM Emissions for Proposed and Potentially Induced Mine Operation – All Build Alternatives, Medium Production Scenario	U-45
Table U-26. Fugitive PM Emissions for Proposed and Potentially Induced Mine Operation – Northern Alternatives, High Production Scenario	U-45
Table U-27. Fugitive PM Emissions for Proposed and Potentially Induced Mine Operation – Southern Alternatives, High Production Scenario	U-46
Table U-28. Criteria Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – All Build Alternatives, Low Production Scenario	U-46
Table U-29. Criteria Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – All Build Alternatives, Medium Production Scenario	U-47
Table U-30. Criteria Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – Northern Alternatives, High Production Scenario	U-47
Table U-31. Criteria Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – Southern Alternatives, High Production Scenario	U-48
Table U-32. Hazardous Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – All Build Alternatives, Low Production Scenario	U-48
Table U-33. Hazardous Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – All Build Alternatives, Medium Production Scenario	U-49
Table U-34. Hazardous Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – Northern Alternatives, High Production Scenario	U-49
Table U-35. Hazardous Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – Southern Alternatives, High Production Scenario	U-50
Table U-36. Criteria and Hazardous Air Pollutant Emissions for BLM Land Management under the BLM Draft RMP/EIS Preferred Alternative	U-52
Table U-37. Criteria and Hazardous Air Pollutant Emissions for Energy Development and Production under the BLM Draft RMP/EIS Preferred Alternative	U-53
Table U-38. Projected Oil and Gas Development Emission Factors and Life of Project Emissions	U-54
Table U-39. Criteria Air Pollutant Emissions from Paving of Tongue River Road	U-55
Table U-40. Hazardous Air Pollutant Emissions from Paving of Tongue River Road	U-55
Table U-41. Comparison of Emissions from Currently Proposed Rail Line and Previously Approved Rail Line Used in BLM Modeling	U-64
Table U-42. Summary of Estimated Criteria Air Pollutants for Construction and Operation (million tons/year)	U-68

Table U-43. Summary of Estimated Hazardous Pollutants for Construction and Operations (tons/year).....	U-71
Table U-44. Impacts on Vegetation from Proposed and Potentially Induced Mining in Cumulative Impacts Study Area (acres).....	U-78
Table U-45. Indicator Species in Study Area Water Bodies and Their Sensitivities.....	U-94
Table U-46. Characteristics of Special-Status Fish Species Known or Likely to be Present in the Cumulative Impacts Study Area.....	U-106
Table U-47. Impacts on Predicted Suitable Special-Status Plant Habitat in Proposed and Potentially Induced Mine Areas (acres)	U-113
Table U-48. Water Wells within the Build Alternatives' Rights-of-Way and Estimated Water Use for Construction	U-139
Table U-49. FEMA and NRCS-Mapped Floodplains in the Proposed and Potentially Induced Mine Boundaries (acres).....	U-148
Table U-50. Wetland Impacts at Existing Coal Mines.....	U-155
Table U-51. Wetland Impacts at Proposed and Potentially Induced Coal Mines.....	U-157
Table U-52. Cumulative Wetland Impacts.....	U-158
Table U-53. Cultural Resources Sensitivity at Existing Mines.....	U-170
Table U-54. Previously Recorded Tribal, Archaeological, and Built Environment Resources In and Adjacent to Proposed and Potentially Induced Mines	U-172
Table U-55. Cultural Resources Sensitivity at Proposed and Potentially Induced Mines.....	U-173
Table U-56. Land Uses in Reasonably Foreseeable Development Areas of the Rosebud Mine and Spring Creek Mine (acres).....	U-181
Table U-57. Land Uses in the Proposed and Potentially Induced Mine Footprints (acres).....	U-183
Table U-58. Private Properties Located in a Build Alternative Right-of-Way that Overlaps the Development Footprint for Proposed or Potentially Induced Mines	U-184
Table U-59. Paleontological Sensitivity of Existing Mines	U-203
Table U-60. Paleontological Sensitivity in Proposed and Potentially Induced Mines	U-205
Table U-61. Energy Consumption for Spring Creek and Decker Mines ^a	U-212
Table U-62. Energy Consumption for Rosebud Mine	U-212
Table U-63. Mine Production Capacities	U-215
Table U-64. Maximum Production Capacities for All Mines, Assuming Winter Construction	U-215
Table U-65. Energy Consumption for Construction of Proposed and Potentially Induced Mines (Low, Medium, and High Production Scenarios) Assuming Winter Construction of Tongue River Railroad	U-217
Table U-66. Energy Consumption for Construction and Operation of Proposed and Potentially Induced Mines (Low Production Scenario) Assuming Winter Construction.....	U-219
Table U-67. Energy Consumption for Construction and Operation of Proposed and Potentially Induced Mines (Medium Production Scenario) Assuming Winter Construction	U-219

Table U-68. Energy Consumption for Construction and Operation of Proposed and Potentially Induced Mines (High Production Scenario) Assuming Winter Construction	U-220
Table U-69. Energy Consumption for Construction and Operation of Proposed and Potentially Induced Mines.....	U-221
Table U-70. Estimated Loss of Farm Output in Four-County Area ^a	U-229
Table U-71. Estimated Jobs, Migration, and Increased Demand for Housing from Proposed and Potentially Induced Mines (Construction, Nine-County Area).....	U-231
Table U-72. Estimated Jobs, Migration and Increased Demand for Housing from Proposed and Potentially Induced Mines (Construction, Four-County Area).....	U-231
Table U-73. Estimated Jobs, Migration and Increased Demand for Housing from Proposed and Potentially Induced Mines (Operations, Nine-County Area)	U-233
Table U-74. Estimated Jobs, Migration and Increased Demand for Housing from Proposed and Potentially Induced Mines (Operations, Four-County Area).....	U-233
Table U-75. Cumulative Impacts on Migration and Housing, Nine-County Area, Northern Alternatives.....	U-236
Table U-76. Cumulative Impacts on Migration and Housing, Four-County Area, Northern Alternatives.....	U-237
Table U-77. Cumulative Impacts on Migration and Housing, Nine-County Area, Southern Alternatives.....	U-238
Table U-78. Cumulative Impacts on Migration and Housing, Four-County Area, Southern Alternatives.....	U-239

Figures

Figure U-1. Projects Analyzed.....	U-3
Figure U-2. Groundwater Wells within the Build Alternatives' Rights-of-Way	U-137

Acronyms and Abbreviations

AADT	average annual daily traffic
ANC	acid neutralizing capacity
AQRV	air quality-related values
ARM	Administrative Rules of Montana
BLM	Bureau of Land Management
BMA	block management area
BNSF	BNSF Railway Company
Board	Surface Transportation Board
Btu	British thermal units
C.F.R	Code of Federal Regulations
CBNG	coal bed natural gas
CEQ	Council on Environmental Quality
CO	carbon monoxide
CO ₂	carbon dioxide
CWA	Clean Water Act
DM&E	Dakota, Minnesota, and Eastern Powder River Basin Expansion EIS
DNRC	Montana Department of Natural Resources and Conservation
Dv	deciviews
EA	environmental assessment
EC	electrical conductivity
EIS	environmental impact statement
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
Fort Keogh	U.S. Department of Agriculture Fort Keogh Livestock and Range Research Laboratory
GHG	greenhouse gas
GIS	geographic information system
HAP	hazardous air pollutant
I-94	Interstate 94
kWh	kilowatt hours
lbs/hour	pounds per hour
LMP	Landscape Management Project
LOS	level of service
MCA	Montana Code Annotated
MDT	Montana Department of Transportation
MEPA	Montana Environmental Policy Act
mg/L	milligrams per liter
Mm ⁻¹	inverse megameters

MMTCO ₂ e	million metric tons of carbon dioxide equivalent
MNHP	Montana Natural Heritage Program
Montana AAQS or MAAQS	Montana Ambient Air Quality Standards
Montana DEQ	Montana Department of Environmental Quality
Montana FWP	Montana Fish, Wildlife & Parks
MPDES	Montana Pollutant Discharge Elimination System
MTM	Mountaintop Mining
MWh	megawatt hours
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NO _x	nitrogen oxides
NRCS	Natural Resources Conservation Service
NSO	no surface occurrence
NWI	National Wetland Inventory
OEA	Office of Environmental Analysis
PAB	palustrine aquatic bed
Pb	lead
PEM	palustrine emergent
PM	particulate matter
PM ₁₀	particulate matter 10 microns or less in diameter
PM _{2.5}	particulate matter 2.5 microns or less in diameter
PSD	Prevention of Significant Deterioration
PUS	palustrine unconsolidated shoreline
R	riverine
RFD	reasonably foreseeable development
RM	river mile
RMP	resource management plan
Draft RMP/EIS	Miles City Field Office Draft Resource Management Plan and Environmental Impact Statement
RP	reference post
SAR	sodium adsorption ratio
SO ₂	sulfur dioxide
SO _x	sulfur oxide
SWPPP	stormwater pollution prevention plan
TDS	total dissolved solids
tpy	tons per year
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency

USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
WRAP	Western Region Air Partnership

Appendix U

Cumulative Impact Analysis

U.1 Introduction to Cumulative Impacts Analysis

This appendix describes the cumulative impacts that would result from the addition of the impacts from the proposed rail line to the impacts from relevant past, present, and reasonably foreseeable future projects and actions¹ in the same geographic area and period. The Surface Transportation Board's (Board) Office of Environmental Analysis (OEA) based this analysis on the proposed rail line resource area impacts reported in Chapters 3 through 16 of this Draft Environmental Impact Statement (EIS). Chapter 18, *Cumulative Impacts*, provides a summary of these cumulative impacts by resource.

U.2 Applicable Regulations

Council on Environmental Quality (CEQ) regulations that implement the National Environmental Policy Act (NEPA) define a cumulative impact as “the impact on the environment which results from the incremental consequences of an action when added to past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions” (40 Code of Federal Regulations [C.F.R.] § 1508.7). To help federal agencies assess cumulative impacts under NEPA, CEQ developed a handbook entitled *Considering Cumulative Effects under the National Environmental Policy Act* (Council on Environmental Quality 1997). OEA followed these guidelines in its evaluation of whether cumulative impacts would result from adding impacts of construction and operation of the proposed rail line to impacts of other projects and actions in the area of the proposed rail line.

U.3 Affected Environment

Although the exact location of the proposed rail line would depend on which build alternative the Board licenses, any of the northern alternatives² would be located between Miles City and Colstrip, Montana and two terminus points south of Ashland, Montana; either of the southern alternatives would be located between those terminus points and Decker, Montana. One terminus would be near the site of the previously planned Montco Mine and the other

¹ Referred to hereafter as *other projects*.

² The northern alternatives are the Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives. The southern alternatives are the Decker Alternatives.

would be at the proposed Otter Creek Mine in the Otter Creek area east of Ashland (Figure U-1).

The geographic region is primarily rural and sparsely populated. Land uses include grazing land, irrigated land, nonirrigated hay land, forestland, and farmland. The elevations range from 2,362 feet to 4,134 feet. Elevations are lower to the north and increase southward. Five major habitats are present: riparian, grassland, shrubland, woodland, and agricultural fields. The area provides habitat for wildlife species such as elk, mule deer, antelope, white-tailed deer, and mountain lion. Cultural and historic resources include homestead cabins and trails. Several designated recreation areas are located in this region.

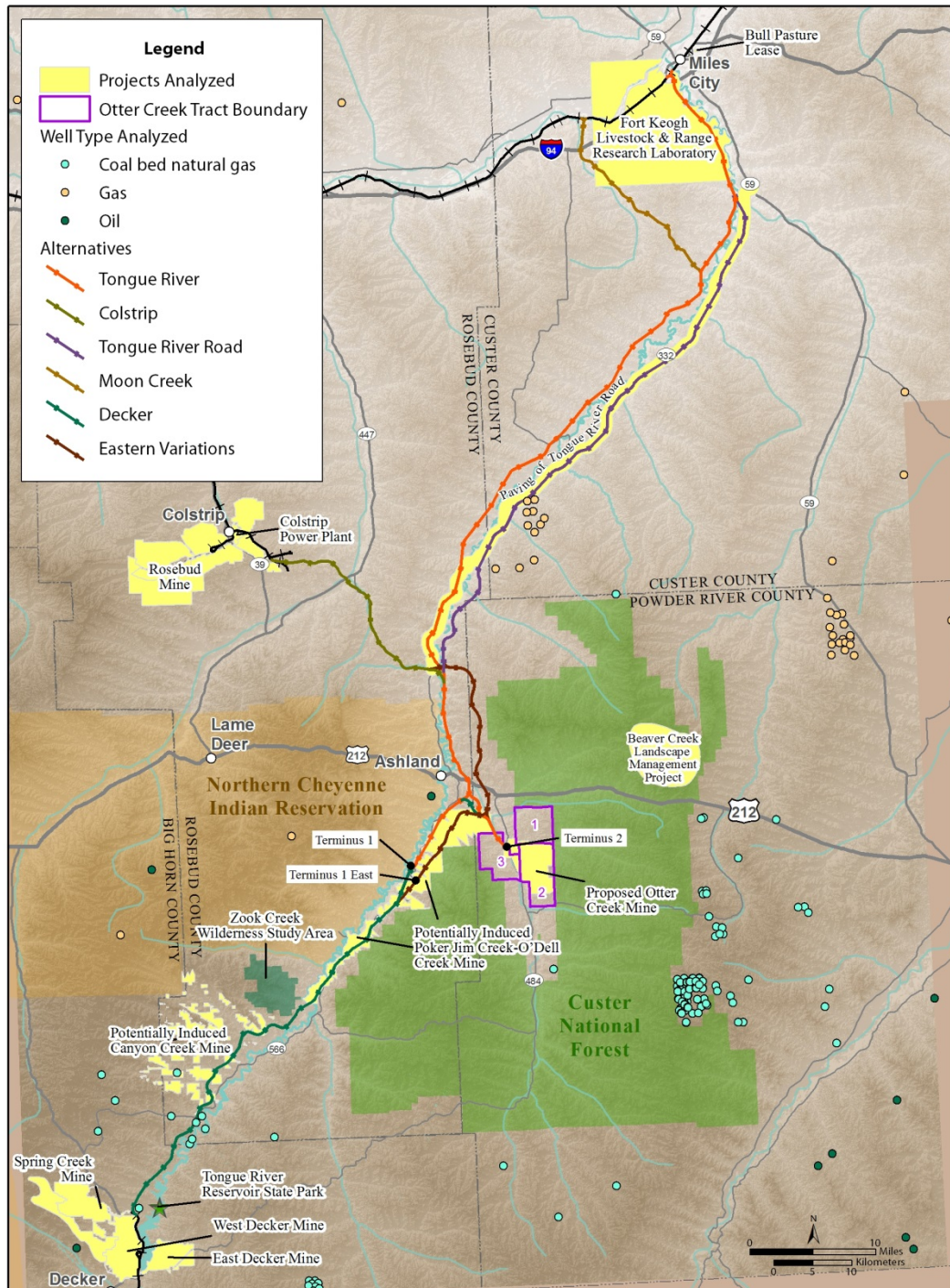


Figure U-1. Projects Analyzed

U.3.1 Methods

Based on the CEQ guidance, OEA structured this cumulative impacts analysis to accomplish the following goals.

- Focus on the impacts and resources in the context of the proposed rail line.
- Rely on information from other agencies and organizations about reasonably foreseeable projects and actions that are beyond OEA's purview.
- Relate to the geographic scope of the proposed rail line.
- Relate to the temporal period of the proposed rail line.
- Reach conclusions based on the best available data at the time of the analysis.

U.3.2 Cumulative Impacts Study Area

OEA determined that the cumulative impacts study area would be based on the study areas defined for each of the resource areas described in Chapters 3 through 16 of this Draft EIS. Some resources have larger cumulative impacts study areas. For example, while the wetland study area for rail line impacts is limited to the right-of-way plus a buffer area, the study area for cumulative impacts encompasses any watersheds that drain into the wetlands along the alignments—a much larger area. In all cases except for greenhouse gas, climate change, and socioeconomics, the outer limits of the cumulative impacts study area are defined as the boundaries of Rosebud, Custer, Powder River, and Big Horn Counties. Most cumulative impacts study areas are within 2 miles of the right-of-way.

OEA determined that the appropriate period for this cumulative impacts analysis is the same as the period for the impact analysis, from 2018 to 2037. Table U-1 illustrates the construction periods for each build alternative for two different construction schedule scenarios. Table U-2 shows the construction schedule for the proposed and potentially induced mines, which are discussed in detail in Section U.1.3.2, *Projects Analyzed, Proposed and Potentially Induced Coal Mines*. The construction period for the proposed rail line would overlap with the construction and operation schedules for these mines.

Table U-1. Build Alternative Construction Periods

Build Alternative	Non-24 hour, 8-month/year Construction Schedule		24-hour, 12-month/year Construction Schedule	
	Construction Duration in Months	Construction Years	Construction Duration in Months	Construction Years
Tongue River	24.0	3.0	20.1	1.7
Tongue River East	38.0	4.7	30.4	2.5
Colstrip	20.0	2.5	16.0	1.3
Colstrip East	30.0	4.0	22.1	1.8
Tongue River Road	36.0	5.0	30.0	2.5
Tongue River Road East	45.2	5.6	36.2	3.0
Moon Creek	36.0	5.0	29.5	2.5
Moon Creek East	49.7	6.2	39.8	3.3
Decker	45.0	6.0	35.3	2.9
Decker East	45.0	6.0	35.3	2.9

Table U-2. Proposed and Potentially Induced Mine Construction Schedules Assuming Winter Construction

Mine	Build Alternatives	Construction Start Date	Construction Duration	Operation Start Date
Otter Creek (proposed)	All	2016	2.5 years	2018
Poker Jim Creek–O’Dell Creek (potentially induced)	All	2021	2.5 years	2023
Canyon Creek (potentially induced)	Decker	2025	2.5 years	2028

U.3.3 Projects Analyzed

OEA researched past, present, and reasonably foreseeable projects and actions that would result in impacts that would coincide in time and space with impacts of the proposed rail line. OEA initially identified and screened a number of projects for potential inclusion in the cumulative impacts analysis. Of these potentially relevant projects, OEA determined that the relevant projects summarized below and noted in Figure U-1 could contribute to cumulative impacts.

U.3.3.1 Existing Coal Mines

Rosebud Mine and Colstrip Power Plant

The Rosebud Mine is approximately 2 miles from Colstrip, Montana, in Rosebud County and would be less than 2 miles from the Colstrip Alternatives. The mine is owned and operated by Westmoreland Coal Company. It occupies approximately 25,000 acres and has three active pits. The Rosebud Mine produces approximately 10 to 13 million tons of coal per year

and has been in operation since 1968 (Westmoreland Coal Company 2014). The mine's short-term (up to 5 years) and long-term (up to 20 years) reasonably foreseeable development (RFD) areas contain 7,734 acres (Bureau of Land Management 2013). The Rosebud Mine supplies almost all of its current production to the adjacent four-unit, 2,100-megawatt Colstrip Power Plant that was specifically designed to burn Rosebud coal. Coal is sold to the Colstrip Power Plant under two long-term contracts.

Spring Creek Mine

The Spring Creek Mine is approximately 7 miles north of Decker, Montana, in Big Horn County and would be 4 miles from the Decker Alternatives. The mine is owned and operated by Cloud Peak Energy. The Spring Creek/Decker Mine RFD consists of two areas totaling 5,688 acres. Spring Creek Mine shipped 17.2 million tons of coal in 2012 to domestic and international markets through the Westshore Terminal in British Columbia, Canada (Cloud Peak Energy 2014) via the BNSF Railway Company (BNSF) line to the south.

Decker Mine

The Decker Mine, which consists of east and west coal tracts, is 3 miles north of Decker, Montana, in Big Horn County. Decker Mine would be less than 1 mile from the Decker Alternatives. The mine is owned by Ambre Energy. The mine has been in operation since the 1970s and has produced over 300 million tons of coal for the domestic market. It currently has a remaining reserve of 138 million tons. The mine is served by two rail loops operated by BNSF with an estimated capacity of 14 million tons per year (Ambre Energy 2012).

U.3.3.2 Proposed and Potentially Induced Coal Mines

The region contains vast quantities of coal. If a rail line were licensed and developed, it would serve the proposed Otter Creek Mine and may induce the development of other coal resources. In Appendix C, *Coal Production and Markets*, OEA analyzed the coal production that would be potentially induced by construction and operation of the proposed rail line. The availability of the rail service coupled with the large quantities of competitively priced coal reserves makes it reasonably foreseeable that these reserves would be mined over the analysis period (2018 to 2037). The analysis considers the proposed Otter Creek Mine and two potentially induced mines: one at the Poker Jim Creek–O'Dell Creek coal deposit and one at the Canyon Creek coal deposit (referred to as the potentially induced mines). The Poker Jim Creek–O'Dell Creek deposit is in and around the previously planned Montco Mine. The Canyon Creek coal deposit is south of the Northern Cheyenne Indian Reservation. Coal production levels for these mines are estimated to range from 20 million tons per year from just the proposed Otter Creek Mine to 72 million tons per year from all three mines (Chapter 3, *Additional Coal Mining*, in Appendix C, *Coal Production and Markets*).

OEA examined other coal deposits in the area but eliminated them from further study because of factors such as higher overburden ratio, low coal heat content, low amount of recoverable reserves, and locations more than 15 miles from the build alternatives.

Proposed Otter Creek Mine

On July 26, 2012, Otter Creek Coal, LLC (Otter Creek Coal), a wholly-owned subsidiary of Arch Coal, Inc, submitted a permit application to the Montana Department of Environmental Quality (Montana DEQ) to construct and operate a surface coal mine near Ashland, Montana. Montana DEQ is currently reviewing the permit for adequacy. The proposed coal mine would consist of three tracts. The permit application focuses on Tract 2, totaling 7,639 acres, which would be mined first, and provides plans for development, mining, and reclamation. While the proposed Otter Creek Mine does not have any current coal contracts, under Otter Creek Coal's mine plan, mining on Tract 2 could begin in 2018 and continue through 2037. The mining start date would depend upon when and if a permit from Montana DEQ would be issued. At its peak, the mine is estimated to produce 20 million tons of coal per year (Otter Creek Coal, LLC 2014). This production level would require an average of 7.4 trains per day to transport the coal. Otter Creek Coal would need to build access roads, facilities, and surface mining infrastructure.

The construction start and completion dates for the proposed Otter Creek Mine would depend on the construction schedule for the authorized proposed rail line alternative. Table U-1 illustrates the construction periods for each build alternative for two different construction schedule scenarios. Under the construction scenario that assumes no construction activities would occur during the winter months, the construction schedule for the build alternatives would range from 2.5 years for the Colstrip Alternative to 6.2 years for the Moon Creek East Alternative and 6 years for either of the Decker Alternatives. The proposed Otter Creek Mine is assumed to commence operations in the calendar year after construction of the proposed rail line is completed (in 2018 for the Colstrip Alternative and in 2021 for the Moon Creek East Alternative and either of the Decker Alternatives).

Under the winter construction scenario, construction of any build alternative would be completed within 3 years except for the Moon Creek East Alternative, which would be constructed in 3.3 years. Under this scenario, the proposed Otter Creek Mine would commence operation in 2018 for any build alternative. Construction of the Moon Creek East Alternative would extend into 2018 if construction commenced in 2015. To maintain consistency with other build alternative calculations, OEA assumed that, if the Moon Creek East Alternative is licensed, the proposed Otter Creek Mine would commence operation in 2018 and would produce 60 percent of its full capacity in 2018.

The proposed rail line would serve the proposed Otter Creek Mine and the development and operation of the mine would affect some of the same resources required for construction and operation of the proposed rail line. Therefore, OEA analyzed the mine as part of this cumulative impacts analysis.

Potentially Induced Poker Jim Creek–O’Dell Creek Mine

The Poker Jim Creek–O’Dell Creek deposit is composed of two coal beds, Knobloch Plate 11A and Knobloch Plate 11B, which contain an estimated 938 million tons of relatively high-quality coal. The coal deposit covers an area of approximately 15,077 acres (Matson and Blumer 1973). Details of this potentially induced mining are included in Appendix C, *Coal Production and Markets*.

The previously planned 10,171-acre Montco Mine was intended to extract the Poker Jim Creek–O’Dell Creek deposit (U.S. Department of the Interior 1984). Although approved by the Montana Department of State Lands in 1984, the mine’s permit was revoked in 1997 by the Montana DEQ and the Montana Department of State Lands because operations had not commenced (*Montco v. Simonich* 947 P.2d 1047, No. 96-656, Oct. 31, 1997). OEA assumed that construction could begin in 2021, last 2.5 years, and would not be affected by the construction schedule of any build alternative. The mine would begin operation in 2023 and would produce from 12 to 16 million tons of coal per year, requiring an average of 4.4 to 5.8 trains per day to transport the coal (Appendix C, *Coal Production and Markets*). The Poker Jim Creek–O’Dell Creek coal deposit does not have any current coal contracts or mining applications.

Potentially Induced Canyon Creek Mine

The Canyon Creek deposit is composed of two coal beds, the Brewster-Arnold and the Wall. The Brewster-Arnold coal bed has relatively low-quality coal and minimal reserves, while the Wall coal bed contains relatively high-quality coal. The coal deposit covers approximately 25,926 acres (Appendix C, *Coal Production and Markets*).

The Bureau of Land Management (BLM) has identified portions of the Canyon Creek deposit to be of sufficient quality to warrant further study pending a formal mining lease application (Bureau of Land Management 2013). OEA assumed that construction would begin in 2025, last 2.5 years, and would not be affected by the construction schedule of any build alternative. The mine would begin operation in 2028 and would produce 22 million tons of coal per year, requiring an average of 8 trains per day to transport the coal (Appendix C, *Coal Production and Markets*). The Canyon Creek coal deposit does not have any current coal contracts or mining applications in place. The deposit would only be developed if the Decker Alternatives are constructed.

Mine Reclamation

The Montana Strip and Underground Mine Reclamation Act (Montana Code Annotated [MCA] 82-4 Part 2) requires that all mines be reclaimed under a plan approved by the Montana DEQ “to make those lands capable of supporting the uses that those lands were capable of supporting prior to any mining or to higher or better uses.” Under the act, prior to receiving a mining permit, operators must present a detailed and comprehensive plan for

reclaiming the land after mining has been completed. The reclamation plan must describe the premining condition and use of the land to be mined, the proposed use of the land after reclamation, an estimated timetable for the reclamation, and the steps that will be taken to comply with the relevant water quality laws. Operators must also post a performance bond to ensure that monies will be available to complete the reclamation if the operator goes out of business prior to finishing the reclamation or is otherwise unable to complete the reclamation. The amount of the bond must equal the amount of the proposed reclamation plan. The bond is not released to the operator until after the state or deferral regulatory office has concluded that the reclamation is successful, which would be over 10 years after the reclamation has been completed.

Reclamation occurs concurrently with mining; once an area is mined, reclamation begins as mining moves to another tract. As an example, at the existing Spring Creek Mine in 2012, mining activities and infrastructure had disturbed 8,117 acres and 3,086 acres were in various stages of reclamation (Cloud Peak Energy 2013). At the end of each mine life, all disturbed mining areas will have been reclaimed and vegetation communities reestablished.

U.3.3.3 Land Management

Fort Keogh Livestock and Range Research Laboratory

The U.S. Department of Agriculture (USDA) Fort Keogh Livestock and Range Research Laboratory (Fort Keogh) is located outside of Miles City, Montana. Fort Keogh was set aside by an Act of Congress dated April 15, 1924 (PL90, 43 Stat. 99), which established the research laboratory for the purpose of “experiments in stock raising and growing of forage crops in connection therewith.” The staff consists of 22 USDA Agricultural Research Service employees and 20 Montana Agricultural Experiment Station employees plus 5 to 10 seasonal employees (U.S. Department of Agriculture 2013).

The property consists of about 55,000 acres, of which approximately 50,000 acres are native rangeland, 2,500 acres are dryland planted pasture, 1,000 acres are irrigated pasture, and 700 acres are irrigated cropland. The remaining acreage is made up of corrals, roads, and the headquarters building. The irrigated farming operation produces alfalfa hay, corn silage, barley grain, sorghum sudan hay, and an assortment of other barley straw and grass hays for livestock feed. Fort Keogh has a modern, 40,000-bushel feed mill and two feedlots that can accommodate about 1,000 head of cattle.

Future activities at Fort Keogh would consist of continued and new research projects in areas where research activities already occur. Currently, cattle herds are maintained for veterinary and breeding research purposes and the property is used as a laboratory for monitoring long-term ecological trends and testing riparian and range management techniques. Laboratory research activities include investigating the effects of cattle grazing on riparian vegetation and streambank integrity, and the effectiveness of invasive plant species management techniques.

The vast majority of Fort Keogh is in a natural state, with agricultural research activities confined to areas between Yellowstone River and Interstate 94 (I-94), and along the west side of the Tongue River. Several intermittent non-fish-bearing tributaries are found throughout Fort Keogh. The Tongue River Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would cross or be within 1 mile of Fort Keogh.

Tongue River Reservoir State Park

Montana State Parks and Montana Fish, Wildlife & Parks (Montana FWP) propose to renovate several campgrounds in the Tongue River Reservoir State Park, including Pee Wee Point North, Pee Wee Point South, and Sandpoint. Tongue River Reservoir State Park is located on Tongue River Reservoir, 6 miles north of Decker, Montana and 1 mile east of Highway 314. Renovations would include water, sewer, and electricity hook ups and construction of storage, docking, and parking areas (Montana State Parks and Montana Fish, Wildlife & Parks 2012).

Montana State Parks and Montana FWP completed an environmental assessment (EA) to meet the requirements of the Montana Environmental Policy Act (MEPA), NEPA, and MCA (2012) (hereafter referred to as the MEPA/NEPA Checklist). The assessment evaluated the impacts of the renovation project on environmental resources (Montana Fish, Wildlife & Parks 2012). The closest build alternatives would be the Decker Alternatives, less than 2 miles away.

BLM Resource Management Plan

The Miles City Field Office of the BLM published the *Miles City Field Office Draft Resource Management Plan and Environmental Impact Statement* (Draft RMP/EIS) (Bureau of Land Management 2013). The Draft RMP/EIS analyzes five alternatives for managing the BLM-administered lands and resources in eastern Montana (Carter, Custer, Daniels, Dawson, Fallon, Garfield, McCone, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Treasure, and Wibaux Counties and portions of Big Horn and Valley Counties). The RMP identifies issues with livestock grazing; energy development; wildlife habitat management, including sage-grouse; special designations, including areas of critical environmental concern; special recreation management areas; national trails; and wilderness study areas. The Final RMP and Record of Decision are expected to be released by 2015 (Bureau of Land Management 2013).

BLM's Preferred Alternative (Alternative E) would include the following elements (Bureau of Land Management 2013).

- Land to be leased for oil and natural gas development (5.4 million acres) (energy development under this RMP is discussed in the next subsection).
- Special-status species high-priority habitats to be managed for sage-grouse in North Rosebud (173,000 acres) and Decker (8,300 acres).

- Livestock grazing to be expanded to 2.7 million acres.
- Surface-disturbing activities to be prohibited in riparian and wetland areas.
- Special recreation management areas to be designated in Powder River Depot (162 acres) and Pumpkin Creek Ranch (19,435 acres).
- New paleontological areas of critical environmental concern to be designated.

Any build alternative would be constructed and operate in landscapes affected by the BLM Draft RMP/EIS activities.

Beaver Creek Landscape Management Project

The *Beaver Creek Landscape Management Project* (Beaver Creek LMP) (U.S. Forest Service 2011) includes over 14,000 acres located in the Custer National Forest in the Ashland Ranger District of the U.S. Forest Service. The Beaver Creek LMP affects federal lands approximately 17 miles east of Ashland, Montana and north of U.S. Highway 212 in Powder River County, Montana. The Beaver Creek LMP is intended to reduce fuel loading (surface, ladder, and canopy fuels) on the landscape in order to promote fires of less severity and intensity and, ultimately, a healthy ponderosa pine ecosystem that is more resilient and sustainable (U.S. Forest Service 2011). The LMP affects land that would be 15 miles from the Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives.

U.3.3.4 Energy Development

BLM Resource Management Plan

The BLM Draft RMP/EIS identifies the reasonably foreseeable development of fluid minerals (oil, conventional natural gas, and coal bed natural gas [CBNG]) in the RMP planning area that covers all of 15 counties and parts of two additional counties in eastern Montana. BLM estimated that up to 7,600 such wells would be drilled in the Draft RMP/EIS planning area between 2011 and 2030, of which 1,200 would be CBNG wells, mostly located in the Powder River Basin of Montana. OEA estimated, based on an analysis of the BLM Draft RMP/EIS data, that 1,158 CBNG wells would be drilled in the four-county area where the proposed rail line would operate. The number of new wells projected to be drilled in the four-county area within the 20-year planning timeline is summarized in Table U-3.

Table U-3. Projected Future Fluid Mineral Wells in Four-County Area

County	Projected Number of New Wells per Township	Number of Townships	Total Projected New Wells
Big Horn	3.5	131	458
Custer	1.5	105	158
Powder River	3.5	90	315
Rosebud (North) ^a	1.5	126	189
Rosebud (South) ^b	3.5	11	38
Rosebud (Total)		137	227
TOTAL		463	1,158

Notes:
^a Low Productivity Area of Rosebud County
^b Medium Productivity Area of Rosebud County
Source: Bureau of Land Management 2013; Min-116, Montana State Library n.d.

OEA also reviewed recent trends and data for oil, conventional natural gas, and CBNG well permits and completions from the Montana Board of Oil and Gas Conservation (2014a, 2014b, 2014c, 2014d). The board reported that seven CBNG wells were permitted statewide from 2009 through 2013, and 15 CBNG wells were completed statewide from 2009 through 2013, of which 11 were completed in 2009 (Montana Board of Oil and Gas Conservation 2014a, 2014b, 2014c, 2014d). During this period, the board reported that 1,197 oil wells and 352 conventional natural gas wells were permitted and 681 oil wells and 386 conventional natural gas wells were completed (Montana Board of Oil and Gas Conservation 2014, 2014b, 2014c, 2014d). The recent well permit and completion data indicate that significantly less than 1,200 CBNG wells would be developed in the Draft RMP/EIS planning area over the 20-year planning timeframe of the Draft RMP/EIS. The most recent CBNG wells, as documented in the Montana Board of Oil and Gas Conservation database, are from 2007; no new well activity has been document since. Almost all of the documented well activity is in Big Horn County. No approved wells are documented in Rosebud County, one is documented in Custer County and three are documented in Powder River County. None of these permitted wells would be in the project area or near any build alternative.

Montana Board of Oil and Gas Conservation reported oil and natural gas production by county; from 2009 through 2013 natural gas production decreased by approximately 86 percent, from 12.4 million cubic feet (2009) to 1.7 million cubic feet (2013), mostly due to a substantial decrease in natural gas production in Big Horn County. Oil production in the four-county area decreased by approximately 16 percent, from 765,000 barrels (2009) to 639,000 barrels (2013). This recent data indicates a downward trend in development.

Of the remaining 6,400 oil and conventional gas wells, approximately 3,100 wells are projected to be drilled in areas with high development potential in and around existing fields in the deeper portion of the Williston Basin and along the Cedar Creek Anticline.

Approximately 3,300 wells (those that would be drilled in areas of medium or low potential)

are projected for areas generally not proven productive by historical drilling but that still may contain hydrocarbons.

Any build alternative would be constructed and operate in a landscape affected by energy development on BLM-administered lands. However, such development is more likely to occur near the Decker Alternatives.

Other Energy Development

In addition to well development on BLM-administered lands, oil and gas exploration and development continues throughout southeastern Montana on other federal, state, tribal, and private lands. Gas well development in southeastern Montana includes CBNG wells. All projects that cause disturbances from gas and oil well development, whether on federal or nonfederal land, must implement proper reclamation procedures when the wells are abandoned (MCA 82-10-400 *et seq.*).

Most of the region around the northern build alternatives³ has a low potential for oil and gas development. There is moderate potential for development along the Decker Alternatives.

U.3.3.5 Construction Projects

Tongue River Road Paving

The Montana Department of Transportation's (MDT) *Tongue River Road Corridor Planning Study* (2012) identified paving the gravel sections of Tongue River Road from reference post (RP) 17.7 to RP 50.4 as a potential large-scale improvement project. Funding for this improvement has not yet been identified and other improvement options for construction have not been finalized. This project would be close to the Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives (Montana Department of Transportation 2012).

Bull Pasture Subdivision Leasing

Montana Department of Natural Resources and Conservation (DNRC) issued a Request for Proposal in October 2013 for the commercial lease of the bull pasture subdivision, a 38.55-acre parcel of school trust land in Custer County, just outside of Miles City. This subdivision would be less than 3 miles from the Tongue River Alternatives and Tongue River Road Alternatives. The land is currently zoned as light industrial, which permits manufacturing, fabrication, assembly, or material treatments conducted in an enclosed structure; open storage yards; building material yards; warehouses; and other business and service uses allowed in the general commercial and heavy commercial zoning districts. No proposals

³ The northern alternatives are the Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives. The southern alternatives are the Decker Alternatives.

were received by the submission deadline of December 2, 2013 (Montana Department of Natural Resources and Conservation 2015). DNRC plans to issue a new request for a proposal in 2015.

Keystone XL Pipeline

TransCanada Company is proposing a pipeline that would deliver oil from Canada to points south. The proposed pipeline, if constructed, would pass through Fallon County, Montana. This county is included in the socioeconomics study area. Therefore, OEA analyzed impacts from this project only in conjunction with the socioeconomics cumulative impacts analysis.

Youngs Creek Mine and Brook Mine

Youngs Creek Mine and Brook Mine would be located in Sheridan County, Wyoming. Cloud Peak Energy, Inc. has completed a permit application for Youngs Creek Mine, but has not yet determined a construction start date. The Wyoming Department of Environmental Quality has accepted Ramaco LLC's permit application to for the Brook Mine and is currently completing a technical review. Brook Mine construction is anticipated to start in 2016. Ramaco has stated that the coal would be destined for domestic utilities and would be competitive in the Asian export market. Both mines have high quality coal with an average heat content of 9,100 British thermal units per pound and low sulfur content (between 0.32 and 0.68 percent). Sheridan County, Wyoming is included in the socioeconomics study area.

U.3.4 Projects Considered but Not Included in the Analysis

Certain projects proposed in the cumulative impacts study area have been excluded from this analysis for the reasons provided below.

- BLM identified other coal mine operations and development in the Montana and Wyoming Powder River Basin, including the North Ashland coal deposit as reasonably foreseeable (Bureau of Land Management 2013). However, these operations would be located outside the cumulative impacts study area.
- CX Ranch land abuts the existing Spring Creek and Decker West mine sites owned and operated by Cloud Peak Energy. Available coal reserves on the CX Ranch land are limited and there are no current plans for development. Montana DEQ suggests that the area could be developed into a travel corridor but not used for mining.
- In January 2013, Big Metal (a subsidiary of Cloud Peak Energy) and the Crow Tribe of Indians signed an Exploration Agreement with an Option to Lease Agreement for up to 1.4 billion tons of coal reserved on the Crow Indian Reservation to the west of the Spring Creek Mine. The U.S. Bureau of Indian Affairs has approved these agreements. The Office of Surface and Mining indicates that no permits applications have been filed to mine on this land. Also, unlike the potentially induced Poker Jim–O'Dell Creek and

Canyon Creeks Mines, this mine area currently has no available planned modes to transport mined coal from the area.

- Several electric power transmission line projects have been proposed, such as the Teckla-Osage-Rapid City 230 kilovolt transmission line. These projects have no associated design specifics or funding and are therefore not considered reasonably foreseeable.
- Several petroleum product and natural gas pipeline projects have been proposed, including the Keystone XL pipeline. These projects would be outside the cumulative impacts study area. The Keystone XL Pipeline is included in the socioeconomics cumulative impact analysis because the pipeline, if constructed, would pass through one county in Montana (Fallon County) that is also part of the nine-county cumulative impacts study area for socioeconomics.
- Other than the Otter Creek Mine permit application, OEA did not identify any current or foreseeable U.S. Army Corps of Engineers (USACE) permit applications or operations.
- OEA considered two U.S. Department of Agriculture, U.S. Forest Service RMPs and LMPs, the 15-Mile and Elk Creek EIS and Cow Creek Rangeland Environmental Assessment. However, the U.S. Forest Service has recently announced that these projects have been cancelled.
- OEA did not include the Bakken shale and the Belle Creek Plains Carbon Dioxide (CO₂) Reduction projects for oil and natural gas development because they would be located outside of the cumulative impacts study area.

U.4 Environmental Consequences

This section discusses the potential cumulative impacts resulting from the proposed rail line in conjunction with the other reasonably foreseeable actions described in Section U.3.3, *Projects Analyzed*. OEA analyzed all of the environmental resources described in Chapters 3 through 16 of this Draft EIS for potential cumulative impacts, as discussed in the subsections that follow.

Each resource discussion describes the impacts of the other projects on the resource, notes where there is an overlap of the build alternative(s) and these other project(s), and then describes the impacts from the proposed rail line. Not all of the other projects would affect the resource and not all build alternatives would contribute to cumulative impacts. If there is no overlap of any of the other projects with the build alternatives, no additional cumulative impacts analysis is warranted. Furthermore, if the other projects do not affect the resource, no additional analysis of cumulative impacts on that resource is warranted.

U.4.1 Transportation

U.4.1.1 Rail Operations and Rail Safety

Construction and operation of the proposed rail line would result in rail operations and rail safety impacts. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and operations is described in Chapter 3, Section 3.2, *Rail Operations and Rail Safety*. OEA defined the study area for impacts of the proposed rail line on rail operations and rail safety as all new rail lines associated with the build alternatives and existing rail lines associated with the Colstrip Subdivision: the Colstrip Subdivision would be affected only by the Colstrip Alternatives (Chapter 3, Section 3.2.1, *Study Area*). The study area for cumulative impacts on rail operations and rail safety is consistent with this study area.

Rail traffic from the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines is estimated in Chapter 3, *Transportation*. None of the other projects included in Section U.3.3, *Projects Analyzed*, would result in increased rail traffic in the study area. Therefore, no additional analysis of cumulative impacts on rail operations and rail safety is warranted and no cumulative impacts on rail operation and safety would result.

U.4.1.2 Grade-Crossing Delay

Construction and operation of the proposed rail line would result in grade-crossing delay impacts such as increased number of vehicles delayed, longer delays, or changes to level of service (LOS). Any build alternative would contribute to cumulative impacts on grade-crossing delay by adding to impacts from other projects. The following subsections describe the impacts of other projects and discuss how impacts from the proposed rail line, when added to the impacts of these other projects, would result in cumulative impacts on grade-crossing delay.

The other projects are described in Section U.3.3, *Projects Analyzed*. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and grade-crossing delay is described in Chapter 3, Section 3.3, *Grade-Crossing Delay*, and Appendix D, *Grade-Crossing Safety and Delay Analysis*. OEA defined the study area for impacts of the proposed rail line on grade-crossing delay as all roads in Custer, Rosebud, Big Horn, and Powder River Counties with existing at-grade crossings (these crossings are only on the Colstrip Subdivision and would be affected only by the Colstrip Alternatives) or public, at-grade crossings proposed for the build alternatives (referred to as new grade crossings) (Chapter 3, Section 3.3.1, *Study Area*). The study area for cumulative impacts on grade-crossing delay is consistent with this study area.

Existing Coal Mines and Colstrip Power Plant

Existing Coal Mines and Colstrip Power Plant Impacts on Grade-Crossing Delay

The existing coal mines and Colstrip Power Plant are already operating in the grade-crossing delay cumulative impacts study area. The associated vehicle traffic is included in the average annual daily traffic (AADT) levels used in the analysis of vehicle delay at new or existing grade crossings. The analysis includes projections of traffic that would be associated with expansion of the Rosebud and Spring Creek Mines. These RFD areas would produce the same amount of coal permitted by the State of Montana and would therefore require the same workforce levels as the existing mines. Workers would simply shift from the previously permitted tract to the new tract. Ongoing activities at existing coal mines, including in the RFD areas, and the Colstrip Power Plant would not increase the AADT levels on roads with new or existing grade crossings. Therefore, delays at existing grade crossings would remain the same. The existing coal mines would contribute to grade-crossing delays at the new grade crossings as they are constructed.

Contribution of the Build Alternatives to Cumulative Impacts on Grade-Crossing Delay

The Colstrip Alternatives would be constructed and would operate near the Rosebud Mine and Colstrip Power Plant. Mine and power plant operations would continue during construction and operation of the build alternatives. The Decker Alternatives would be constructed and would operate near the Spring Creek and Decker Mines. Mine operations would continue during construction and operation of the build alternatives. Coal would be transported from the mines during operation of the build alternatives.

The build alternatives would contribute to delays at new grade crossings. The delay would vary by build alternative and coal production scenario.⁴ The addition of impacts from the build alternatives to the impacts of the existing coal mines and power plant would result in cumulative impacts on grade-crossing delay.

Proposed and Potentially Induced Coal Mines

Proposed and Potentially Induced Coal Mine Impacts on Grade-Crossing Delay

The proposed and potentially induced mines would be constructed and would operate in the grade-crossing delay cumulative impacts study area. While rail traffic from construction of

⁴ Three coal production scenarios (low, medium, high) depend on which build alternative is licensed and constructed and which proposed and potentially induced mines are producing coal. Higher coal production scenarios are associated with more rail traffic. See Appendix C, *Coal Production and Markets*.

the proposed and potentially induced mines would affect delays at existing crossings, it would not affect delays at new crossings because mine construction would be complete before rail operation began. Rail traffic from operation of the proposed and potentially induced mines would contribute to grade-crossing delays at new and existing grade crossings.

Construction and operation of the proposed and potentially induced mines would result in a growing workforce, which would increase traffic on roads in the cumulative impacts study area. This traffic would be dispersed by varying shift hours, construction periods, commuting routes, and distances traveled.

Contribution of the Build Alternatives to Cumulative Impacts on Grade-Crossing Delay

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would provide access to the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek Mine. The construction start and completion dates for the proposed Otter Creek Mine would depend on the construction schedule for the proposed rail line. New at-grade crossings would be built on Cow Creek, Rosebud Creek, Tongue River, Tongue River East, Moon Creek, Snider Creek, Liscom Creek, Beaver Creek, and Foster Creek Roads.

The Decker Alternatives would provide access to the proposed Otter Creek Mine and to the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines. The Decker Alternatives would be the only build alternatives that would provide access to the Canyon Creek Mine. New at-grade crossings would be built on Highway 314, Four Mile Creek, and at three points along Tongue River Road.

OEA calculated vehicle delay times for new at-grade crossings along the Tongue River Road, which would lead to all proposed and potentially induced mines, and along the East Tongue River Road, which would lead to the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek Mine. OEA assumed that construction of each mine would not overlap and that construction of the proposed Otter Creek Mine would overlap with construction of the proposed rail line. OEA assumed that each worker would add one vehicle to daily traffic.⁵ The resulting vehicle delay during construction of the potentially induced mines would be less than 1 second more than the impacts from construction of the proposed rail line, with an average delay of less than 2 seconds per vehicle and a maximum of 25 vehicles delayed per day at a single crossing. This impact on grade-crossing delay would be short-term in the case of the construction workforce. Therefore, no cumulative impacts on grade-crossing delay at the new crossings are expected.

⁵ The estimates are conservative because they are based on construction jobs outlined in Section U.4.13, *Socioeconomics*, which do not directly correspond to number of mine construction employees.

During operations of the proposed and potentially induced mines, workforce traffic would increase the grade-crossing delay by less than 1 second per vehicle more than the proposed rail line impacts, with total average delay less than 4 seconds per vehicle and a maximum of 86 vehicles delayed per day at a single crossing. Delays would depend on how many trains were operating, which would be determined by the coal production scenario (low, medium, and high). The largest delay would result under the high coal production scenario on the Decker Alternatives. With all traffic flowing over Tongue River Road, one worker per vehicle, and all three mines operating at the same time, an average grade-crossing delay of 3.56 seconds per vehicle with 77 average vehicles delayed per day would result.

Level-of-Service (LOS) designations at these crossings would remain at LOS A under any build alternative. An LOS of A indicates generally free-flowing traffic.

Land Management

Land Management Impacts on Grade-Crossing Delay

Fort Keogh Livestock and Range Research Laboratory

Fort Keogh is an operating land management project that addresses cattle management and grazing. Management activities of Fort Keogh would not affect current traffic on these area roads because no future activities are planned that would result in an increase of vehicle traffic to and from the facility. Therefore, no additional analysis of cumulative impacts on grade-crossing delay is warranted.

Tongue River Reservoir State Park

The proposed Tongue River Reservoir State Park project would renovate the Pee Wee Point North, Pee Wee Point South, and Sandpoint campgrounds. The renovations would improve the campgrounds but would not affect AADT levels on area roads or existing grade-crossing delay. Therefore, no additional analysis of cumulative impacts on grade-crossing delay is warranted.

BLM Resource Management Plan

The BLM Draft RMP/EIS would continue current management activities and identify new facilities or management strategies. The BLM Draft RMP/EIS addresses livestock grazing, wildlife habitat, special-designation areas, special recreation areas, national trails, and wilderness study areas. These activities and plans would not affect AADT on area roads or existing grade-crossing delay. Therefore, no additional analysis of cumulative impacts on grade-crossing delay is warranted.

Beaver Creek Landscape Management Project

Implementation of the Beaver Creek LMP would promote a healthier and more resilient ponderosa pine ecosystem on 14,000 acres of forest by using large tree removal, fire applications, and selective vegetation thinning. These practices would promote fires that are of lower intensity and less severe than those caused by stand replacement fires. Management of forests would not affect traffic on area roads or existing grade-crossing delay. Therefore, no additional analysis of cumulative impacts on grade-crossing delay is warranted.

Energy Development

Energy Development Impacts on Grade-Crossing Delay

The BLM Draft RMP/EIS would promote oil and natural gas projects on 5.4 million acres of leased land in Rosebud, Custer, Powder River, and Big Horn Counties (the four-county area). BLM estimated that a maximum of 7,600 wells, including CBNG wells, are projected to be drilled in the RMP planning area in the analysis period of 2011 through 2030.⁶ In order to estimate of the number of potential wells in the project area, OEA used a geographic analysis of the townships in the Tongue River area and their oil and gas well development potential. The OEA analysis projected a lower number wells than the number projected by BLM for the RMP planning area because most of the Tongue River area is of low or medium development potential and none of the area is of high development potential.

OEA estimated that 1,158 CBNG wells would be developed between 2011 and 2030, and considers this estimate much higher than the number of wells that will be permitted and completed. However, none of the currently approved wells would be in the project area or near the build alternatives (Appendix U, Section U.3.3.4, *Energy Development*). In addition to well development on BLM-administered lands, oil and gas exploration and development continues throughout southeastern Montana on federal, state, tribal, and private lands.

The preferred alternative in the BLM Draft RMP/EIS would increase the amount of land to be leased for oil and gas development. OEA calculated traffic increases associated with construction of the wells. BLM stated that each drill rig would require three workers and OEA assumed that each of those workers would add one vehicle to daily traffic on local roads. The road length that would be affected by CBNG construction would range from 0.237 to 0.365 mile, with an average of 0.301 mile. The total road length that would be affected would range from 90.3 to 2,107.7 miles across all four counties (Table U-4). The total length of affected roads would be distributed throughout the counties.

⁶ BLM 2013 Estimated Future Oil And Gas Production, Page Min-116.

Table U-4. Road Disturbance for Coal Bed Natural Gas Well Development by County

County	Average Length of Road (miles per well)	Total Wells to be Drilled	Total Length of Road Affected (miles)
Custer	0.301	300	90.3
Rosebud	0.301	2,800	842.8
Powder River	0.301	6,700	2,016.7
Big Horn	0.301	7,000	2,107.0

Energy development on nonfederal lands would cause an increase in traffic along Moon Creek Road, Foster Creek Road, Tongue River Road, Liscom Creek Road, Beaver Creek Road, Snider Creek Road, Tongue River Road East, Four Mile Creek Road, and Highway 314 during construction and maintenance.

Although traffic would increase on local roads, the workforce for well construction and maintenance is expected to be small. Impacts on traffic and grade-crossing delay would occur during maintenance and would not be permanent. These increases would be reduced by measures to reduce vehicle traffic by consolidating well facilities (such as pads and storage vessels) whenever feasible.

Contribution of the Build Alternatives to Cumulative Impacts on Grade-Crossing Delay

Any build alternative would operate in landscapes affected by oil and gas development, whether on federal or nonfederal lands. Most of the region around the northern build alternatives has a low potential for oil and gas development. There is moderate potential for development along the Decker Alternatives. Construction of any build alternative would introduce additional vehicles to the cumulative impacts study area, increasing traffic and grade-crossing delay. Therefore, the addition of impacts from the build alternatives to impacts from energy development would result in cumulative impacts on grade-crossing delay.

Construction Projects

Construction Project Impacts on Grade-Crossing Delay

Tongue River Road Paving

The 32.7-mile paving project proposed for Tongue River Road would improve roadway conditions, leading to higher AADT levels and subsequent increase in vehicle delay at grade crossings along Tongue River Road. Three to five new at-grade crossings along Tongue River Road would be affected. MDT estimates that future AADT on the Tongue River Road would be between 110 vehicles per day and 2,056 vehicles per day from development of area

mines. MDT states that current travelers may avoid Tongue River Road because it has a gravel surface. With improvements, these travelers may alter their routes in the Ashland and Forsyth areas. An increase of 2,056 vehicles per day on Tongue River Road would result in an increase in average vehicle delay of less than 1 second. This would be an increase from the total average delay of less than 4 seconds and an average of 95 vehicles delayed per day across all new at-grade crossings along Tongue River Road.

Bull Pasture Subdivision Leasing

Leasing the 38.55-acre bull pasture subdivision would not result in impacts on grade-crossing delay at new crossings because land would be preserved for grazing purposes instead of light industrial uses. Therefore, no additional analysis of cumulative impacts on grade-crossing delay is warranted.

Contribution of the Build Alternatives to Cumulative Impacts on Grade-Crossing Delay

Tongue River Road Paving

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would cross the paving project. The addition of impacts from the build alternatives to impacts from the road paving project would result in cumulative impacts on grade-crossing delay at three to five new at-grade crossings.

Cumulative Impact Summary: Grade-Crossing Delay

The proposed rail line would affect grade-crossing delay and would combine with impacts from the other relevant projects to result in cumulative impacts on grade-crossing delay in the study area. The contribution of the proposed rail line to cumulative impacts is summarized as follows.

- **Existing coal mines and Colstrip Power Plant.** The Colstrip Alternatives and Decker Alternatives would contribute to cumulative impacts on grade-crossing delays at new grade crossings. The delay would vary by build alternative and coal production scenario. The build alternatives would not contribute to cumulative impacts on existing grade crossings along the Colstrip Subdivision.
- **Proposed and potentially induced coal mines.** Any build alternative would contribute to grade-crossing delay impacts. No cumulative impacts would result from construction of the proposed Otter Creek Mine because mine construction would occur before new grade crossings were constructed. Construction of the potentially induced mines would increase vehicular traffic on area roads and would affect delays at new grade crossings. These impacts would not be permanent. The average total delay would be less than 4 seconds per vehicle and a maximum of 106 vehicles would be delayed per day at a single crossing.

Operation of the proposed and potentially induced mines would slightly increase traffic on area roads from workers commuting to and from the mines. The average total delay would be less than 4 seconds per vehicle and a maximum of 58 vehicles would be delayed per day at a single crossing.

- **Energy development.** Any build alternative would contribute to cumulative impacts by increasing traffic on area roads during construction and maintenance of oil and gas wells, whether on federal or nonfederal lands in the cumulative impact area. Increased traffic on area roads resulting from construction and operations workers would cause a slight delay at new and existing grade crossings.
- **Construction projects.** The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative impacts related to road paving by causing a small increase in traffic on Tongue River Road. This would result in a slight delay at three to five new at-grade crossings.

In summary, operation of any build alternative would result in cumulative impacts on grade-crossing delay when combined with impacts from proposed and potentially induced coal mines and energy development. Some build alternatives would result in cumulative impacts on grade-crossing delay when combined with impacts from existing coal mines and the Tongue River Road paving project. These projects would have to comply with Montana DEQ and other state permits and approvals as well as any BLM-required mitigation measures. OEA concludes that the direct impacts from the proposed rail line, when combined with impacts from past, present, and reasonably foreseeable projects and actions, would result in minor adverse cumulative impacts on grade-crossing delay.

U.4.1.3 Grade-Crossing Safety

Construction and operation of the proposed rail line would result in grade-crossing safety impacts such as collisions between trains and vehicles. Any build alternative would contribute to cumulative impacts on grade-crossing safety by adding to impacts from other projects. The following subsections describe the impacts of other relevant projects and how potential impacts from the proposed rail line, when added to the impacts of these projects, would result in cumulative impacts on grade-crossing safety.

The other projects are described in Section U.3.3, *Projects Analyzed*. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and grade-crossing safety is described in Chapter 3, Section 3.4, *Grade-Crossing Safety*. OEA defined the study area for impacts of the proposed rail line on grade-crossing safety as all roads in Custer, Rosebud, Big Horn, and Powder River Counties with existing at-grade crossings (these crossings are only on the Colstrip Subdivision and would be affected only by the Colstrip Alternatives) or public, at-grade crossings proposed for the build alternatives (referred to as new grade crossings) (Chapter 3, Section 3.4.1, *Study Area*). The study area for cumulative impacts on grade-crossing safety is consistent with this study area.

Existing Coal Mines and Colstrip Power Plant

Existing Coal Mines and Colstrip Power Plant Impacts on Grade-Crossing Safety

The existing coal mines and Colstrip Power Plant are already operating in the grade-crossing safety cumulative impacts study area. The associated vehicle traffic is included in the AADT levels used in the analysis of vehicle safety at new or existing grade crossings. The analysis includes projections of traffic that would be associated with expansion of the Rosebud and Spring Creek Mines. These RFD areas would produce the same amount of coal permitted by the State of Montana and would therefore require the same workforce levels as the existing mines. Workers would simply shift from the previously permitted tract to the new tract.

Ongoing activities at existing coal mines, including in the RFD areas, and the Colstrip Power Plant would have little effect on predicted accidents at new and existing at-grade crossings in the study area except at the crossing of Highway 314 by either of the Decker Alternatives. This grade crossing has a higher predicted accident frequency of 0.08951 accidents per year and a predicted interval between accidents of 11 years under the high coal production scenario (Appendix C, *Coal Production and Markets*).

Contribution of the Build Alternatives to Cumulative Impacts on Grade-Crossing Safety

The Colstrip Alternatives would be constructed and operate near the Rosebud Mine and Colstrip Power Plant. Mine and power plant operations would continue during construction and operation of the build alternative. The Decker Alternatives would be constructed and would operate near the Spring Creek and Decker Mines. Mine operations would continue during construction and operation of the build alternatives; coal transport from the mines would happen during operation of the build alternatives.

The build alternatives would contribute to accidents at new grade crossings. The accident rate would vary by build alternative and coal production scenario. The addition of impacts from the build alternatives to the impacts of the existing coal mines and power plant would result in cumulative impacts on grade-crossing safety. The greatest impact would be at the crossing of Highway 314 by either of the Decker Alternatives. This grade crossing has a predicted accident frequency of 0.08951 accidents per year and a predicted interval between accidents of 11 years under the high coal production scenario.

Proposed and Potentially Induced Coal Mines

Proposed and Potentially Induced Coal Mine Impacts on Grade-Crossing Safety

The proposed and potentially induced mines would be constructed and would operate in the grade-crossing safety cumulative impacts study area.

Construction and operation of the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines would result in an increase in the area workforce. OEA estimates that peak employment for construction of the proposed Otter Creek Mine would reach 1,373 direct and indirect jobs, 646 for the potentially induced Poker Jim Creek–O’Dell Creek Mine and 888 for the potentially induced Canyon Creek Mine. For operations, direct and indirect jobs would reach 2,378 jobs for the proposed Otter Creek Mine, 1,119 for the potentially induced Poker Jim Creek–O’Dell Creek Mine, and 1,539 for the potentially induced Canyon Creek Mine.⁷ This growing workforce would increase traffic on roads in the cumulative impacts study area. This traffic would be dispersed by varying shift hours, construction periods, commuting routes, and distances traveled. OEA anticipates that these jobs would be filled by the local labor force and in-migration of workers to an area within commuting distance in the six surrounding counties, Custer, Rosebud, Powder River, Big Horn, and Yellowstone Counties, Montana and Sheridan County, Wyoming.

Contribution of the Build Alternatives to Cumulative Impacts on Grade-Crossing Safety

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would provide access to the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek Mine. The construction start and completion dates for the proposed Otter Creek Mine would depend on the construction schedule for the proposed rail line. New at-grade crossings would be built on Cow Creek, Rosebud Creek, Tongue River, Tongue River East, Moon Creek, Snider Creek, Liscom Creek, Beaver Creek, and Foster Creek Roads.

Either of the Decker Alternatives would provide access to the proposed Otter Creek Mine and to the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines. The Decker Alternatives would be the only build alternatives that would provide access to the Canyon Creek Mine. New at-grade crossings would be built on Highway 314, Four Mile Creek Road, and at three points along Tongue River Road.

The build alternatives would contribute to safety impacts at new and existing grade crossings. The addition of these impacts to impacts from the proposed and potentially induced mines would result in cumulative grade-crossing safety impacts. Safety impacts would depend on how many trains were operating, as determined by the coal production scenario (low, medium, and high). Impacts would range from one accident every 20 years in the high production scenario for the Decker Alternatives at a single new grade crossing and one accident every 35 years in the low production scenario for the Moon Creek East Alternative at a single new crossing.

⁷ The estimates are conservative because they are based on construction jobs outlined in Section U.4.13, *Socioeconomics*, which does not directly correspond to mine construction employees.

OEA calculated accident frequency for new at-grade crossings along the Tongue River Road, which would lead to all proposed and potentially induced mines, and along East Tongue River Road, which would lead to the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek Mine. OEA assumed that construction of each mine would not overlap and that construction of the proposed Otter Creek Mine would overlap with construction of the proposed rail line. OEA assumed that each worker would add one vehicle to daily traffic. The resulting average accident frequency during construction of the proposed mine and potentially induced mines would be 0.02865 accidents per year with an accident interval of 35 years. When combined with impacts from the potentially induced coal mines, the build alternatives would contribute to a cumulative maximum predicted accident frequency of 0.03300 accidents per year and an accident interval of 30 years at a single, new, at-grade crossing along Tongue River Road.

During operations of the proposed and potentially induced mines, the average predicted accident frequency would be 0.03931 per year with an accident interval of 25 years. When combined with impacts from proposed and potentially induced coal mines, the build alternatives would contribute to a cumulative maximum predicted accident frequency of 0.05101 accidents per year and an accident interval of 20 years at a single, new at-grade crossing along Tongue River Road and East Tongue River Road. This maximum impact on grade-crossing safety would occur at grade crossings on the Decker Alternatives under the high production scenario, assuming all mines operate at the same time.

Land Management

Land Management Impacts on Grade-Crossing Safety

Fort Keogh Livestock and Range Research Laboratory

Fort Keogh is a land management project in operation that addresses cattle management and grazing. Management activities of Fort Keogh would not affect current traffic on these area roads because no future activities are planned that would result in an increase of vehicle traffic to and from the facility. Therefore, no additional analysis of cumulative impacts on grade-crossing safety is warranted.

Tongue River Reservoir State Park

The proposed Tongue River Reservoir State Park project would renovate the Pee Wee Point North, Pee Wee Point South, and Sandpoint campgrounds. The renovations would improve the campgrounds but would not affect traffic on area roads or existing grade-crossing safety. Therefore, no additional analysis of cumulative impacts on grade-crossing safety is warranted.

BLM Resource Management Plan

The BLM Draft RMP/EIS would continue current management activities and identify new facilities or management strategies. The BLM Draft RMP/EIS addresses livestock grazing, wildlife habitat, special-designation areas, special recreation areas, national trails, and wilderness study areas. These activities and plans would not affect traffic on area roads or existing grade-crossing delay. Therefore, no additional analysis of cumulative impacts on grade-crossing safety is warranted.

Beaver Creek Landscape Management Project

Implementation of the Beaver Creek LMP would promote a healthier and more resilient ponderosa pine ecosystem on 14,000 acres of forest by using large tree removal, fire applications, and selective vegetation thinning. These practices would promote fires that are of lower intensity and less severe than those caused by stand replacement fires. Management of forests would affect traffic on area roads or existing grade-crossing safety. Therefore, no additional analysis of cumulative impacts on grade-crossing safety is warranted.

Energy Development

Energy Development Impacts on Grade-Crossing Safety

The BLM Draft RMP/EIS would promote oil and natural gas projects on 5.4 million acres of leased land in Rosebud, Custer, Powder River, and Big Horn Counties (the four-county area). OEA estimated that 1,158 CBNG wells would be developed between 2011 and 2030, and considers this estimate much higher than the number of wells that will be permitted and completed (Section U.3.3.4, *Energy Development*). In addition to well development on BLM-administered lands, oil and gas exploration and development continues throughout southeastern Montana on federal, state, tribal, and private lands.

The preferred alternative in the BLM Draft RMP/EIS would increase the amount of land to be leased for oil and gas development, which would increase the traffic on local roads. OEA calculated traffic increases associated with construction of the wells. OEA assumed that each drill rig would require three workers and each worker would add one vehicle to daily traffic on local roads. The road length per well that would be affected by CBNG construction would range from 0.237 to 0.365 mile, with an average of 0.301 mile per well. The total road length that would be affected would range from 90.3 to 2,107.7 miles across all four counties (Table U-4). The total length of affected roads would be distributed throughout the counties. Therefore, any impact on traffic or grade-crossing safety would occur only during construction of the wells and periodically during maintenance. It should be noted that none of the currently approved wells would be in the project area or near the build alternatives (Appendix U, Section U.3.3.4, *Energy Development*).

Energy development on nonfederal lands would cause an increase in traffic levels along Moon Creek Road, Foster Creek Road, Tongue River Road, Liscom Creek Road, Beaver

Creek Road, Snider Creek Road, East Tongue River Road, Four Mile Creek Road, and Highway 314 during construction and maintenance.

Although traffic would increase on local roads, the workforce for well construction and maintenance is expected to be small. Impacts on traffic and grade-crossing safety would not be permanent. BLM would introduce signaling and speed bumps where appropriate to reduce traffic speed and reduced accidents (Bureau of Land Management 2013).

Contribution of the Build Alternatives to Cumulative Impacts on Grade-Crossing Safety

Any build alternative would be constructed and operate in landscapes affected by oil and gas development, whether on federal or nonfederal lands. Most of the region around the northern build alternatives has a low potential for oil and gas development. There is moderate potential for development along the Decker Alternatives. Construction of any build alternative would introduce additional vehicles to the cumulative impacts study area, increasing traffic and grade-crossing safety impacts. The addition of impacts from the build alternatives to impacts from energy development would result in cumulative impacts on grade-crossing safety.

Construction Projects

Construction Project Impacts on Grade-Crossing Safety

Tongue River Road Paving

The 32.7-mile paving project proposed for Tongue River Road would improve roadway conditions and contribute to safer travel, leading to more traffic and an increase in predicted accident frequency rates at grade crossings along Tongue River Road. MDT estimates that future traffic on the Tongue River Road would be between 110 vehicles per day and 2,056 vehicles per day from development of areas mines. MDT states that current travelers may avoid Tongue River Road because it has a gravel surface. With improvements, these travelers may alter their routes in the Ashland and Forsyth areas.

Bull Pasture Subdivision Leasing

Leasing the 38.55-acre bull pasture subdivision would not result in impacts on grade-crossing safety at new crossings because land would be preserved for grazing purposes instead of light industrial uses. Therefore, no additional analysis of cumulative impacts on grade-crossing safety is warranted.

Contribution of the Build Alternatives to Cumulative Impacts on Grade-Crossing Safety

Tongue River Road Paving

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would cross the paving project. The addition of impacts from the build alternatives to impacts from the road paving project would result in grade-crossing safety impacts. The crossings located along Tongue River Road would experience an increase in the predicted accident frequency rate and predicted interval between accidents due to the change in road surface type (Tables U-5 through U-7). Paved roads have a higher rate of predicted accident frequencies because the smoother road surface facilitates higher speeds. The predicted accident frequency rate for the high production scenario would be one accident during the 20-year analysis period (from 2018 to 2037) at any single new crossings along Tongue River Road for the Tongue River Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives.

Table U-5. Cumulative Grade-Crossing Safety Impact of Paving Tongue River Road plus Build Alternative, Low Production Scenario (7.4 trains per day)

Crossing by Build Alternative ^a	Type of Crossing	Type of Protection	Number of Roadway Lanes	AADT (Year 2037)	Train Speed (mph)	Train Length (feet)	Trains Per Day	Unpaved Road	Paved Road		
								Predicted Accident Frequency	Predicted Intervals Between Accidents (years)	Predicted Accident Frequency	Predicted Intervals Between Accidents (years)
Tongue River Alternative											
Tongue River Road	At-Grade	Passive	2	301	40	6,925	7.4	0.01700	59	0.03090	32
Tongue River East Alternative											
Tongue River Road	At-Grade	Passive	2	301	40	6,925	7.4	0.01700	59	0.03090	32
Colstrip Alternative											
Tongue River Road	At-Grade	Passive	2	54	40	6,925	7.4	0.00899	111	0.01635	61
Colstrip East Alternative											
Tongue River Road	At-Grade	Passive	2	54	40	6,925	7.4	0.00899	111	0.01635	61
Tongue River Road Alternative											
Tongue River Road	At-Grade	Passive	2	301	40	6,925	7.4	0.01700	59	0.03090	32
Tongue River Road East Alternative											
Tongue River Road	At-Grade	Passive	2	301	40	6,925	7.4	0.01700	59	0.03090	32
Moon Creek Alternative											
Tongue River Road	At-Grade	Passive	2	301	40	6,925	7.4	0.01700	59	0.03090	32
Moon Creek East Alternative											
Tongue River Road	At-Grade	Passive	2	301	40	6,925	7.4	0.01700	59	0.03090	32

Notes:

^a Decker Alternatives are not included in this analysis because they would not cross the paving project. AADT = annual average daily traffic; mph = miles per hour

Table U-6. Cumulative Grade-Crossing Safety Impact of Paving Project plus Build Alternative, Medium Scenario (11.9 trains per day)

Crossing by Build Alternative ^a	Type of Crossing	Type of Protection	Number of Roadway Lanes	AADT (Year 2037)	Train Speed (mph)	Train Length (feet)	Trains Per Day	Unpaved Road		Paved Road	
								Predicted Accident Frequency	Predicted Intervals Between Accidents (years)	Predicted Accident Frequency	Predicted Intervals Between Accidents (years)
Tongue River Alternative											
Tongue River Road	At-Grade	Passive	2	301	40	6,925	11.9	0.02316	43	0.04210	24
Tongue River East Alternative											
Tongue River Road	At-Grade	Passive	2	301	40	6,925	11.9	0.02316	43	0.04210	24
Colstrip Alternative											
Tongue River Road	At-Grade	Passive	2	54	40	6,925	11.9	0.01225	82	0.02227	45
Colstrip East Alternative											
Tongue River Road	At-Grade	Passive	2	54	40	6,925	11.9	0.01225	82	0.02227	45
Tongue River Alternative											
Tongue River Road	At-Grade	Passive	2	301	40	6,925	11.9	0.02316	43	0.04210	24
Tongue River East Alternative											
Tongue River Road	At-Grade	Passive	2	301	40	6,925	11.9	0.02316	43	0.04210	24
Tongue River Road Alternative											
Tongue River Road	At-Grade	Passive	2	301	40	6,925	11.9	0.02316	43	0.04210	24
Tongue River Road East Alternative											
Tongue River Road	At-Grade	Passive	2	301	40	6,925	11.9	0.02316	43	0.04210	24
Moon Creek Alternative											
Tongue River Road	At-Grade	Passive	2	301	40	6,925	11.9	0.02316	43	0.04210	24
Moon Creek East Alternative											
Tongue River Road	At-Grade	Passive	2	301	40	6,925	11.9	0.02316	43	0.04210	24

Notes:

^a Decker Alternatives are not included in this analysis because they would not cross the paving project

AADT = annual average daily traffic; mph = miles per hour

Table U-7. Cumulative Grade-Crossing Safety Impact of Paving Project plus Build Alternative, High Scenario (18.6 trains per day)

Crossing by Build Alternative ^a	Type of Crossing	Type of Protection	Number of Roadway Lanes	AADT (Year 2037)	Train Speed (mph)	Train Length (feet)	Trains Per Day	Unpaved Road		Paved Road	
								Predicted Accident Frequency	Predicted Intervals Between Accidents (years)	Predicted Accident Frequency	Predicted Intervals Between Accidents (years)
Tongue River Alternative											
Tongue River Road	At-Grade	Passive	2	301	40	6,925	18.6	0.02732	37	0.04966	20
Tongue River East Alternative											
Tongue River Road	At-Grade	Passive	2	301	40	6,925	18.6	0.02732	37	0.04966	20
Colstrip Alternative											
Tongue River Road	At-Grade	Passive	2	54	40	6,925	18.6	0.01444	69	0.02626	38
Colstrip East Alternative											
Tongue River Road	At-Grade	Passive	2	54	40	6,925	18.6	0.01444	69	0.02626	38
Tongue River Road Alternative											
Tongue River Road	At-Grade	Passive	2	301	40	6,925	18.6	0.02732	37	0.04966	20
Tongue River Road East Alternative											
Tongue River Road	At-Grade	Passive	2	301	40	6,925	18.6	0.02732	37	0.04966	20
Moon Creek Alternative											
Tongue River Road	At-Grade	Passive	2	301	40	6,925	18.6	0.02732	37	0.04966	20
Moon Creek East Alternative											
Tongue River Road	At-Grade	Passive	2	301	40	6,925	18.6	0.02732	37	0.04966	20

Notes:

^a Decker Alternatives are not included in this analysis because they would not cross the paving project

AADT = annual average daily traffic; mph = miles per hour

Cumulative Impact Summary: Grade-Crossing Safety

The proposed rail line could affect grade-crossing safety and could combine with impacts from the other relevant projects to result in cumulative impacts on grade-crossing safety in the study area. The contribution of the proposed rail line to cumulative impacts is summarized as follows.

- Existing coal mines and Colstrip Power Plant.** The Colstrip and Decker Alternatives would contribute to the same level of traffic because the existing coal mines and Colstrip Power Plant are already operating in the grade-crossing safety cumulative impacts study area and the associated vehicle traffic is included in the AADT levels used in the analysis of vehicle safety at new or existing grade crossings. The build alternatives would contribute to accidents at new grade crossings. The greatest impact would be at the crossing of Highway 314 by either of the Decker Alternatives, with a predicted accident interval of 11 years under the high coal production scenario.
- Proposed and potentially induced coal mines.** Any build alternative would contribute to cumulative impacts by increasing traffic on area roads. Construction of the proposed Otter Creek would occur before new grade crossings were constructed. Construction of the potentially induced mines would temporarily increase vehicular traffic on area roads and would affect safety at new grade crossings. The resulting cumulative impact would be an average predicted accident frequency of 0.02605 accidents per year with an accident interval of 1 accident every 34 years.

Operation of the proposed and potentially induced mines would increase traffic on area roads from workers commuting to and from the mines. The actual traffic increases across all coal production scenarios would be small due to differences in employee shift hours, construction time period, commuting distance, and routes used. The cumulative average predicted accident frequency would be 0.0136 accidents per year with an accident interval of 1 accident every 39 years.

- Energy development.** Any build alternative would contribute to cumulative impacts by increasing traffic on area roads during construction and maintenance of oil and gas wells, whether on federal or nonfederal lands in the cumulative impact area. Increased traffic on area roads would result from construction and operations workers. CBNG construction would affect from 90.3 to 2,107 miles of road (Table U-4).
- Construction projects.** The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative impacts related to road paving. The smoother road surface would increase traffic and speeding, which would increase the accident frequency rate and reduce the interval between accidents. The increase in the predicted accident frequency rate for the high production scenario would result in 1 accident during the 20-year analysis period (from 2018 to 2037) based on the predicted interval between accidents at crossings along Tongue River Road for the build alternatives.

In summary, operation of any build alternative would result in cumulative impacts on grade-crossing safety when combined with impacts from proposed and potentially induced coal mines and energy development. Some build alternatives would result in cumulative impacts on grade-crossing safety when combined with impacts from existing coal mines and the Tongue River Road paving project. These projects would have to comply with Montana DEQ and other state permits and approvals as well as any BLM-required mitigation measures. OEA concludes that the direct impacts from the proposed rail line, when combined with impacts from past, present, and reasonably foreseeable projects and actions, would result in minor adverse cumulative impacts on grade-crossing safety.

U.4.1.4 Navigation

Construction and operation of the proposed rail line would result in navigation impacts on the Tongue River. Any build alternative would contribute to cumulative impacts on navigation by adding to impacts from other projects. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and navigation is described in Chapter 3, Section 3.5, *Navigation*. OEA defined the study area for impacts of the proposed rail line on navigation as the Tongue River between the southernmost point of navigability (0.25 miles north of Ashland, Montana) and the confluence of the Tongue River with the Yellowstone River. The study area also includes the locations of proposed bridge crossings of navigable portions of the Tongue River (Chapter 3, Section 3.5.1, *Study Area*). The study area for cumulative impacts on navigation is consistent with this study area.

None of the other relevant projects included in Section U.3.3, *Projects Analyzed*, would include placement of a structure or work in, over, below, or above navigable waterways. Therefore, no additional analysis of cumulative impacts on navigation is warranted and no cumulative impacts on navigation would result.

U.4.2 Air Quality

Construction and operation of the proposed rail line would result in the following air quality impacts: emissions of criteria air pollutants and hazardous air pollutants, changes in ambient concentrations of such pollutants, and resulting impacts on visibility and acidic deposition. Any build alternative would contribute to cumulative impacts on air quality by adding to impacts from other projects. The following subsections describe the impacts of the other projects and how impacts from the proposed rail line, when added to the impacts of these other projects, would result in cumulative impacts on air quality.

The other projects are described in Section U.3.3, *Projects Analyzed*. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and air quality is described in Chapter 4, *Air Quality*. OEA defined the study area for air quality impacts as the southeastern Montana region comprising Big Horn, Custer, Powder River, and Rosebud Counties, and extending to the nearest Class I and sensitive Class II areas, notably the

Northern Cheyenne Indian Reservation (Chapter 4, Section 4.2, *Study Area*). The air quality cumulative impacts study area is consistent with this study area.

U.4.2.1 Existing Coal Mines and Colstrip Power Plant

Existing Coal Mines and Colstrip Power Plant Impacts on Air Quality

The existing coal mines and Colstrip Power Plant are already operating in the air quality cumulative impacts study area. The existing coal mines and power plant contribute criteria air pollutant and hazardous air pollutant emissions to the air quality study area.

OEA estimated the criteria air pollutant emissions based on the operating conditions established in the permit for each mine or power plant. OEA estimated the hazardous air pollutants based on the estimated fuel consumption for operations.

Colstrip Power Plant Air Emissions

Montana DEQ issued Permit 2035-06 for the Colstrip Power Plant on October 13, 2013 (Montana Department of Environmental Quality 2013a). The permit sets operating conditions, including criteria air pollutant emissions limits for the power plant circulating fluidized bed boiler (Montana Department of Environmental Quality 2013a, Section IV) (Table U-8). OEA estimated air emissions impacts from Colstrip Power Plant operations based on these permitted emissions, which would be greater than or equal to actual emissions from power plant operations.

Table U-8. Permit Limits for Criteria Air Pollutant Emissions from Colstrip Energy Limited Partnership Power Plant

Pollutant	Annual (tons)	Daily	3-hour	1-hour	Total Plant Potential to Emit
SO ₂	1,840	5.04 tons	432 lbs/hr	574 lbs	1,840 tpy
NO _x	1,435	7,864 lbs	328 lbs		1,435 tpy
CO	232	1,272 lbs	53 lbs		232 tpy
PM ₁₀	26.28	144.0 lbs	6.0 lbs		46.17 tpy
PM					72.94 tpy
VOC					15.94 tpy

Notes:

tpy = tons per year; lbs = pounds; lbs/hr = pounds per hour; SO₂ = sulfur dioxide; NO_x = nitrogen oxides; CO = carbon monoxide; PM₁₀ = particulate matter 10 microns in diameter or less; PM = particulate matter; VOC = volatile organic compound

Source: Montana Department of Environmental Quality 2013, Limit 13, Section IV

Rosebud Mine Emissions

OEA estimated criteria air pollutant emissions impacts from Rosebud Mine operations based on air quality permit numbers 1483-08 (Montana Department of Environmental Quality 2001a), 1570-07 (Montana Department of Environmental Quality 2013), and 1570-08

(Montana Department of Environmental Quality 2014). Permit 1483-08 covers Areas A, B, D, and E of the Rosebud Mine. However, Area E is no longer in operation and Area D is being reclaimed. Permit 1570-07 covers Area C and Permit 1570-08 covers Area F. Permit 1570-08 also covers a planned expansion of Area F that would not change the permitted emissions. All mining activity, coal extraction, and coal processing are accounted for under the emission inventory based on these three permits. Permitted emissions would be greater than or equal to actual emissions from mine operations. Permitted criteria air pollutant from Rosebud Mine operations are summarized in Table U-9.

Table U-9. Rosebud Mine Permitted Criteria Air Pollutant Emissions^a

Mine Area	Criteria Air Pollutant Emissions (tons per year)				
	Fugitive and Non-Fugitive Emissions Total				
	CO	NO _x	SO ₂	VOC	PM ₁₀
Areas A, B, D	793	445	48	37	1,863.4
Area C	577	146	17	NR	1,456.07
Area F	NR	NR	NR	NR	92.25
Total	1,370	591	65	37	3,411.72

Notes:
^a Permitted emissions include fugitive emissions from mine operations, emissions from vehicle exhaust (diesel fuel and gasoline), and emissions from explosives detonation
 NR = Not Reported; CO = carbon monoxide; NO_x = nitrogen oxides; SO₂ = sulfur dioxide; VOC = volatile organic compound; PM₁₀ = particulate matter 10 microns in diameter or less
 Source: Montana Department of Environmental Quality 2001a, 2013b, 2014

OEA estimated the hazardous air pollutant emissions from the Rosebud Mine based on fuel consumption from operation of mine equipment. OEA developed fuel consumption factors (gallons of diesel fuel used per ton of coal produced; gallons of gasoline used per ton of coal produced) from the fuel consumption factors identified in Permit 1570-06 (Montana Department of Environmental Quality 2001b). Based on an annual coal production limit of 8 million tons per year, a diesel fuel consumption rate of 2.4 million gallons per year, and a gasoline consumption rate of 132,000 gallons per year, the calculated fuel consumption factors are 0.275 gallon of diesel fuel per ton coal produced and 0.012 gallon of gasoline per ton coal produced.⁸

Air Quality Measurement Results

The Rosebud Mine operated an air quality monitoring program for particulate matter 10 microns or less in diameter (PM₁₀) in accordance with its air quality permit until 2001 (as reported in Chapter 4, Section 4.4.2, *Ambient Air Quality*).

⁸ These factors are somewhat different from the factors used in Appendix F, *Life Cycle of Greenhouse Gas Emissions*, because of differences in data sources used to represent fuel usage and emissions compared to those in the air permit for the Rosebud Mine.

Spring Creek Mine Emissions

OEA estimated criteria air pollutant emissions impacts from Spring Creek Mine based on Permit 1120-11, issued October 2, 2012 (Montana Department of Environmental Quality 2012a) and permitted emissions would be greater than or equal to actual emissions from mine operations. Permitted criteria air pollutant emissions from Spring Creek Mine operations are summarized in Table U-10.

Table U-10. Spring Creek Mine Permitted Criteria Air Pollutant Emissions^a

Mine Area	Criteria Air Pollutant Emissions (tons per year)				
	Fugitive and Non-Fugitive Emissions Total				
	CO ^a	NO _x	SO ₂ ^a	VOC ^a	PM10 ^{c, d}
Spring Creek	— ^b	603.33	—	—	1,048

Notes:

^a CO, SO₂, and VOC permitted emissions were not reported in the permit. Permitted NO_x emissions include emissions from diesel fuel and gasoline combustion and explosives detonation. Permitted particulate emissions include diesel fuel and gasoline combustion and fugitive dust from mine operations.

^b Permitted emissions include fugitive emissions from mine operations, emissions from vehicle exhaust (diesel fuel and gasoline), and emissions from explosives detonation; permitted emissions do not include emissions from diesel generators

^c The permit's emission inventory reports PM10 emissions from mining operations to be 1,039 tons per year, including emissions from blasting, excavation, and operation of vehicles, conveyors, and other equipment.

^d The permit allowed operation of a new crushing unit with a permitted PM10 emission rate of 8.89 tons per year; total permitted PM10 emissions are 1,048 tons per year

CO = carbon monoxide; NO_x = nitrogen oxides; SO₂ = sulfur dioxide; VOC = volatile organic compound; PM10 = particulate matter 10 microns in diameter or less

Source: Montana Department of Environmental Quality 2012a MAQP#1120-11, p11-13

OEA estimated the hazardous air pollutant emissions from the Spring Creek Mine based on fuel consumption from operations of mine equipment. The emissions inventory reports diesel fuel consumption for coal production of 24 million tons per year as 5.3 million gallons per year for coal dumping at truck dump operations. Gasoline consumption is 120,000 gallons per year for similar operations.

Nitrogen oxides (NO_x) emissions for the Spring Creek Mine were reported in the *Environmental Assessment for Spring Creek Coal Lease Modification* (Bureau of Land Management 2010) and a previous EA (Bureau of Land Management 2006a). The permitted total NO_x emissions including explosives use and vehicle exhaust was 603 tons per year.

Air Quality Measurement Results

Air quality measurement results for PM10 and NO_x for the Spring Creek Mine operations are presented in the permit and are summarized in Tables U-11 through U-14 (Montana Department of Environmental Quality 2009 Section VI:11). The modeling for Spring Creek Mine PM10 and NO_x emissions indicate that the Spring Creek Mine operations do not cause or contribute to violations of ambient air quality standards. The Spring Creek mine operated a PM10 air quality monitoring program in accordance with its air quality permit until 2009 (Chapter 4, Section 4.4.2, *Ambient Air Quality*).

Table U-11. 24-Hour PM10 Modeling Results – Spring Creek Mine

Year	Modeled H2H Annual Proposed / Potentially Induced Mine Concentration (µg/m³)	MDEQ PM10 Default Background Concentration (µg/m³)	Total PM10 Concentration (µg/m³)	NAAQS/ MAAQS (µg/m³)	Pass?	Easting (meters)	Northing (meters)	Elevation (meters)
2016	119.2	30	149.2	150	Yes	351190.38	4993724.00	1152.03
2017	119.9	30	149.9	150	Yes	350990.47	4993717.50	1158.00

Notes:

H2H = Highest Second High 24-hour PM10 concentration; µg/m³ = micrograms per cubic meter; MDEQ = Montana Department of Environmental Quality; PM10 = particulate matter 10 microns in diameter or less; NAAQS/MAAQS = National Ambient Air Quality Standards/Montana Ambient Air Quality Standards

Source: Montana Department of Environmental Quality 2012a MAQP#1120-11, p11-12

Table U-12. Annual PM10 Modeling Results – Spring Creek Mine

Year	Modeled H1H Annual PM10 Concentration (µg/m³)	MDEQ PM10 Default Background Concentration (µg/m³)	Total PM10 Concentration (µg/m³)	NAAQS/ MAAQS (µg/m³)	Pass?	Easting (meters) ⁴	Northing (meters)	Elevation (meters)
2016	28.7	8	36.7	50	Yes	353082.94	4995140.00	1107.57
2017	28.0	8	36.0	50	Yes	351490.19	4993733.00	1143.74

Notes:

H1H = Highest First High Annual PM10 concentration; µg/m³ = micrograms per cubic meter; MDEQ = Montana Department of Environmental Quality; PM10 = particulate matter 10 microns in diameter or less; NAAQS/MAAQS = National Ambient Air Quality Standards/Montana Ambient Air Quality Standards

Source: Montana Department of Environmental Quality 2012a MAQP#1120-11, p11-12

Table U-13. 1-Hour NO₂ Modeling Results – Spring Creek Mine

Year	H1H 1-hour NO ₂ Concentration (µg/m³)	MDEQ Default NO ₂ Background Concentration (µg/m³)	Total NO ₂ Concentration (µg/m³)	NAAQS/ MAAQS (µg/m³)	Pass?	Easting (meters)	Northing (meters)	Elevation (meters)
2016	262.6	75	337.6	564	Yes	353328.78	4995194.00	1116.16
2017	259.9	75	334.9	564	Yes	353178.75	4993243.50	1101.01

Notes:

H1H = Highest Second High 1-hour modeled NO_x concentration was selected and the ozone limiting method was applied.

NO₂ = nitrogen dioxide; µg/m³ = micrograms per cubic meter; MDEQ = Montana Department of Environmental Quality; NAAQS/MAAQS = National Ambient Air Quality Standards/Montana Ambient Air Quality Standards

Source: Montana Department of Environmental Quality 2012a MAQP#1120-11, p11-12

Table U-14. Annual NO₂ Modeling Results – Spring Creek Mine

Year	H1H Annual NO ₂ Concentration (µg/m ³)	MDEQ Default NO ₂ Background Concentration (µg/m ³)	Total NO ₂ Concentration (µg/m ³)	NAAQS/ MAAQS (µg/m ³)	Pass?	Easting (meters)	Northing (meters)	Elevation (meters)
2016	16.4	6	22.4	100/94	Yes	353128.81	4995192.00	1108.43
2017	10.7	6	16.7	100/94	Yes	351490.19	4993733.00	1143.74

Notes:

H1H = Highest First High Annual modeled NO_x concentration was selected and the Ambient Ratio Method was applied (modeling results were multiplied by 0.75).

NO₂ = nitrogen dioxide; µg/m³ = micrograms per cubic meter; MDEQ = Montana Department of Environmental Quality; NAAQS/MAAQS = National Ambient Air Quality Standards/Montana Ambient Air Quality Standards.

Source: Montana Department of Environmental Quality 2012a MAQP#1120-11, p11-12

Decker Mine Emissions

OEA estimated criteria air pollutant emissions impacts based on Permit 1435-07 (Montana Department of Environmental Quality 2012b) and earlier permits (Montana Department of Environmental Quality 2009). Permitted emissions would be greater than or equal to actual emissions from mine operations. Permitted criteria air pollutant from Decker Mine operations are summarized in Table U-15.

Table U-15. Decker Mine Permitted Criteria Air Pollutant Emissions^a

Mine Area	Criteria Air Pollutant Emissions (tons per year)				
	Fugitive and Non-Fugitive Emissions Total				
	CO	NO _x	SO ₂	VOC	PM10 ^b
Decker	1,151	701	77	56	1,732

Notes:

^a Permitted emissions include fugitive emissions from mine operations, emissions from vehicle exhaust (diesel fuel and gasoline), and emissions from explosives detonation; permitted emissions do not include emissions from diesel generators

^b PM10 emissions from mining operations are reported in the air permit emission inventory to be 1,732.58 tons per year, including blasting, excavation, and operation of vehicles, conveyors, and other equipment (Montana Department of Environmental Quality 2012b:p10)

CO = carbon monoxide; NO_x = nitrogen oxides; PM = particulate matter; SO₂ = sulfur dioxide; VOC = volatile organic compound

Source: Montana Department of Environmental Quality 2012b: p10

OEA estimated the hazardous air pollutant emissions from the Decker Mine based on fuel consumption from operations of mine equipment. The emissions inventory report for Permit 1435-07 reports diesel fuel consumption for coal production of 16 million tons per year as 4 million gallons per year, not including stationary equipment. Gasoline consumption is 213,900 gallons per year. The permit states that Decker coal mine operations cannot exceed 170,000 gallons per year combined fuel usage in the diesel-fired stationary equipment.

Decker Coal Company proposes to add 40 acres to federal coal lease Mountaintop Mining (MTM) 54716 and 460.47 acres to federal coal lease MTM 101099, which are located at the West Tract of the Decker Mine. BLM is in the process of preparing an EA of lease modifications for the Decker Mine (Bureau of Land Management 2013a).

Air Quality Measurement Results

The Decker coal mine operates a PM10 monitoring program in accordance with its air quality permit (as reported in Chapter 4, Section 4.4.2, *Ambient Air Quality*).

Summary of Emissions from Existing Mines

Table U-16 presents a summary of permitted criteria air pollutant emissions for operation of the existing mines and the Colstrip power plant. Table U-16 summarizes the data shown in Tables U-8, U-9, U-10, and U-15.

Table U-16. Existing Coal Mine and Power Plant Permitted Criteria Air Pollutant Emissions

Existing Mine Area	Criteria Air Pollutant Emissions (tons per year)				
	Non-Fugitive Emissions Total				
	CO	NO _x	SO ₂	VOC	PM
Colstrip Power Plant	232	1,435	1,840	16	73
Rosebud Mine	1,370	591	65	37	3,412
Spring Creek	NR	603	NR	NR	1,048
Decker	1,151	701	77	56	1,732

Notes:
CO = carbon monoxide; NO_x = nitrogen oxides; PM = particulate matter; SO₂ = sulfur dioxide; VOC = volatile organic compound; PM = particulate matter; NR = not reported in permit
Sources: Montana Department of Environmental Quality 2001a, 2012a, 2013b, 2014

Table U-17 summarizes estimated criteria air pollutant emissions from the existing Rosebud, Spring Creek, and Decker Mines. Table U-18 summarizes estimated hazardous air pollutant emissions from the existing mines based on estimated annual fuel consumption.

Table U-17. Criteria Air Pollutant Emissions from Fuel Consumption for Existing Mine Operations

Existing Mine	Permitted Coal Production Rate (million tons/year)	Fuel Usage (million gallons)	Criteria Air Pollutant Emissions (million tons per year)						
			CO	NO _x	Pb	PM10	PM2.5	SO ₂	VOC
Rosebud Mine	21	6.6	8.21E-04	2.30E-03	9.95E-07	9.70E-05	9.41E-05	3.00E-06	1.81E-04
Spring Creek Mine	16	4.4	5.38E-04	1.51E-03	6.52E-07	6.36E-05	6.17E-05	1.96E-06	1.19E-04
Decker Mine	24	5.4	6.67E-04	1.87E-03	8.08E-07	7.88E-05	7.64E-05	2.43E-06	1.47E-04

Notes:
CO = carbon monoxide; NO_x = nitrogen oxides; Pb = lead; PM = particulate matter; PM10 = particulate matter 10 microns in diameter or less; PM2.5 = particulate matter 2.5 microns in diameter or less; SO₂ = sulfur dioxide; VOC = volatile organic compound

Table U-18. Hazardous Air Pollutant Emissions from Fuel Consumption for Existing Mine Operations

Existing Mine	Hazardous Air Pollutant Emissions (tons per year)				
	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene
Rosebud Mine	4.36E-02	8.29E-03	5.02E-03	5.97E-03	3.62E-01
Spring Creek Mine	2.86E-02	5.44E-03	3.29E-03	3.91E-03	2.37E-01
Decker Mine	3.54E-02	6.74E-03	4.07E-03	4.85E-03	2.94E-01
	Formaldehyde	n-Hexane	Toluene	Xylene	
Rosebud Mine	9.17E-02	8.15E-03	5.79E-01	8.68E-01	
Spring Creek Mine	6.01E-02	5.34E-03	3.79E-01	5.69E-01	
Decker Mine	7.45E-02	6.62E-03	4.70E-01	7.05E-01	

Contribution of the Build Alternatives to Cumulative Impacts on Air Quality

The Colstrip Alternatives would be constructed and would operate near the Rosebud Mine and Colstrip Power Plant. Mine and power plant operations would continue during construction and operation of the build alternative. The Decker Alternatives would be constructed and would operate near the Spring Creek and Decker Mines. Mine operations would continue during construction and operation of the build alternatives; coal transport from the mines would coincide with operation of the build alternatives.

Construction and operation of any of these build alternatives would contribute to criteria air pollutant emissions and hazardous air pollutant emissions in the study area. The addition of impacts from the build alternatives to the impacts from existing mine and power plant operations would result in cumulative impacts on air quality.

U.4.2.2 Proposed and Potentially Induced Coal Mines

Proposed and Potentially Induced Coal Mine Impacts on Air Quality

The proposed and potentially induced mines would be constructed and would operate in the cumulative impacts study area for air quality. OEA estimated the particulate emissions from construction of the proposed and potentially induced mines based on the estimated acreage and construction schedule. OEA estimated the criteria air pollutant and hazardous air pollutants based on the estimated fuel consumption for construction and operations.

Fugitive Particulate Emissions

OEA estimated the fugitive particulate matter emissions from operation of the proposed Otter Creek Mine based on permitted emissions for Rosebud Mine operations (Montana

Department of Environmental Quality 2001b).⁹ The permitted emissions of 1,547 tons of particulate matter per year are based on a permitted mine production rate of 8 million tons per year (Permit 1483-08). This corresponds to an overall particulate matter emission rate of 36.95 tons of PM10 per million tons of coal mined. OEA estimated fugitive particulate matter emissions from proposed Otter Creek Mine operation at 56.85 tons of PM10 per year for a production rate of 20 million tons per year. The estimated fugitive particulate matter emissions are directly proportional to the amount of coal mined; estimated particulate matter emissions from proposed Otter Creek Mine operation would be 96.65 tons PM10 per year for the high coal production scenario of 34 million tons per year.

OEA estimated the emissions from fuel combustion for operation of stationary and mobile equipment based on the estimated fuel consumption and emission factors. OEA estimated annual fuel consumption for the proposed Otter Creek Mine based on a fuel consumption factor for the Rosebud Mine (Montana Department of Environmental Quality 2001b). The emission inventory for the Rosebud Mine is based on consumption of 2.4 million gallons per year of diesel fuel and consumption of 132,013 gallons per year of gasoline for stationary and mobile equipment. This consumption corresponds to a diesel fuel consumption factor of 0.185 gallon of diesel fuel per ton of coal produced and 0.010 gallon of gasoline per ton of coal produced.¹⁰ Based on these factors, 3.7 million gallons per year of diesel fuel and 203,097 gallons per year of gasoline would be consumed for the production of 20 million tons per year of coal for the proposed Otter Creek Mine.

OEA used the same factors to calculate emissions for construction of the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines. The particulate emissions estimated from construction of the proposed and potentially induced mines are summarized in Table U-19.

Table U-19. Fugitive PM Emissions from Construction of Proposed and Potentially Induced Mines

Proposed / Potentially Induced Mine	General Construction Fugitive Emissions			
	Total Mine Area (acres)	Construction Activity Duration (months)	Fugitive PM10 Emissions (tons)	Fugitive PM2.5 Emissions (tons)
Otter Creek	18,181	29	120,213	18,032
Poker Jim Creek–O’Dell Creek	10,171	29	67,251	10,088
Canyon Creek	24,649	29	162,979	24,447
Notes:				
PM10 = particulate matter 10 microns in diameter or less; PM2.5 = particulate matter 2.5 microns in diameter or less				

⁹ Montana DEQ and DNRC are jointly preparing an EIS pursuant to MEPA to analyze and disclose the effects of the proposed Otter Creek Mine (Montana Department of Environmental Quality 2013b, 2013c).

¹⁰ These factors are somewhat different from the factors used in Appendix F, *Life-Cycle Greenhouse Gas Emissions*, because of differences in data sources used to represent fuel usage and emissions compared to those in the air permit for the Rosebud Mine.

Criteria and Hazardous Air Pollutant Emissions

The proposed and potentially induced mines would operate at different levels of production based on a specific coal production scenario (high, medium, low). Each coal production scenario would induce a unique group of mines and builds alternatives associated with that scenario (Appendix C, *Coal Production and Markets*).

OEA estimated the criteria pollutant emissions from fuel consumption for operation of the proposed and potentially induced mines for the low, medium, and high production scenarios (Tables U-20, U-21, and U-22), and the hazardous air pollutants for the medium production scenario (Table U-23).

Table U-20. Criteria Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – All Build Alternatives, Low Production Scenario

Proposed / Induced Mine	Annual Coal Production Rate (million tons/year)	Fuel Usage (million gallons)	Criteria Air Pollutant Emissions (million tons)						
			CO	NO _x	Pb	PM10	PM2.5	SO ₂	VOC
Otter Creek Mine									
Year 1	12	3.4	4.24E-04	1.19E-03	5.14E-07	5.02E-05	4.87E-05	1.55E-06	9.35E-05
Year 2	16	4.6	5.66E-04	1.59E-03	6.86E-07	6.69E-05	6.49E-05	2.07E-06	1.25E-04
Year 3+	20	5.7	7.07E-04	1.98E-03	8.57E-07	8.36E-05	8.11E-05	2.58E-06	1.56E-04

Notes:

Fuel usage is a mix of diesel fuel and gasoline

CO = carbon monoxide; NO_x = nitrogen oxides; Pb = lead; PM10 = particulate matter 10 microns in diameter or less; PM2.5 = particulate matter 2.5 microns in diameter or less; SO₂ = sulfur dioxide; VOC = volatile organic compounds

Table U-21. Criteria Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – All Build Alternatives, Medium Production Scenario

Proposed / Induced Mine	Annual Coal Production Rate (million tons/year)	Fuel Usage (million gallons)	Criteria Air Pollutant Emissions (million tons)						
			CO	NO _x	Pb	PM10	PM2.5	SO ₂	VOC
Otter Creek Mine									
Year 1	12	3.4	4.24E-04	1.19E-03	5.14E-07	5.02E-05	4.87E-05	1.55E-06	9.35E-05
Year 2	16	4.6	5.66E-04	1.59E-03	6.86E-07	6.69E-05	6.49E-05	2.07E-06	1.25E-04
Year 3+	20	5.7	7.07E-04	1.98E-03	8.57E-07	8.36E-05	8.11E-05	2.58E-06	1.56E-04
Poker Jim Creek-O'Dell Creek Mine									
Year 1	7.2	2.1	2.55E-04	7.14E-04	3.09E-07	3.01E-05	2.92E-05	9.30E-07	5.61E-05
Year 2	9.6	2.8	3.39E-04	9.51E-04	4.11E-07	4.01E-05	3.89E-05	1.24E-06	7.48E-05
Year 3+	12.0	3.4	4.24E-04	1.19E-03	5.14E-07	5.02E-05	4.87E-05	1.55E-06	9.35E-05

Notes:

Fuel usage is a mix of diesel fuel and gasoline

CO = carbon monoxide; NO_x = nitrogen oxides; Pb = lead; PM10 = particulate matter 10 microns in diameter or less; PM2.5 = particulate matter 2.5 microns in diameter or less; SO₂ = sulfur dioxide; VOC = volatile organic compounds

Table U-22. Criteria Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – Northern Alternatives, High Production Scenario

Proposed / Induced Mine	Annual Coal Production Rate (million tons/year)	Fuel Usage (million gallons)	Criteria Air Pollutant Emissions (million tons)						
			CO	NO _x	Pb	PM10	PM2.5	SO ₂	VOC
Otter Creek Mine									
Year 1	20.4	5.9	7.21E-04	2.02E-03	8.74E-07	8.53E-05	8.27E-05	2.63E-06	1.59E-04
Year 2	27.2	7.8	9.62E-04	2.70E-03	1.17E-06	1.14E-04	1.10E-04	3.51E-06	2.12E-04
Year 3+	34.0	9.8	1.20E-03	3.37E-03	1.46E-06	1.42E-04	1.38E-04	4.39E-06	2.65E-04
Poker Jim Creek-O’Dell Creek Mine									
Year 1	9.6	2.8	3.39E-04	9.51E-04	4.11E-07	4.01E-05	3.89E-05	1.24E-06	7.48E-05
Year 2	12.8	3.7	4.53E-04	1.27E-03	5.49E-07	5.35E-05	5.19E-05	1.65E-06	9.97E-05
Year 3+	16.0	4.6	5.66E-04	1.59E-03	6.86E-07	6.69E-05	6.49E-05	2.07E-06	1.25E-04

Notes:

Fuel usage is a mix of diesel fuel and gasoline

CO = carbon monoxide; NO_x = nitrogen oxides; Pb = lead; PM10 = particulate matter 10 microns in diameter or less; PM2.5 = particulate matter 2.5 microns in diameter or less; SO₂ = sulfur dioxide; VOC = volatile organic compounds

Table U-23. Hazardous Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Construction – Northern and Southern Alternatives, Medium Production Scenario

Proposed /Potentially Induced Mine	Hazardous Air Pollutant Emissions (tons)				
	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene
Otter Creek Mine	1.13E-02	2.14E-03	1.30E-03	1.54E-03	9.35E-02
Poker Jim Creek–O'Dell Creek Mine	6.76E-03	1.29E-03	7.78E-04	9.25E-04	5.61E-02
	Formaldehyde	n-Hexane	Toluene	Xylene	
Otter Creek Mine	2.37E-02	2.11E-03	0.1496	0.2244	
Poker Jim Creek–O'Dell Creek Mine	1.42E-02	1.26E-03	0.0898	0.1346	

OEA estimated fugitive particulate matter emissions based on particulate matter emission factors and the coal production rate for each proposed and potentially induced mine. The estimates are based on the low, medium, and high production scenarios for the northern alternatives and high production scenarios for the southern alternatives¹¹ (Tables U-24 through U-27).

¹¹ The northern alternatives are the Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives. The southern Alternatives are the Decker Alternatives.

Table U-24. Fugitive PM Emissions for Proposed and Potentially Induced Mine Operations – All Build Alternatives, Low Production Scenario

Proposed / Potentially Induced Mine	Annual Coal Production Rate (million tons/year)	Fugitive PM emissions (tons)		
		PM	PM10	PM2.5
Otter Creek Mine				
Year 1	12	6,212	2,321	216
Year 2	16	8,282	3,095	289
Year 3+	20	10,353	3,868	361
Notes:				
Fuel usage is a mix of diesel fuel and gasoline				
PM = particulate matter; PM10 = particulate matter 10 microns in diameter or less; PM2.5 = particulate matter 2.5 microns in diameter or less				

Table U-25. Fugitive PM Emissions for Proposed and Potentially Induced Mine Operation – All Build Alternatives, Medium Production Scenario

Proposed / Potentially Induced Mine	Annual Coal Production Rate (million tons/year)	Fugitive PM emissions (tons)		
		PM	PM10	PM2.5
Otter Creek Mine				
Year 1	12	6,212	2,321	216
Year 2	16	8,282	3,095	289
Year 3+	20	10,353	3,868	361
Poker Jim Creek–O’Dell Creek Mine				
Year 1	7.2	3,727	1,393	130
Year 2	9.6	4,969	1,857	173
Year 3+	12	6,212	2,321	216
Notes:				
Fuel usage is a mix of diesel fuel and gasoline				
PM = particulate matter; PM10 = particulate matter 10 microns in diameter or less; PM2.5 = particulate matter 2.5 microns in diameter or less				

Table U-26. Fugitive PM Emissions for Proposed and Potentially Induced Mine Operation – Northern Alternatives, High Production Scenario

Proposed / Potentially Induced Mine	Annual Coal Production Rate (million tons/year)	Fugitive PM Emissions (tons)		
		PM	PM10	PM2.5
Otter Creek Mine				
Year 1	20.4	10,560	3,946	368
Year 2	27.2	14,080	5,261	491
Year 3+	34	17,600	6,576	613
Poker Jim Creek–O’Dell Creek Mine				
Year 1	9.6	4,969	1,857	173
Year 2	12.8	6,626	2,476	231
Year 3+	16	8,282	3,095	289
Notes:				
Fuel usage is a mix of diesel fuel and gasoline				
PM = particulate matter; PM10 = particulate matter 10 microns in diameter or less; PM2.5 = particulate matter 2.5 microns in diameter or less				

Table U-27. Fugitive PM Emissions for Proposed and Potentially Induced Mine Operation – Southern Alternatives, High Production Scenario

Proposed / Potentially Induced Mine	Annual Coal Production Rate (million tons/year)	Fugitive PM Emissions (tons)		
		PM	PM	PM2.5
Otter Creek Mine				
Year 1	20.4	10,560	3,946	368
Year 2	27.2	14,080	5,261	491
Year 3+	34	17,600	6,576	613
Poker Jim Creek-O’Dell Creek Mine				
Year 1	9.6	4,969	1,857	173
Year 2	12.8	6,626	2,476	231
Year 3+	16	8,282	3,095	289
Canyon Creek-Mine				
Year 1	13.2	6,833	2553	238
Year 2	17.6	9,111	3404	317
Year 3+	22	11,388	4255	397
Notes:				
Fuel usage is a mix of diesel fuel and gasoline				
PM = particulate matter; PM10 = particulate matter 10 microns in diameter or less; PM2.5 = particulate matter 2.5 microns in diameter or less				

The criteria air pollutant emissions for proposed and potentially induced mine operations are summarized in Tables U-28 through U-31 for the low, medium, and high production scenarios, respectively.

Table U-28. Criteria Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – All Build Alternatives, Low Production Scenario

Proposed / Potentially Induced Mine	Annual Coal Production Rate (million tons/year)	Fuel Usage (million gallons)	Criteria Air Pollutant Emissions (million tons)						
			CO	NO _x	Pb	PM10	PM2.5	SO ₂	VOC
Otter Creek Mine									
Year 1	12	3.4	4.24E-04	1.19E-03	5.14E-07	5.02E-05	4.87E-05	1.55E-06	9.35E-05
Year 2	16	4.6	5.66E-04	1.59E-03	6.86E-07	6.69E-05	6.49E-05	2.07E-06	1.25E-04
Year 3+	20	5.7	7.07E-04	1.98E-03	8.57E-07	8.36E-05	8.11E-05	2.58E-06	1.56E-04
Notes:									
Fuel usage is a mix of diesel fuel and gasoline									
CO = carbon monoxide; NO _x = nitrogen oxides; Pb = lead; PM10 = particulate matter 10 microns in diameter or less; PM2.5 = particulate matter 2.5 microns in diameter or less; SO ₂ = sulfur dioxide; VOC = volatile organic compound									

Table U-29. Criteria Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – All Build Alternatives, Medium Production Scenario

Proposed / Potentially Induced Mine	Annual Coal Production Rate (million tons/year)	Fuel Usage (million gallons)	Criteria Air Pollutant Emissions (million tons)						
			CO	NO _x	Pb	PM10	PM2.5	SO ₂	VOC
Otter Creek Mine									
Year 1	12	3.4	4.24E-04	1.19E-03	5.14E-07	5.02E-05	4.87E-05	1.55E-06	9.35E-05
Year 2	16	4.6	5.66E-04	1.59E-03	6.86E-07	6.69E-05	6.49E-05	2.07E-06	1.25E-04
Year 3+	20	5.7	7.07E-04	1.98E-03	8.57E-07	8.36E-05	8.11E-05	2.58E-06	1.56E-04
Poker Jim Creek-O’Dell Creek Mine									
Year 1	7.2	2.1	2.55E-04	7.14E-04	3.09E-07	3.01E-05	2.92E-05	9.30E-07	5.61E-05
Year 2	9.6	2.8	3.39E-04	9.51E-04	4.11E-07	4.01E-05	3.89E-05	1.24E-06	7.48E-05
Year 3+	12.0	3.4	4.24E-04	1.19E-03	5.14E-07	5.02E-05	4.87E-05	1.55E-06	9.35E-05
Notes:									
Fuel usage is a mix of diesel fuel and gasoline									
CO = carbon monoxide; NO _x = nitrogen oxides; Pb = lead; PM10 = particulate matter 10 microns in diameter or less; PM2.5 = particulate matter 2.5 microns in diameter or less; SO ₂ = sulfur dioxide; VOC = volatile organic compound									

Table U-30. Criteria Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – Northern Alternatives, High Production Scenario

Proposed / Potentially Induced Mine	Annual Coal Production Rate (million tons/year)	Fuel Usage (million gallons)	Criteria Air Pollutant Emissions (million tons)						
			CO	NO _x	Pb	PM10	PM2.5	SO ₂	VOC
Otter Creek Mine									
Year 1	20.4	5.9	7.21E-04	2.02E-03	8.74E-07	8.53E-05	8.27E-05	2.63E-06	1.59E-04
Year 2	27.2	7.8	9.62E-04	2.70E-03	1.17E-06	1.14E-04	1.10E-04	3.51E-06	2.12E-04
Year 3+	34.0	9.8	1.20E-03	3.37E-03	1.46E-06	1.42E-04	1.38E-04	4.39E-06	2.65E-04
Poker Jim Creek-O’Dell Creek Mine									
Year 1	9.6	2.8	3.39E-04	9.51E-04	4.11E-07	4.01E-05	3.89E-05	1.24E-06	7.48E-05
Year 2	12.8	3.7	4.53E-04	1.27E-03	5.49E-07	5.35E-05	5.19E-05	1.65E-06	9.97E-05
Year 3+	16.0	4.6	5.66E-04	1.59E-03	6.86E-07	6.69E-05	6.49E-05	2.07E-06	1.25E-04
Notes:									
Fuel usage is a mix of diesel fuel and gasoline									
CO = carbon monoxide; NO _x = nitrogen oxides; Pb = lead; PM10 = particulate matter 10 microns in diameter or less;									
PM2.5 = particulate matter 2.5 microns in diameter or less; SO ₂ = sulfur dioxide; VOC = volatile organic compound									

Table U-31. Criteria Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – Southern Alternatives, High Production Scenario

Proposed / Potentially Induced Mine	Annual Coal Production Rate (million tons/year)	Fuel Usage (million gallons)	Criteria Air Pollutant Emissions (million tons)						
			CO	NO _x	Pb	PM10	PM2.5	SO ₂	VOC
Otter Creek Mine									
Year 1	20.4	5.9	7.21E-04	2.02E-03	8.74E-07	8.53E-05	8.27E-05	2.63E-06	1.59E-04
Year 2	27.2	7.8	9.62E-04	2.70E-03	1.17E-06	1.14E-04	1.10E-04	3.51E-06	2.12E-04
Year 3+	34.0	9.8	1.20E-03	3.37E-03	1.46E-06	1.42E-04	1.38E-04	4.39E-06	2.65E-04
Poker Jim Creek-O'Dell Creek Mine									
Year 1	9.6	2.8	3.39E-04	9.51E-04	4.11E-07	4.01E-05	3.89E-05	1.24E-06	7.48E-05
Year 2	12.8	3.7	4.53E-04	1.27E-03	5.49E-07	5.35E-05	5.19E-05	1.65E-06	9.97E-05
Year 3+	16.0	4.6	5.66E-04	1.59E-03	6.86E-07	6.69E-05	6.49E-05	2.07E-06	1.25E-04
Canyon Creek Mine									
Year 1	13.2	3.8	4.67E-04	1.31E-03	5.66E-07	5.52E-05	5.35E-05	1.70E-06	1.03E-04
Year 2	17.6	5.1	6.22E-04	1.74E-03	7.54E-07	7.36E-05	7.14E-05	2.27E-06	1.37E-04
Year 3+	22.0	6.3	7.78E-04	2.18E-03	9.43E-07	9.20E-05	8.92E-05	2.84E-06	1.71E-04
Notes:									
Fuel usage is a mix of diesel fuel and gasoline									
CO = carbon monoxide; NO _x = nitrogen oxides; Pb = lead; PM10 = particulate matter 10 microns in diameter or less; PM2.5 = particulate matter 2.5 microns in diameter or less; SO ₂ = sulfur dioxide; VOC = volatile organic compound									

The hazardous air pollutant emissions for proposed and potentially induced mine operations are summarized in Tables U-32 through U-35 for the low, medium, and high production scenarios, respectively.

Table U-32. Hazardous Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – All Build Alternatives, Low Production Scenario

Proposed / Potentially Induced Mine	Hazardous Air Pollutant Emissions (tons)				
	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene
Otter Creek Mine					
Year 1	2.25E-02	4.29E-03	2.59E-03	3.08E-03	1.87E-01
Year 2	3.00E-02	5.72E-03	3.46E-03	4.11E-03	2.49E-01
Year 3+	3.76E-02	7.15E-03	4.32E-03	5.14E-03	3.12E-01
Formaldehyde n-Hexane Toluene Xylene					
Otter Creek Mine					
Year 1	4.74E-02	4.21E-03	0.2992	0.4488	
Year 2	6.32E-02	5.62E-03	0.3989	0.5984	
Year 3+	7.90E-02	7.02E-03	0.4987	0.7480	

Notes:
Fuel usage is a mix of diesel fuel and gasoline

Table U-33. Hazardous Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – All Build Alternatives, Medium Production Scenario

Proposed / Potentially Induced Mine	Hazardous Air Pollutant Emissions (tons)				
	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene
Otter Creek Mine					
Year 1	2.25E-02	4.29E-03	2.59E-03	3.08E-03	1.87E-01
Year 2	3.00E-02	5.72E-03	3.46E-03	4.11E-03	2.49E-01
Year 3+	3.76E-02	7.15E-03	4.32E-03	5.14E-03	3.12E-01
Poker Jim Creek–O’Dell Creek Mine					
Year 1	1.35E-02	2.57E-03	1.56E-03	1.85E-03	1.12E-01
Year 2	1.80E-02	3.43E-03	2.07E-03	2.47E-03	1.50E-01
Year 3+	2.25E-02	4.29E-03	2.59E-03	3.08E-03	1.87E-01
	Formaldehyde	n-Hexane	Toluene	Xylene	
Otter Creek Mine					
Year 1	4.74E-02	4.21E-03	0.2992	0.4488	
Year 2	6.32E-02	5.62E-03	0.3989	0.5984	
Year 3+	7.90E-02	7.02E-03	0.4987	0.7480	
Poker Jim Creek–O’Dell Creek Mine					
Year 1	2.84E-02	2.53E-03	0.1795	0.2693	
Year 2	3.79E-02	3.37E-03	0.2394	0.3590	
Year 3+	4.74E-02	4.21E-03	0.2992	0.4488	
Notes:					
Fuel usage is a mix of diesel fuel and gasoline					

Table U-34. Hazardous Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – Northern Alternatives, High Production Scenario

Proposed / Potentially Induced Mine	Hazardous Air Pollutant Emissions (tons)				
	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene
Otter Creek Mine					
Year 1	3.83E-02	7.29E-03	4.41E-03	5.24E-03	3.18E-01
Year 2	5.11E-02	9.72E-03	5.88E-03	6.99E-03	4.24E-01
Year 3+	6.38E-02	1.22E-02	7.35E-03	8.74E-03	5.30E-01
Poker Jim Creek–O’Dell Creek Mine					
Year 1	1.80E-02	3.43E-03	2.07E-03	2.47E-03	1.50E-01
Year 2	2.40E-02	4.57E-03	2.77E-03	3.29E-03	1.99E-01
Year 3+	3.00E-02	5.72E-03	3.46E-03	4.11E-03	2.49E-01
	Formaldehyde	n-Hexane	Toluene	Xylene	
Otter Creek Mine					
Year 1	8.06E-02	7.16E-03	0.5086	0.7630	
Year 2	1.07E-01	9.55E-03	0.6782	1.0173	
Year 3+	1.34E-01	1.19E-02	0.8477	1.2716	
Poker Jim Creek–O’Dell Creek Mine					
Year 1	3.79E-02	3.37E-03	0.2394	0.3590	
Year 2	5.06E-02	4.49E-03	0.3191	0.4787	
Year 3+	6.32E-02	5.62E-03	0.3989	0.5984	
Notes:					
Fuel usage is a mix of diesel fuel and gasoline					

Table U-35. Hazardous Air Pollutant Emissions from Fuel Consumption for Proposed and Potentially Induced Mine Operations – Southern Alternatives, High Production Scenario

Proposed / Potentially Induced Mine	Hazardous Air Pollutant Emissions (tons)				
	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene
Otter Creek Mine					
Year 1	3.83E-02	7.29E-03	4.41E-03	5.24E-03	3.18E-01
Year 2	5.11E-02	9.72E-03	5.88E-03	6.99E-03	4.24E-01
Year 3+	6.38E-02	1.22E-02	7.35E-03	8.74E-03	5.30E-01
Poker Jim Creek–O’Dell Creek Mine					
Year 1	1.80E-02	3.43E-03	2.07E-03	2.47E-03	1.50E-01
Year 2	2.40E-02	4.57E-03	2.77E-03	3.29E-03	1.99E-01
Year 3+	3.00E-02	5.72E-03	3.46E-03	4.11E-03	2.49E-01
Canyon Creek Mine					
Year 1	2.48E-02	4.72E-03	2.85E-03	3.39E-03	2.06E-01
Year 2	3.30E-02	6.29E-03	3.80E-03	4.52E-03	2.74E-01
Year 3+	4.13E-02	7.86E-03	4.75E-03	5.66E-03	3.43E-01
	Formaldehyde	n-Hexane	Toluene	Xylene	
Otter Creek Mine					
Year 1	8.06E-02	7.16E-03	0.5086	0.7630	
Year 2	1.07E-01	9.55E-03	0.6782	1.0173	
Year 3+	1.34E-01	1.19E-02	0.8477	1.2716	
Poker Jim Creek–O’Dell Creek Mine					
Year 1	3.79E-02	3.37E-03	0.2394	0.3590	
Year 2	5.06E-02	4.49E-03	0.3191	0.4787	
Year 3+	6.32E-02	5.62E-03	0.3989	0.5984	
Canyon Creek Mine					
Year 1	5.21E-02	4.63E-03	0.3291	0.4937	
Year 2	6.95E-02	6.18E-03	0.4388	0.6582	
Year 3+	8.69E-02	7.72E-03	0.5485	0.8228	
Notes:					
Fuel usage is a mix of diesel fuel and gasoline					

Contribution of the Build Alternatives to Cumulative Impacts on Air Quality

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would provide access to the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek Mine. The construction start and completion dates for the proposed Otter Creek Mine would depend on the construction schedule for the proposed rail line. The Decker Alternatives would provide access to the proposed Otter Creek Mine and to the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines. The Decker Alternatives would be the only build alternatives that would provide access to the potentially induced Canyon Creek Mine.

Any build alternative would contribute to criteria air pollutant emissions and hazardous air pollutant emissions in the cumulative impacts study area. The addition of impacts from the build alternatives to impacts from the proposed and potentially induced mines would result in cumulative impacts on air quality in the study area. The contributions from the proposed rail line, existing mines, and proposed and potentially induced mines to cumulative impacts would not result in exceedances of ambient air quality standards.

U.4.2.3 Land Management

Land Management Impacts on Air Quality

Fort Keogh Livestock and Range Research Laboratory

Fort Keogh is an operating land management project that addresses cattle management and grazing. Associated facility and vehicle operations would result in a small amount of air pollutant emissions, which would contribute to impacts on ambient air quality.

Tongue River Reservoir State Park

The proposed Tongue River Reservoir State Park project would renovate the Pee Wee Point North, Pee Wee Point South, and Sandpoint campgrounds. The use of construction equipment and vehicles would result in a small amount of air pollutant emissions, which would contribute to impacts on ambient air quality.

BLM Resource Management Plan

The BLM Draft RMP/EIS would continue current management activities and identify new facilities or management strategies. The BLM Draft RMP/EIS addresses livestock grazing, wildlife habitat, special-designation areas, special recreation areas, national trails, and wilderness study areas.

BLM estimated criteria and hazardous air pollutant emissions of land management such as vegetation management, fire management (from prescribed fires only), forestry and woodland products, livestock grazing, recreation, BLM fleet travel, and road maintenance based on the BLM preferred alternative (Alternative E) as presented in the Draft RMP/EIS (Bureau of Land Management 2007a) (Table U-36). Land management under the BLM Draft RMP/EIS would result in a small amount of air pollutant emissions that would contribute to impacts on ambient air quality.

Table U-36. Criteria and Hazardous Air Pollutant Emissions for BLM Land Management under the BLM Draft RMP/EIS Preferred Alternative

Resource or Resource Use	Emissions (tons per year)						
	CO	NO _x	SO ₂	PM ₁₀	PM _{2.5}	VOC	HAP
Vegetation management	11.3	0.1	0	10.7	1.4	3.1	0.3
Fire management	1,741.9	58.3	13.6	210.7	151.1	97.3	9.7
Forestry and woodland products	2.7	3.9	0.1	10.7	1.3	0.4	0
Livestock grazing	11.3	9.3	0.2	136.9	14.3	4.2	0.4
Recreation trails and travel management	26.6	0.1	0	292.6	30.1	27.1	2.7
General purpose BLM fleet travel	4.6	1.7	0	72.7	7.3	2	0.2
Road maintenance	0.5	1.2	0	1.4	0.2	0.1	0
TOTAL	1,798.9	74.6	13.9	735.7	205.7	134.2	13.3

Notes:

BLM = Bureau of Land Management; CBNG = coal bed natural gas; CO = carbon monoxide; NO_x = nitrogen oxides; PM₁₀ = particulate matter 10 microns in diameter or less; PM_{2.5} = particulate matter 2.5 microns in diameter or less; SO₂ = sulfur dioxide; VOC = volatile organic compound; HAP = hazardous air pollutant

Source: Bureau of Land Management 2007a

Beaver Creek Landscape Management Project

Implementation of the Beaver Creek LMP would promote a healthier and more resilient ponderosa pine ecosystem on 14,000 acres of forest by using large tree removal, fire applications, and selective vegetation thinning. These practices would promote fires that are of lower intensity and less severe than those caused by stand replacement fires. The Beaver Creek LMP would result in a small amount of air pollutant emissions that would contribute to impacts on ambient air quality.

Contribution of the Build Alternatives to Cumulative Impacts on Air Quality

Fort Keogh Livestock and Range Research Laboratory

The Tongue River Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be constructed and operate near where research activities occur in Fort Keogh. The addition of air quality impacts from these build alternatives to the impacts of the ongoing use of Fort Keogh would result in cumulative impacts on air quality.

Tongue River Reservoir State Park

The Decker Alternatives would be constructed and would operate near the Tongue River Reservoir State Park. The addition of air quality impacts from the Decker Alternatives to the impacts of the renovations at Tongue River Reservoir State Park would result in cumulative impacts on air quality.

BLM Resource Management Plans

Any build alternative would be constructed and operate in landscapes affected by land management practices under the BLM Draft RMP/EIS. The addition of impacts from the build alternatives to the impacts from the BLM Draft RMP/EIS would result in cumulative impacts on air quality.

U.4.2.4 Energy Development

Energy Development Impacts on Air Quality

The BLM Draft RMP/EIS would promote oil and natural gas projects on 5.4 million acres of leased land in Rosebud, Custer, Powder River, and Big Horn Counties (the four-county area). OEA estimated that 1,158 CBNG wells would be developed between 2011 and 2030, and considers this estimate much higher than the number of wells that will be permitted and completed. However, none of the currently approved wells would be in the project area or near the build alternatives (Appendix U, Section U.3.3.4, *Energy Development*). In addition to well development on BLM-administered lands, oil and gas exploration and development continues throughout southeastern Montana on federal, state, tribal, and private lands.

BLM estimated the criteria and hazardous air pollutant emissions for energy development projects under the preferred alternative of the BLM Draft RMP/EIS (Table U-37).

Table U-37. Criteria and Hazardous Air Pollutant Emissions for Energy Development and Production under the BLM Draft RMP/EIS Preferred Alternative

Resource or Resource Use	Emissions (tons per year)						
	CO	NO _x	SO ₂	PM ₁₀	PM _{2.5}	VOC	HAP
Oil and Gas Development/ Production							
Oil	347.8	151.7	2.3	34.8	9.3	1,207.5	76.3
Natural Gas	136.1	56.3	0.1	8.8	3.2	38.9	3.9
CBNG	59.6	30.1	0	6.7	2.0	20.6	3.9
Coal Mining	2,121.0	1,817.4	179.8	4,448.4	444.8	144.2	14.4
TOTAL	2,664.5	2,055.5	182.2	4,498.7	459.3	1,411.2	98.5

Notes:

BLM = Bureau of Land Management; CBNG = coal bed natural gas; CO = carbon monoxide; HAP = hazardous air pollutant; NO_x = nitrogen oxides; PM₁₀ = particulate matter 10 microns in diameter or less; PM_{2.5} = particulate matter 2.5 microns in diameter or less; SO₂ = sulfur dioxide; VOC = volatile organic compound

Source: Bureau of Land Management 2007a

BLM's estimate of the total criteria air pollutant emissions is for CBNG development projects involving construction and operation of 18,225 CBNG production wells and 1,730 conventional oil and gas production wells over a 21-year project period. OEA independently estimated that 1,158 oil and gas production wells would be constructed in the four-county area within a 20-year planning cycle (Section U.3.3.4, *Energy Development*). OEA estimated the criteria air pollutant emissions from projected future oil and gas production

using the BLM emissions-per-well factors for construction and operation of CBNG wells (Bureau of Land Management 2007a), assuming that the criteria air pollutant emissions would be proportional to the number of wells constructed and operated. Because the combined construction and operation emission factors for conventional oil and gas wells are higher than the combined emission factors for CBNG wells, OEA assumed that all of the projected 1,158 wells in the four-county area would be conventional oil and gas wells. Table U-38 summarizes the criteria air pollutant emissions estimated by BLM for the CBNG project and estimated by OEA for projected wells in the four-county area.

CBNG wells and the associated gas processing facilities are subject to Montana DEQ air quality permitting requirements (17 Administrative Rules of Montana [ARM] 8.7). Depending on the equipment type (e.g., pump engine, compressor, generator) a permit may require emission controls or best management practices to minimize potential air quality impacts. It should be noted that none of the currently approved wells would be in the project area or near the build alternatives (Appendix U, Section U.3.3.4, *Energy Development*).

Table U-38. Projected Oil and Gas Development Emission Factors and Life of Project Emissions

	NO _x	PM ₁₀	PM _{2.5}	SO	CO	VOC
Emissions Factors: tons per well (BLM)						
Operation	0.028005	0.022943	0.004753	0.002043	0.00639	0.002186
Construction	11.73868	1.032434	0.516984	1.449514	2.754828	0.437738
Estimated Emissions tons total emissions (OEA)						
Operation	48.4	39.7	8.2	3.5	11.1	3.8
Construction	20,308	1,786	894	2,508	4,766	757
Total	20,356	1,826	903	2,511	4,777	761

Notes:

CO = carbon monoxide; NO_x = nitrogen oxides; PM₁₀ = particulate matter 10 microns in diameter or less; PM_{2.5} = particulate matter 2.5 microns in diameter or less; SO = sulfur monoxide; VOC = volatile organic compound

Source: Bureau of Land Management 2007b: Appendix A Sections A.1.4, A.2.4

Contribution of the Build Alternatives to Cumulative Impacts on Air Quality

Any build alternative would be constructed and operate in landscapes affected by future oil and gas development. Most of the region around the northern build alternatives has a low potential for oil and gas development. There is moderate potential for development along the Decker Alternatives.

The addition of impacts from construction and operation of the build alternatives to impacts from oil and gas development would result in cumulative impacts on criteria air pollutant emissions and hazardous air pollutant emissions in the cumulative impacts study area.

U.4.2.5 Construction Projects

Construction Project Impacts on Air Quality

Tongue River Road Paving

The 32.7-mile paving project proposed for Tongue River Road would contribute criteria air pollutant and hazardous air pollutant emissions from fuel combustion. Criteria air pollutant emissions from road paving activities are estimated based on fuel consumption, and are summarized in Table U-39; hazardous air pollutant emissions are summarized in Table U-40.

Table U-39. Criteria Air Pollutant Emissions from Paving of Tongue River Road

Activity	Fuel Usage (gallons)	Criteria Air Pollutants (tons)						
		CO	NO _x	Pb	PM10	PM2.5	SO ₂	VOC
Road paving	66,900.00	340.91	50.70	0.07	1.12	1.09	0.21	12.07

Notes:
CO = carbon monoxide; NO_x = nitrogen oxides; PM10 = particulate matter 10 microns in diameter or less; PM2.5 = particulate matter 2.5 microns in diameter or less; SO = sulfur monoxide; VOC = volatile organic compound

Table U-40. Hazardous Air Pollutant Emissions from Paving of Tongue River Road

Activity	Hazardous Air Pollutant Emissions (tons)				
	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene
Road paving	5.04E-04	9.59E-05	5.80E-05	6.90E-05	2.41E-02

Activity	Hazardous Air Pollutant Emissions (tons)			
	Formaldehyde	n-Hexane	Toluene	Xylene
Road paving	1.06E-03	9.42E-05	3.86E-02	5.79E-02

Notes:
Fuel usage is a mix of diesel fuel and gasoline

Bull Pasture Subdivision Leasing

Leasing the 38.55-acre bull pasture subdivision would contribute criteria air pollutant and hazardous air pollutant emissions. Emissions would result from vehicle usage associated with inspection, management, and similar activities would result in a small amount of air pollutant emissions that would contribute to impacts on ambient air quality.

Contribution of the Build Alternatives to Cumulative Impacts on Air Quality

Tongue River Road Paving

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be crossed by the paving project. The addition of impacts

from the build alternatives to the impacts of the paving project would result in cumulative impacts on air quality.

Bull Pasture Subdivision Leasing

The Tongue River Alternatives and Tongue River Road Alternatives would be closest to the Bull Pasture Subdivision Leasing project. The addition of impacts from the build alternatives to the impacts from leasing the bull pasture subdivision and potential development would result in cumulative impacts on air quality.

Ambient Concentrations and Air Quality Related Values

Impacts on Ambient Concentrations

The results of air quality modeling for the proposed rail line (Chapter 4, Section 4.5.1.2, *Operation*) indicate that pollutant concentrations from rail operation would be within the National Ambient Air Quality Standards (NAAQS) and Montana Ambient Air Quality Standards (Montana AAQS).

Air pollutant concentrations in the study area would increase because of future development. However, if such increases resulted in levels approaching the NAAQS and Montana AAQS, it is likely that Montana DEQ and the U.S. Environmental Protection Agency (USEPA) would require additional emissions controls on sources in the region. The past and current air quality monitoring programs indicate that PM10 concentrations near existing mines are within the NAAQS and Montana AAQS (Chapter 4, Section 4.4.2, *Ambient Air Quality*). The proposed and potentially induced coal mines would be required under their Montana DEQ air quality permits to use equipment and practices that meet current emission control requirements, and so would be expected to control emissions at least as well as the existing mines do. As a result, ambient concentrations near the proposed and potentially induced mines likely would be comparable to the concentrations measured at the existing mines, and would be within the NAAQS and Montana AAQS.

Cumulative impact projects other than mines are unlikely to contribute more than negligibly to concentrations in the project area due to their relatively low levels of emissions and their distances from the railroad. As a result, cumulative impacts of all of these sources would be unlikely to cause a violation of the NAAQS or Montana AAQS in the study area.

Impacts on Air Quality Related Values

Air quality related values (AQRVs) refer to resources such as visibility, plants and animals that are affected by air pollution. AQRVs are assessed in the Class I and sensitive Class II areas that are included in the cumulative impacts study area, most notably, the Northern Cheyenne Indian Reservation.

On the scale of the cumulative impacts study area, ambient pollutant concentrations are influenced by numerous sources spread throughout the study area and beyond as well as by

regional meteorology and topography. BLM and other agencies have modeled the cumulative impacts of coal, oil, and gas development as well as other RFD in the region, including rail operation¹², the proposed Otter Creek Mine, and the potentially induced mines. For this cumulative impacts analysis, OEA selected modeling conducted by the Western Region Air Partnership (WRAP) and by BLM for its Miles City Draft RMP/EIS, the Statewide Oil and Gas EIS, and the Powder River Basin Coal Review.

WRAP recently completed a detailed modeling study known as the West-wide Jump Start Air Quality Modeling Study (WestJumpAQMS) that included southeastern Montana in the modeled region (Western Region Air Partnership 2013). However, WestJumpAQMS did not represent the previously approved version of the proposed rail line specifically in the modeling and so cannot be used to assess quantitatively the potential impacts of rail operation.

The BLM Draft RMP/EIS (Bureau of Land Management 2013b) also included air quality modeling. However, the modeling assessed impacts only near certain emissions sources (out to 3 kilometers from the source) and so is not applicable to assessment of regional cumulative impacts associated with rail operation. The Draft RMP/EIS qualitatively assessed impacts in an area also encompassed by the cumulative impacts study area and considered actions “pertaining to the Tongue River Railroad Project (near Colstrip and Decker, Montana).” The Draft RMP/EIS concluded that sulfur and nitrogen deposition impacts would likely be minor. The small increases in sulfur and nitrogen deposition would cause minor lake acidification impacts at Class I and sensitive Class II areas. Visibility impacts were judged likely to be small because increases in emissions of sulfur dioxide (SO₂), NO_x, and fine particulate matter (PM_{2.5}) would be relatively low, and emission sources would be spread over a large geographic area so concentration increases of haze-inducing pollutants would be low. The Draft RMP/EIS analysis considered only emissions sources that BLM would influence, such as RFD occurring on BLM-controlled land, and in this way is not comparable to the Statewide Oil and Gas EIS or the Powder River Basin Coal Review, which considered all sources in the region (Bassett pers. comm.). Consequently, the results of the Draft RMP/EIS modeling are useful in establishing context for impacts but cannot be used to assess quantitatively the impacts of rail operation.

The modeling studies that are most applicable to assessing potential impacts of rail operation are the Statewide Oil and Gas EIS (Bureau of Land Management 2008) and the Powder River Basin Coal Review (Bureau of Land Management 2012). These two studies evaluated air quality impacts in the Powder River Basin and surrounding regions according to several impact criteria: ambient pollutant concentrations compared to the NAAQS and Montana AAQS, concentrations compared to the USEPA Prevention of Significant Deterioration (PSD) increments, visibility, acid deposition, and acid-neutralizing capacity (ANC) in

¹² In this section, *rail operation* refers to operation of a previously approved version of the proposed rail line used in the BLM model. This version is not identical to any build alternative currently analyzed.

sensitive lakes. These criteria are described in Chapter 4, Section 4.5, *Applicable Regulations*.

PSD requirements did not apply to the BLM modeling because the modeling was not part of a stationary source permitting process. BLM used the PSD increments as a guide to compare results and to provide context for evaluating air quality impacts. Similarly, PSD increments do not apply to rail operation because the railroad is not a stationary source but the increments can be used to compare potential impacts for purposes of information.

Statewide Oil and Gas EIS

BLM modeled a region approximately 700 kilometers by 800 kilometers encompassing southeastern Montana and northeastern Wyoming using the CALPUFF dispersion model (Bureau of Land Management 2006b). This modeling domain encompasses the air quality study area and includes a number of federal Class I and sensitive Class II areas, including the Northern Cheyenne Indian Reservation voluntary Class I area. The previously approved rail line, currently proposed rail line, proposed Otter Creek Mine, and the potentially induced Poker Jim Creek–O’Dell Creek or Canyon Creek Mines would be located near the center of this modeling domain. The rail line as then approved by the Board (Surface Transportation Board 2004a, 2004b) was included in the modeling, as were coal mines in Montana and Wyoming. The RFD projections included mines judged likely to be developed during the forecast period, including the proposed Otter Creek Mine and an additional RFD coal mine in the same area (though this mine was not specifically identified as the potentially induced Poker Jim Creek–O’Dell Creek or Canyon Creek Mines) (Bureau of Land Management 2006c). Impacts were estimated for a development year of 2024.

Ambient Concentrations Assessment

The Statewide Oil and Gas EIS modeling accounted for emissions from CBNG and conventional oil and gas RFD areas, coal mines and coal-related sources including power plants, and all other sources in Wyoming, Montana, Idaho, Utah, Nebraska, South Dakota, and North Dakota (Bureau of Land Management 2006b). The cumulative impacts analysis for the Statewide Oil and Gas EIS for 2024 concluded that maximum concentrations of criteria air pollutants from all sources, including the rail operation and the proposed Otter Creek Mine, would be within the NAAQS and PSD increments, except that levels would exceed the NAAQS for 1-hour NO₂ and the PSD Class II increments for 3-hour SO₂, 24-hour PM₁₀, and 24-hour PM_{2.5}. The 1-hour NO₂ results should be viewed with caution because the modeling used the ambient ratio method for NO_x-to-NO₂ conversion in the atmosphere, with the default conversion rate of 75 percent, which is a relatively high value appropriate for area-wide quasi-equilibrium conditions rather than peak 1-hour values (U.S. Environmental Protection Agency 2010). As a result, the modeling probably overestimated the 1-hour NO₂ levels, and actual NO₂ concentrations that may result from the modeled sources likely would be substantially lower.

Based on these results, any potential contributions of rail operation, the proposed Otter Creek Mine, and the potentially induced Poker Jim Creek–O’Dell Creek or Canyon Creek Mines to cumulative exceedances of air quality standards and PSD increments are likely to be small.

At the Northern Cheyenne Indian Reservation, the Statewide Oil and Gas EIS cumulative impacts analysis for 2024 concluded that maximum concentrations of criteria air pollutants from sources, including rail operation, the proposed Otter Creek mine, and potentially induced mines would exceed the NAAQS for 1-hour NO₂ and the PSD Class I increments (Bureau of Land Management 2007b). As noted above, however, the 1-hour NO₂ results should be viewed with caution and likely would be lower. The relative contributions of the rail operation and the proposed Otter Creek and potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines to the overall air pollutant emissions in the study area would be small. Based on these results, any contributions of rail operation, the proposed Otter Creek Mine, and the potentially induced coal mines to potential cumulative exceedances of air quality standards and PSD increments at the Northern Cheyenne Indian Reservation are likely to be small, but such contributions would be larger at the reservation than at locations more distant from these sources.

Visibility Assessment

The Statewide Oil and Gas EIS cumulative impacts analysis assessed visibility impacts at PSD Class I and sensitive Class II areas, including the Northern Cheyenne Indian Reservation. For the Northern Cheyenne Indian Reservation in 2024, the analysis showed that visibility impacts greater than the 10 percent significance threshold (change in light extinction of 10 percent above background visibility) would occur on 234 days per year due to existing emissions sources, and 316 days per year due to all sources including RFD, an increase of 82 days per year (Bureau of Land Management 2007b).

The Statewide Oil and Gas EIS stated that the proposed rail line by itself would not affect visibility at any mandatory Class I or Class II areas (Bureau of Land Management 2007b). The analysis also indicated that impacts of rail operation at the Northern Cheyenne Indian Reservation voluntary Class I area would be negligible, with only 1 day per year having a change in light extinction of greater than 5 percent, a maximum daily change of 7 percent, and no days having a change in light extinction of greater than 10 percent (Bureau of Land Management 2007b).

The Statewide Oil and Gas EIS did not report separately the visibility impacts of the proposed Otter Creek Mine or potentially induced mines. Based on these results, any contributions of the proposed Otter Creek Mine and potentially induced mines to cumulative visibility impacts are likely to be small at most Class I and sensitive Class II locations, but would be larger at the Northern Cheyenne Indian Reservation and other locations that are closer to the mines.

Acidic Deposition Assessment

The Statewide Oil and Gas EIS modeled acidic deposition impacts caused by NO_x and sulfur oxide (SO_x) emissions from all sources, including rail operation and potentially induced mines, and found them to be below applicable thresholds at all Class I areas (Bureau of Land Management 2006b, 2007c). Cumulative impacts on sensitive-lake, acid-neutralizing capacity were also modeled and found to be less than regulatory thresholds except for two lakes (Florence Lake and Upper Frozen Lake in Wyoming) that showed small exceedances of the thresholds. Based on these results, any contributions of the proposed Otter Creek Mine and potentially induced mines to cumulative acidic deposition and lake chemistry impacts are likely to be small at most Class I and sensitive Class II locations, but would be larger at the Northern Cheyenne Indian Reservation and other locations that are closer to the mines.

Powder River Basin Coal Review

The Powder River Basin Coal Review (Bureau of Land Management 2012) presents similar modeling for the same regional domain using the CALPUFF model (referred to as the Phase 1 Modeling) (Bureau of Land Management 2009a Section IV:9-10). The existing emissions sources modeled were very similar to those modeled for the Statewide Oil and Gas EIS. The Powder River Basin Coal Review Phase 1 modeling estimated cumulative air quality effects with RFD predicted for a high-development scenario to 2020. This study also modeled the previously approved rail line on a 130-mile alignment (Surface Transportation Board 2004a, 2004b), the proposed Otter Creek mine, and other RFD coal mines (locations unspecified) (Bureau of Land Management 2009b).

BLM conducted additional modeling to update its estimates to 2030 using photochemical grid modeling (referred to as the Phase 2 Modeling) (Bureau of Land Management 2014). BLM used the Comprehensive Air Quality Model with Extensions in conjunction with the Weather Research and Forecasting meteorological model and the Sparse Matrix Operator Kernel Emissions processor. This modeling included the proposed Otter Creek Mine, a new railroad line serving the proposed Otter Creek Mine along an alignment similar to the currently proposed Colstrip Alternative, and six new RFD coal mines. The new RFD coal mines included the Youngs Creek Mine in the Sheridan/Decker area, an additional mine assumed to be developed in the Sheridan/Decker area, and one in the Ashland/Colstrip area (Bureau of Land Management 2011).

Ambient Concentrations Assessment

The Phase 1 Modeling (Bureau of Land Management 2009a) estimated that concentrations in 2020 would be within the NAAQS and PSD increments except that PM₁₀ and PM_{2.5} levels for the high-development scenario would exceed the NAAQS at some Wyoming locations due to emission sources near those locations, largely projected CBNG development. The NAAQS would not be exceeded in Montana. The modeling estimated exceedances of the

PSD increments for SO₂ and 24-hour PM₁₀ at the Northern Cheyenne Indian Reservation. These exceedances were attributed to CBNG development in Wyoming and projected coal-fired power plants in Montana. The Phase 1 Modeling did not identify rail operation, the proposed Otter Creek Mine, or potentially induced mines as a contributor to any exceedances of the NAAQS or the PSD increments.

The Phase 2 Modeling (Bureau of Land Management 2014) updated the Phase 1 Modeling estimates for 2020 and added estimates for 2030. The modeling estimated that concentrations in 2030 would be lower than in 2020. Exceedances of the NAAQS and Montana AAQS for CO, ozone (not addressed in Phase 1), and PM₁₀ were estimated for 2020 and 2030 and attributed to wildfires, based on the emissions inventory data used in the modeling. The exceedances were not due to rail operation, the proposed Otter Creek Mine, or potentially induced mines. Other than during wildfire episodes, the maximum modeled concentrations in 2030 were below the NAAQS and Montana AAQS except for ozone and PM₁₀ in one Class I area and two Class II areas. Maximum modeled concentrations in 2030 were below the NAAQS and Montana AAQS at the Northern Cheyenne Indian Reservation. No modeled concentration changes exceeded the PSD increments.

Visibility Assessment

The Phase 1 Modeling performed a visibility analysis (Bureau of Land Management 2009a) which estimated that existing emissions sources currently lead to significant impacts on visibility. The high-development scenario in 2020 was estimated to increase the number of days on which the change in visibility (compared to baseline levels) would be greater than the thresholds of 5 and 10 percent. The analysis estimated increases of 0 to 60 days above these thresholds, depending on the Class I or sensitive Class II area, due to existing and RFD emissions sources. Coal mines were found to have a negligible impact on visibility except at the Northern Cheyenne Indian Reservation, the Crow Indian Reservation, and Big Horn Canyon National Recreation Area. The Phase 1 Modeling did not identify rail operation, the proposed Otter Creek Mine, or the potentially induced mines as contributors to visibility impacts. However, these results suggest that rail operation and the proposed and potentially induced mines would contribute to visibility impacts.

The Phase 2 Modeling updated the Phase 1 Modeling visibility estimates for 2020 and added estimates for 2030 (Bureau of Land Management 2014). Visibility in 2030 was estimated to be the same as or better than in 2020. The Phase 2 Modeling reported visibility impacts in terms of deciviews (dv) and inverse megameters (Mm⁻¹) for the 20th percentile best and worst days. These indicators are not comparable to the indicators used in the Phase 1 Modeling. The Phase 2 Modeling estimated that visibility impacts for the high-development scenario would be reduced or unchanged, compared to baseline levels, in all Class I areas (including the Northern Cheyenne Indian Reservation) and most of the sensitive Class II areas. Some sensitive Class II areas would have greater visibility impacts with the high-development scenario compared to baseline levels. The Phase 2 Modeling identified coal mines as contributors to visibility impacts but did not identify specific mines or rail operation

as contributors. These results suggest that rail operation and the proposed and potentially induced mines would contribute to visibility impacts.

Acidic Deposition Assessment

The Phase 1 Modeling estimated that increases in acid deposition due to all existing and RFD emissions sources by 2020 would be small and would not exceed the thresholds at Class I and sensitive Class II areas (Bureau of Land Management 2009a). Acid deposition into sensitive lakes was estimated to remain within thresholds except for two sensitive lakes where deposition, largely from SO₂ emissions from power plants, would exceed the thresholds for acid neutralizing capacity. The Phase 1 Modeling estimated that coal mines and coal-related sources contributed a large fraction of the impacts from existing sources and RFD. However, the modeling did not specifically identify rail operation or coal mines as a contributor to any impacts on acid deposition or lake acid neutralizing capacity. Because rail operation, the proposed Otter Creek Mine, and the potentially induced mines would have low SO₂ emissions compared to coal-fired power plants, these results suggest a small potential to contribute to acid deposition impacts.

The Phase 2 Modeling updated the Phase 1 Modeling acid deposition estimates for 2020 and added estimates for 2030 (Bureau of Land Management 2014). The updated 2020 estimates are considerably higher than the Phase 1 Modeling estimates. The Phase 2 Modeling does not explain these differences. The Phase 2 Modeling estimated that nitrogen deposition rates declined from the baseline year (2008) to 2020 and to 2030, but that the threshold for nitrogen deposition would be exceeded at most Class I and sensitive Class II areas in 2020 and 2030. Modeled sulfur deposition rates declined from 2020 to 2030, and the sulfur deposition threshold was not exceeded at any Class I or sensitive Class II area in 2020 or 2030. Acid deposition into sensitive lakes was estimated in the Phase 2 Modeling to exceed the acidification thresholds at all lakes analyzed for 2020 and 2030. As with acid deposition, the updated 2020 lake acidification estimates are considerably higher than the Phase 1 Modeling estimates but the report on the Phase 2 Modeling does not explain these differences. Modeled lake acidification levels declined from the baseline year (2008) to 2020 and to 2030. As with the Phase 1 Modeling, the Phase 2 Modeling did not identify specifically rail operation or coal mines as contributors to impacts on acid deposition or lake acid neutralizing capacity. The Phase 2 Modeling identified emissions from power plants as the largest contributor to SO₂-related acidic deposition, and emissions from power plants, mobile sources, conventional oil and gas, and CBNG sources as the largest contributors to NO₂-related acidic deposition. These results suggest that potential contributions from rail operation and the proposed and potentially induced mines to lake acidification impacts would be relatively small.

Cumulative Impacts from All Sources Compared to BLM Modeling Projections

Actual cumulative impacts from all sources likely would be less than estimated in the Statewide Oil and Gas EIS and the Powder River Basin Coal Review Phase 2 Modeling because the rate of coal, oil, and gas development in the region has been much less than these studies predicted (Bassett pers. comm., Bureau of Land Management 2013b). Total compression capacity (a measure of the potential for natural gas production from existing wells in an area) from CBNG wells in the Powder River Basin declined from 2010 to 2013 (Bureau of Land Management 2013b). If these trends continue, the amount of development that actually occurs in the region by a forecast year such as 2020 would be much less than predicted in the modeled high-development scenarios described above, and emissions and the resulting cumulative impacts would be correspondingly lower. The updated forecasts (Bureau of Land Management 2011) used in the Phase 2 Modeling accounted for projected decreases in conventional oil and gas and CBNG production in a downwardly revised high development scenario, as reflected in the declining impacts estimated for 2030 compared to 2020.

The contribution of rail operation to cumulative impacts also is likely to be less than estimated by the Board (2004a and 2004b) and in the Statewide Oil and Gas EIS and the Powder River Basin Coal Review. The emissions of carbon monoxide (CO), NO_x, SO₂, and volatile organic compounds (VOCs) would be reduced because of tightened USEPA standards for locomotive engine emissions, reduced sulfur content of diesel fuel since 2004, and the shorter length of the proposed rail line compared to the previously approved alignment. To assess this difference, OEA compared the estimated emissions from the currently proposed rail line to estimated emissions for the previously approved rail line and rail traffic level (Surface Transportation Board 2004a, 2004b), as included in the BLM modeling. Table U-41 presents this comparison and shows that emissions of NO_x from the currently proposed rail line would be much lower than the previously approved rail line due to more restrictive emissions standards and a shorter length. Emissions of SO₂ would also be much lower due to reductions in the sulfur content of diesel fuel. These reduced emissions, in turn would reduce in acidic deposition impacts from the currently proposed rail line.

Table U-41. Comparison of Emissions from Currently Proposed Rail Line and Previously Approved Rail Line Used in BLM Modeling

Pollutant	Source	Emissions (tons per year)		Ratio of Maximum Emissions for Proposed Rail Line vs. BLM Modeled Alignment
		Proposed Rail Line Alternative/ Scenario with Highest Emissions ^a	Previously Approved Rail Line as Modeled by BLM	
CO	Locomotive exhaust	216215.8	590	0.37
NO _x	Locomotive exhaust	523522.6	2,700	0.19
PM ₁₀	Locomotive exhaust	12.719.5	165 (locomotives and wind erosion combined)	–
	Wind erosion	30.7		–
	Coal dust	177.6	Not calculated	–
	Total PM ₁₀	221.0227.8	165	1.331.38
PM _{2.5}	Locomotive exhaust	12.318.9	Not calculated	–
	Wind erosion	4.6	Not calculated	–
	Coal dust	33.9	Not calculated	–
	Total PM _{2.5}	50.857.4	Not calculated	–
SO ₂	Locomotive exhaust	0.78	483	0.002
VOC	Locomotive exhaust	2232.3	165	0.130.20

Notes:

^a High production scenario. Tongue River East Alternative in 2030 for NO_x, Tongue River East Alternative in 2030/2037 for CO and SO₂, Tongue River Alternative in 2023 for PM₁₀ and PM_{2.5}, Tongue River East Alternative in 2023 for VOC

CO = carbon monoxide; NO_x = nitrogen oxides; PM = particulate matter; SO₂ = sulfur dioxide; VOC = volatile organic compound; BLM = Bureau of Land Management

Table U-41 shows that locomotive emissions of PM₁₀ and PM_{2.5} would be less than estimated in the BLM modeling for the same reasons. Coal dust emissions were not quantified in the BLM estimates. When coal dust is included, the PM₁₀ and PM_{2.5} emissions would exceed the levels estimated in the BLM modeling. However, data from another major railroad study, the Dakota, Minnesota, and Eastern Powder River Basin Expansion EIS (DM&E) (Surface Transportation Board 2000) suggest that the increased coal dust emissions would have only a small effect on visibility in the region. Furthermore, the increased particulate matter would not be enough to offset the visibility benefits of decreased NO_x and SO_x emissions. As a result, the currently proposed rail line would have lower visibility impacts than the previously approved rail line modeled in the BLM studies.

The visibility modeling analysis performed for the DM&E EIS (Surface Transportation Board 2000) estimated that on days when that project had the maximum visibility impact, 77 to 80 percent of the light extinction attributed to locomotive emissions was caused by ammonium nitrate particles (formed in the atmosphere as a result of NO_x emissions), 10 to 12 percent by elemental carbon (from particulate matter emissions), 3 to 6 percent by ammonium sulfate particles (formed in the atmosphere as a result of SO_x emissions), 1 to 3 percent by NO₂, 1 to 2 percent by organic carbon (from particulate matter emissions), and 0.4

percent by other particulate matter compounds. These results show that the major portion of the light extinction was caused by ammonium nitrate and only a small portion was caused by directly emitted (primary) particulate matter. Because of the proximity of the two projects (about 100 miles apart) and the general topographic and meteorological similarity of the two regions (both railroads would be located in the Powder River Basin; the previously approved rail line in the northern part and the DM&E in the southern part), the proportions of light extinction by compound for emissions from the previously approved rail line would be similar to the DM&E results. With this assumption, the increased particulate matter emissions from the currently proposed rail line would increase the BLM-modeled visibility impact by a relatively small amount (because the proportion of the total visibility impact attributed to particulate matter is relatively small). The decreased NO_x and SO_x emissions would reduce the visibility impact by a relatively large amount (because the proportion of the total visibility impact that is due to NO_x and SO_x emissions is relatively large). These differences would lead to a net reduction in visibility impacts for the currently proposed rail line compared to the BLM modeling.

An additional factor that suggests a lower visibility impact for the currently proposed rail line is the form of the carbon contained in the coal dust. Of all the constituents of primary particulate matter emissions, elemental carbon is by far the most potent in reducing visibility. For equal masses of primary particulate matter, elemental carbon produces 2.5 times the light extinction of the next most potent constituent, organic carbon (Earth Tech 2000). Coal in general, except for anthracite, contains much less elemental carbon than organic carbon (Birch and Noll 2004, Kong et al. 2011). Subbituminous coal, the type found in the Otter Creek deposit, contains relatively little elemental carbon (Noll and Birch 2004), and accordingly is a relatively small contributor to light extinction.

In addition, it is the fine particles that cause most of the visibility impairment (National Park Service 1999) and the fine particle (PM_{2.5}) proportion of coal dust is low (29 percent of PM₁₀) compared to the fine particle proportion of locomotive exhaust (97 percent of PM₁₀), as shown in Table U-41. These characteristics suggest that coal dust particulate matter emitted from the currently proposed rail line would be much less potent in causing light extinction than the same mass of locomotive particulate matter emissions.

These factors—the low relative contribution of particulate matter to rail-related visibility impacts and the relatively low light extinction effectiveness of coal dust emissions (due to the low elemental carbon content and low fine particulate matter content)—suggest that coal dust would play a relatively small role in visibility impacts of the currently proposed rail line. Because of the small role of coal dust and the fact that NO_x and SO_x emissions would be well below the levels modeled by BLM, it is likely that the visibility and acidic deposition impacts of the currently proposed rail line would be less than the already minor impacts estimated in the BLM modeling. Consequently, construction and operation of the proposed rail line would not contribute to major impairment of visibility or to significant acidic deposition.

Cumulative Impact Summary: Air Quality

The proposed rail line would affect air quality and would combine with impacts from the other projects to result in cumulative impacts on air quality in the study area. The contribution of the proposed rail line to cumulative impacts is summarized as follows.

- **Existing coal mines and Colstrip Power Plant.** The Colstrip Alternatives and Decker Alternatives would contribute to cumulative impacts by contributing criteria air pollutant and hazardous air pollutant emissions to emissions from the existing mines and power plant. Cumulative impacts would include impacts on AQRVs.
- **Proposed and potentially induced coal mines.** Any build alternative would contribute to cumulative impacts by contributing criteria air pollutant and hazardous air pollutant emissions to emissions from the proposed and potentially induced mines. Cumulative impacts would include impacts on AQRVs.
- **Land management.** Any build alternative would contribute to cumulative impacts by contributing criteria air pollutant and hazardous air pollutant emissions to emissions from the land management. Cumulative impacts would include impacts on AQRVs.
- **Energy development.** Any build alternative would contribute to cumulative impacts by contributing criteria air pollutant and hazardous air pollutant emissions to emissions from the energy development activities. Cumulative impacts would include impacts on AQRVs.
- **Construction projects.** The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative impacts related to road paving by contributing criteria air pollutant and hazardous air pollutant emissions. The Tongue River Alternatives and Tongue River Road Alternatives would contribute to cumulative impacts related to leasing the bull pasture subdivision by contributing criteria air pollutant and hazardous air pollutant emissions.

In summary, Tables U-42 and U-43 summarize the contributions of construction and operation of the proposed rail line, construction and operation of the proposed and potentially induced mines, and construction and operation of other projects to criteria air pollutant and hazardous air pollutant emissions. These emissions, when combined with emissions from other sources in and beyond the cumulative impacts study area, would lead to cumulative impacts on ambient air quality and AQRVs.

The contribution of the proposed rail line to cumulative impacts, as assessed based on the BLM modeling studies, would not result in exceedances of ambient air quality standards or PSD increments beyond the area adjacent to the right-of-way. Because coal dust emissions have a small contribution to impairing visibility and NO_x and SO_x emissions would be well below the levels modeled by BLM, it is likely that the visibility and acidic deposition impacts of the proposed rail line would be less than the already minor impacts estimated in the BLM modeling detailed above. Consequently, construction and operation of the proposed rail line

would not contribute cumulatively to major impairment of visibility or to significant acidic deposition.

In summary, construction and operation of any build alternative would result in cumulative impacts on air quality when combined with impacts from proposed and potentially induced coal mines, land management, and energy development. Some build alternatives would result in cumulative impacts on air quality when combined with impacts from existing coal mines, the Tongue River Road paving project, and the bull pasture subdivision. These projects would have to comply with Montana DEQ and other state permits and approvals as well as any BLM-required mitigation measures. OEA concludes that the direct impacts from the proposed rail line, when combined with impacts from past, present, and reasonably foreseeable projects and actions, would result in negligible adverse cumulative impacts on air quality.

Table U-42. Summary of Estimated Criteria Air Pollutants for Construction and Operation (million tons/year)

Project/Activity	Time Period	Criteria Air Pollutant Emissions (million tons/year)							
		CO	NO _x	Pb	PM10	PM2.5	SO ₂	VOC	
Construction									
Proposed or Potentially Induced Mines ^a									
Otter Creek (Northern & Southern Alternatives)	2.5 years	3.61E-04	1.01E-03	4.37E-07	4.26E-05	4.14E-05	1.32E-06	7.95E-05	
Poker Jim Creek–O'Dell Creek (Northern & Southern Alternatives)	2.5 years	1.70E-04	4.76E-04	2.06E-07	2.01E-05	1.95E-05	6.20E-07	3.74E-05	
Canyon Creek (Southern Alternative Only)	2.5 years	2.33E-04	6.54E-04	2.83E-07	2.76E-05	2.68E-05	8.52E-07	5.14E-05	
Other Projects									
Paving of Tongue River Road	1 year	2.10E-03	3.12E-04	4.09E-07	6.91E-06	6.70E-06	1.32E-06	7.44E-05	
Total Construction Emissions		2.86E-03	2.45E-03	1.33E-06	9.72E-05	9.43E-05	4.11E-06	2.43E-04	
Operations									
Existing Mines and Power Plants									
Colstrip Power Plant		2.32E-04	1.44E-03	--	7.30E-05	--	1.84E-03	1.60E-05	
Rosebud		1.37E-03	5.91E-04	--	3.41E-03	--	6.52E-05	3.70E-05	
Spring Creek		--	6.03E-04	--	1.05E-03	--	--	--	
Decker		1.15E-03	7.01E-04	--	1.73E-03	--	7.70E-05	5.60E-05	
Proposed or Potentially Induced Mine ^{b, c}									
Northern/Southern Alternative Low Production									
Otter Creek	20 years	7.07E-04	1.98E-03	8.57E-07	8.36E-05	8.11E-05	2.58E-06	1.56E-04	
Poker Jim Creek–O'Dell Creek	12 years	--	--	--	--	--	--	--	
Canyon Creek	7 years	--	--	--	--	--	--	--	
Northern/Southern Alternative Medium Production									
Otter Creek	20 years	7.07E-04	1.98E-03	8.57E-07	8.36E-05	8.11E-05	2.58E-06	1.56E-04	
Poker Jim Creek–O'Dell Creek	12 years	4.24E-04	1.19E-03	5.14E-07	5.02E-05	4.87E-05	1.55E-06	9.35E-05	
Canyon Creek	7 years	--	--	--	--	--	--	--	

Project/Activity	Time Period	Criteria Air Pollutant Emissions (million tons/year)						
		CO	NO _x	Pb	PM10	PM2.5	SO ₂	VOC
Northern Alternative High Production								
Otter Creek	20 years	1.20E-03	3.37E-03	1.46E-06	1.42E-04	1.38E-04	4.39E-06	2.65E-04
Poker Jim Creek–O'Dell Creek	12 years	5.66E-04	1.59E-03	6.86E-07	6.69E-05	6.49E-05	2.07E-06	1.25E-04
Canyon Creek	7 years	--	--	--	--	--	--	--
Southern Alternative High Production								
Otter Creek	20 years	1.20E-03	3.37E-03	1.46E-06	1.42E-04	1.38E-04	4.39E-06	2.65E-04
Poker Jim Creek–O'Dell Creek	12 years	5.66E-04	1.59E-03	6.86E-07	6.69E-05	6.49E-05	2.07E-06	1.25E-04
Canyon Creek	7 years	7.78E-04	2.18E-03	9.43E-07	9.20E-05	8.92E-05	2.84E-06	1.71E-04
BLM Land Management RMP EIS ^d								
Oil and Gas Development/ Production								
Oil		3.48E-04	1.52E-04	--	3.48E-05	9.30E-06	2.30E-06	7.63E-05
Natural Gas		1.36E-04	5.63E-05	--	8.80E-06	3.20E-06	1.00E-07	3.90E-06
CBNG		5.96E-05	3.01E-05	--	6.70E-06	2.00E-06	0.00E+00	3.90E-06
Coal Mining		2.12E-03	1.82E-03	--	4.45E-03	4.45E-04	1.80E-04	1.44E-05
Vegetation Management		1.13E-05	1.00E-07	--	1.07E-05	1.40E-06	0.00E+00	3.00E-07
Fire Management		1.74E-03	5.83E-05	--	2.11E-04	1.51E-04	1.36E-05	9.70E-06
Forestry and Woodland Products		2.70E-06	3.90E-06	--	1.07E-05	1.30E-06	1.00E-07	0.00E+00
Livestock Grazing		1.13E-05	9.30E-06	--	1.37E-04	1.43E-05	2.00E-07	4.00E-07
Recreation Trails and Travel Management		2.66E-05	1.00E-07	--	2.93E-04	3.01E-05	0.00E+00	2.70E-06
General Purpose BLM Fleet Travel		4.60E-06	1.70E-06	--	7.27E-05	7.30E-06	0.00E+00	2.00E-07
Road Maintenance		5.00E-07	1.20E-06	--	1.40E-06	2.00E-07	0.00E+00	0.00E+00

Project/Activity	Time Period	Criteria Air Pollutant Emissions (million tons/year)						
		CO	NO _x	Pb	PM10	PM2.5	SO ₂	VOC
Other Projects								
Maintenance of Tongue River Road	20 years	1.05E-03	1.56E-04	2.05E-07	3.46E-06	3.35E-06	6.61E-07	3.72E-05
Proposed Rail Line Operation								
2030 Maximum Emissions Scenario ^e	20 + years	2.16E-04	5.23E-04	1.10E-09	2.15E-04	5.73E-05	7.77E-07	2.21E-05
Total Operations Emissions - Low Production Scenario		9.19E-03	8.12E-03	1.06E-06	1.18E-02	8.07E-04	2.18E-03	4.36E-04
Total Operations Emissions - Medium Production Scenario		9.61E-03	9.31E-03	1.58E-06	1.19E-02	8.55E-04	2.18E-03	5.29E-04
Total Operations Emissions - High Production Scenario		1.10E-02	1.33E-02	3.29E-06	1.20E-02	1.02E-03	2.19E-03	8.41E-04
% Tongue River Railroad of Total Emissions - High Production		1.96%	3.94%	0.03%	1.79%	5.63%	0.04%	2.63%
-- = Not Reported								
Notes:								
^a The summary table only includes the high coal production scenario								
^b Assuming years 2021 to 2037 from low and medium production scenarios and years 2025 to 2037 for high production scenarios. During these time periods all mines would be operating based on scenario								
^c These values represent mines operating at full capacity after the first 2 startup years								
^d BLM Land Management RMP EIS data includes both well development and well production								
^e This represents the maximum locomotive, coal dust, and wind erosion emissions from proposed rail line operation in year 2030, high coal production scenario, Tongue River East Alternative								
CO = carbon monoxide; NO _x = nitrogen oxides; Pb = lead; PM10 = particulate matter 10 microns in diameter or less; PM2.5 = particulate matter 2.5 microns in diameter or less; SO ₂ = sulfur dioxide; VOC = volatile organic compound								

Table U-43. Summary of Estimated Hazardous Pollutants for Construction and Operations (tons/year)

Project/Activity	Time Period		Hazardous Air Pollutant Emissions (tons/year)								
			Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	n-Hexane	Toluene	Xylene
Construction											
Proposed or Potentially Induced Mines ^a											
Otter Creek (Northern & Southern Alternatives)	2.5	years	1.92E-02	3.65E-03	2.20E-03	2.62E-03	1.59E-01	4.03E-02	3.58E-03	2.54E-01	3.81E-01
Poker Jim Creek–O'Dell Creek (Northern & Southern Alternatives)	2.5	years	9.01E-03	1.72E-03	1.04E-03	1.23E-03	7.48E-02	1.90E-02	1.69E-03	1.20E-01	1.80E-01
Canyon Creek (Southern Alternatives)	2.5	years	1.24E-02	2.36E-03	1.43E-03	1.70E-03	1.03E-01	2.61E-02	2.32E-03	1.65E-01	2.47E-01
Other Projects											
Paving of Tongue River Road	1	year	3.10E-03	5.91E-04	3.57E-04	4.25E-04	1.49E-01	6.53E-03	5.80E-04	2.38E-01	3.57E-01
Total Construction Emissions			4.37E-02	8.31E-03	5.03E-03	5.98E-03	4.85E-01	9.19E-02	8.16E-03	7.77E-01	1.16E+00
Operations											
Existing Mines and Power Plants											
Colstrip Power Plant			--	--	--	--	--	--	--	--	--
Rosebud			--	--	--	--	--	--	--	--	--
Spring Creek			--	--	--	--	--	--	--	--	--
Decker			--	--	--	--	--	--	--	--	--
Proposed or Potentially Induced Mine ^{b, c}											
Northern/Southern Alternative Low Production											
Otter Creek	20	years	0.04	0.007	0.004	0.005	0.31	0.08	0.007	0.50	0.75
Poker Jim Creek–O'Dell Creek	12	years	--	--	--	--	--	--	--	--	--
Canyon Creek	7	years	--	--	--	--	--	--	--	--	--

Project/Activity	Time Period		Hazardous Air Pollutant Emissions (tons/year)								
			Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	n-Hexane	Toluene	Xylene
Northern/Southern Alternative Medium Production											
Otter Creek	20	years	0.04	0.007	0.004	0.005	0.31	0.08	0.007	0.50	0.75
Poker Jim Creek–O'Dell Creek	12	years	0.02	0.004	0.003	0.003	0.19	0.05	0.004	0.30	0.45
Canyon Creek	7	years	--	--	--	--	--	--	--	--	--
Northern Alternative High Production											
Otter Creek	20	years	0.06	0.01	0.007	0.01	0.53	0.13	0.01	0.85	1.27
Poker Jim Creek–O'Dell Creek	12	years	0.03	0.01	0.003	0.00	0.25	0.06	0.01	0.40	0.60
Canyon Creek	7	years	--	--	--	--	--	--	--	--	--
Southern Alternative High Production											
Otter Creek	20	years	0.06	0.01	0.007	0.01	0.53	0.13	0.01	0.85	1.27
Poker Jim Creek–O'Dell Creek	12	years	0.03	0.01	0.003	0.00	0.25	0.06	0.01	0.40	0.60
Canyon Creek	7	years	0.04	0.01	0.005	0.01	0.34	0.09	0.01	0.55	0.82
BLM Land Management RMP EIS ^d											
Oil and Gas Development/Production											
Oil			--	--	--	--	--	--	--	--	--
Natural Gas		--	--	--	--	--	--	--	--	--	--
CBNG		--	--	--	--	--	--	--	--	--	--
Coal Mining		--	--	--	--	--	--	--	--	--	--
Vegetation Management		--	--	--	--	--	--	--	--	--	--
Fire Management		--	--	--	--	--	--	--	--	--	--
Forestry and Woodland Products		--	--	--	--	--	--	--	--	--	--
Livestock Grazing		--	--	--	--	--	--	--	--	--	--
Recreation Trails and Travel Management		--	--	--	--	--	--	--	--	--	--
General Purpose BLM Fleet Travel		--	--	--	--	--	--	--	--	--	--

Project/Activity	Time Period	Hazardous Air Pollutant Emissions (tons/year)								
		Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Ethylbenzene	Formaldehyde	n-Hexane	Toluene	Xylene
Road Maintenance		--	--	--	--	--	--	--	--	--
Other Projects										
Maintenance of Tongue River Road	20 years	1.55E-03	2.95E-04	1.79E-04	2.12E-04	7.44E-02	3.27E-03	2.90E-04	1.19E-01	1.79E-01
Proposed Rail Line Operations										
2030 Maximum Emissions Scenario ^d	20 + years	0.0059	0.0011	0.0007	0.0008	0.0442	0.0124	0.1216	0.0707	0.1457
Total Operations Emissions - Low Production Scenario		0.04	0.01	0.01	0.01	0.43	0.09	0.13	0.69	1.07
Total Operations Emissions - Medium Production Scenario		0.07	0.01	0.01	0.01	0.62	0.14	0.13	0.99	1.52
Total Operations Emissions - High Production Scenario		0.14	0.03	0.02	0.02	1.24	0.30	0.15	1.98	3.02
% Tongue River Railroad of Total Emissions - High Production		4.12%	4.12%	4.12%	4.12%	3.56%	4.12%	82.62%	3.56%	4.83%

-- = Not Reported

Notes:

^a The summary table only includes the high coal production scenario

^b Assuming years 2021 to 2037 from low and medium production scenarios and years 2025 to 2037 for high production scenarios. During these time periods all mines would be operating based on scenario

^c These values represent mines operating at full capacity after the first 2 startup years

^d BLM Land Management Draft RMP/EIS data includes both well development and well production

^e This represents the maximum locomotive, coal dust, and wind erosion emissions from proposed rail line operation in year 2030, high production scenario, Tongue River East Alternative

U.4.3 Greenhouse Gases and Climate Change

Chapter 5, *Greenhouse Gases and Climate Change*, describes the net life-cycle greenhouse gas (GHG) emissions associated with construction and operation of the proposed rail line and associated coal production, transport, and end-use combustion. Impacts from other projects are not estimated in the analysis because they are generally captured in existing GHG inventories; however, GHG emissions from the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines are not yet captured in existing inventories and were therefore estimated for the Chapter 5 analysis. The analysis also considers changes in life-cycle GHG emissions of coals and natural gas that would be displaced by the increased supply of coal from the proposed rail line. These emissions are based on coal production scenarios explained in Appendix C, *Coal Production and Markets*. Net GHG emissions would depend on the build alternative, coal production levels, and export terminal capacities. Accumulated net GHG emissions from 2018 to 2037 would range from a reduction of 1.7 million metric tons of carbon dioxide equivalent (MMT_{CO₂e}) for northern alternatives¹³ under a scenario of low coal production and zero terminal capacity growth, to an addition of 81 MMT_{CO₂e} for northern alternatives with high coal production and high terminal capacity growth. Net results account for displacement of other coals and natural gas. OEA concludes that the net annual life-cycle emissions would range from a negligible positive impact to a minor adverse impact.

U.4.4 Coal Dust

Operation of the proposed rail line would result in negligible coal dust impacts based on the applicable ambient air quality standards for particulate matter established to protect human health. Any build alternative would contribute to cumulative impacts of fugitive coal dust by adding to impacts from other projects. The other projects are described in Section U.3.3, *Projects Analyzed*. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*. Chapter 6, *Coal Dust*, discusses fugitive coal emitted along rail lines transporting coal. Human health considerations are discussed in Chapter 6, Section 6.3.2, *Coal Dust and Human and Ecological Health*.

OEA defined the study area for coal dust impacts as identical to the air quality study area: the southeastern Montana region comprising Big Horn, Custer, Powder River, and Rosebud Counties, and extending to the nearest Class I and sensitive Class II areas, notably the Northern Cheyenne Indian Reservation. The Class I and sensitive Class II areas are included because impacts on AQRVs are assessed in these areas. However, coal dust concentrations and deposition relative to the NAAQS, Montana AAQS, and deposition guidelines would be

¹³ The northern alternatives consist of the Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives.

within these applicable standards and guidelines. Therefore, the analysis of rail line impacts is limited to the area of actual rail operation, which is a smaller portion of the study area. Concentrations and deposition of coal dust decrease with distance and would be negligible and well within the NAAQS and Montana AAQS. The coal dust cumulative impacts study area is defined as the area where the build alternatives would overlap with the footprint of each of the other projects.

OEA analyzed whether cumulative impacts would result from the addition of impacts from the rail line to impacts from the existing, proposed, and potentially induced mines. OEA assumed that coal dust emissions from proposed and potentially induced mines would be similar to those from existing mines. Based on the results of the existing mines' particulate matter monitoring programs and modeled concentrations that would be attributed to operations of the proposed rail line, OEA determined that cumulative ambient concentrations would be unlikely to cause a violation of the NAAQS or Montana AAQS in the cumulative impacts study area.

In summary, construction and operation of any build alternative would result in cumulative coal dust impacts when combined with impacts from existing, proposed, and potentially induced coal mines. These projects would have to comply with Montana DEQ and other state permits and approvals as well as any BLM-required mitigation measures. OEA concludes that the direct impacts from the proposed rail line, when combined with impacts from past, present, and reasonably foreseeable projects and actions, would result in negligible adverse cumulative impacts from coal dust, but recognizes that there could be minor cumulative nuisance impacts.

U.4.5 Noise and Vibration

Construction and operation of the proposed rail line would result in impacts on sensitive noise receptors. Any build alternative would contribute to cumulative impacts on noise and vibration by adding to impacts from other projects. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and noise and vibration is described in Chapter 7, *Noise and Vibration*. OEA defined the study area for impacts from the proposed rail line on noise and vibration as the area within approximately 2 miles of the build alternative rights-of-way and the Colstrip Subdivision between the Colstrip Alternatives and the junction of the subdivision with the BNSF main line (Chapter 7, Section 7.2, *Study Area*). The cumulative impacts study area is consistent with this study area.

Although some of the projects described in Section U.3.3, *Projects Analyzed* would include actions that would increase noise levels, the noise impact areas of these projects and actions and the noise impact areas of the proposed rail line would not overlap because of the localized nature of noise impacts. Therefore, no further analysis of cumulative impacts on noise and vibration is warranted and no cumulative noise and vibration impacts would result.

U.4.6 Biological Resources

U.4.6.1 Vegetation

Construction and operation of the proposed rail line would result in the following vegetation impacts: permanent vegetation loss from clearing and fill placement, constraints to plant germination and growth through soil compaction and erosion, contributions to the spread of noxious weeds, effects on plant growth through dust deposition, increased risk of wildfires, altered riparian and floodplain vegetation through altered hydrology, and altered vegetation communities as a result of maintenance activities (referred to hereafter as the *common vegetation impacts*). Any build alternative would contribute to cumulative impacts on vegetation by adding to impacts from other projects. The following subsections describe the impacts of these other projects and how impacts from the proposed rail line, when added to the impacts of these projects, would result in cumulative impacts on vegetation.

The other projects are described in Section U.3.3, *Projects Analyzed*. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and vegetation is described in Chapter 8, Section 8.2, *Vegetation*. OEA defined the study area for impacts of the proposed rail line on vegetation as vegetation cover within 5 miles on each side of the centerline of each build alternative (a 10-mile corridor). The quantitative analysis focuses on impacts within the right-of-way (Chapter 8, Section 8.2.1, *Study Area*). The vegetation cumulative impacts study area is consistent with this study area and focuses on those areas where the proposed rail line study area overlaps the footprints of the other projects.

Existing Coal Mines and Colstrip Power Plant

Existing Coal Mines and Colstrip Power Plant Impacts on Vegetation

The RFD area for the Rosebud Mine and Colstrip Power Plant is outside of the cumulative impacts study area and this mine and power plant would not contribute to cumulative impacts on vegetation.

The existing coal mines and Colstrip Power Plant are already operating in the vegetation cumulative impacts study area. Continued development of the Spring Creek and Decker Mines would continue to affect vegetation as mining progresses into the mines' RFD areas, which partially overlap the cumulative impacts study area. Mining and reclamation would result in the common vegetation impacts. The dominant undisturbed vegetation communities in the overlap areas include sagebrush steppe (2,252 acres) and lowland prairie/grassland (766 acres). The remaining vegetated areas in the overlap consist of conifer-dominated forest and woodlands (33 acres), floodplain and riparian (35 acres), and deciduous dominated forest and woodland (12 acres).

Vegetation removal does not occur all at once because mining slowly progresses and plant and vegetation reclamation is required (MCA 82-4 Part 2). Reclamation includes planting

and revegetating mined lands under a plan approved by the Montana DEQ “to make those lands capable of supporting the uses that those lands were capable of supporting prior to any mining or to higher or better uses.” Reclamation occurs concurrently with mining and the reestablished plant and vegetation communities must include native plant species that are at least equal in extent and cover to the natural vegetation in the area, have the same growth characteristics as the original vegetation, and are compatible with plant and animal species in the area (MCA 82-4-233). At the end of each mine life, all disturbed mining areas will have been reclaimed and vegetation communities reestablished (MCA 82-4 Part 2).

Contribution of the Build Alternatives to Cumulative Impacts on Vegetation

The Colstrip Alternatives would be constructed and would operate near the Rosebud Mine and Colstrip Power Plant. Mine and power plant operations would continue during construction and operation of the build alternative. The Decker Alternatives would be constructed and would operate near the Spring Creek and Decker Mines. Mine operations would continue during construction and operation of the build alternatives; coal transport from the mines would coincide with operation of the build alternatives.

The build alternatives would result in the common vegetation impacts. The impacts of the build alternatives, when added to the impacts of the existing coal mines, would result in cumulative impacts on vegetation.

Proposed and Potentially Induced Coal Mines

Proposed and Potentially Induced Coal Mine Impacts on Vegetation

The proposed and potentially induced mines would be constructed and would operate in the vegetation cumulative impacts study area. Development of the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines would affect approximately 4,714 acres, 17,560 acres, and 11,644 acres of vegetation, respectively, within the cumulative impacts study area (Table U-44). These impacts assume the entire mine areas would be disturbed at some point during the life of the mines. The mining and reclamation process and applicable statute for the three mines would be the same as described for the Rosebud, Spring Creek, and Decker Mines, as would the common vegetation impacts during mining and reclamation. The extent and degree of these impacts would be based on the acreages of vegetation within the mine boundaries (Table U-44).

When mine reclamation is complete, compliance with MCA 82-4 Part 2 will reestablish vegetation.

Table U-44. Impacts on Vegetation from Proposed and Potentially Induced Mining in Cumulative Impacts Study Area (acres)

Vegetation Cover Class	Otter Creek Mine	Poker Jim Creek – O’Dell Creek Mine	Canyon Creek Mine
Lowland/prairie grassland	2,389	8,294	4,634
Sagebrush steppe	820	2,894	2,070
Conifer-dominated forest and woodland	122	2,058	3,840
Bluff, badland, and dune	1,282	2,962	514
Agriculture	39	277	<1
Floodplain and riparian	59	617	68
Recently burned	1,408-	443	486
Scrub and dwarf shrubland	-	-	2
Deciduous shrubland	-	5	-
Herbaceous marsh	1	<1	-
Montane grassland	-	-	8
Deciduous-dominated forest and woodland	2	10	22
Total	4,714	17,560	11,644
Notes:			
Source: Montana Natural Heritage Program 2013			

Contribution of the Build Alternatives to Cumulative Impacts on Vegetation

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would provide access to the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek Mine. The construction start and completion dates for the proposed Otter Creek Mine would depend on the construction schedule for the proposed rail line. The Decker Alternatives would provide access to the proposed Otter Creek Mine and to the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines. The Decker Alternatives would be the only build alternatives that would provide access to the potentially induced Canyon Creek Mine.

The impacts of the build alternatives would result in the common vegetation impacts. The addition of these impacts to the impacts of the proposed and potentially induced mining projects would result in cumulative impacts on vegetation during the mining and reclamation process.

Land Management

Land Management Impacts on Vegetation

Fort Keogh Livestock and Range Research Laboratory

Fort Keogh is an operating land management project that addresses cattle management and grazing. The majority of Fort Keogh consists of native rangeland that is dominated by lowland/prairie grassland and sagebrush steppe vegetation. Smaller areas of conifer-dominated forest and woodland; bluff, badland, and dune; and floodplain and riparian vegetation cover are scattered across Fort Keogh. A small section consists of agricultural areas associated with irrigated pastures, irrigated cropland, dryland planted pasture, and cattle grazing. The vast majority of Fort Keogh is in a natural state, with agricultural research activities confined to areas between the Yellowstone River and I-94, and along the west side of the Tongue River. Although future activities at Fort Keogh would consist of continued and new research projects in areas where research activities already occur, no planned activities would develop or disturb Fort Keogh beyond its current condition because the facility is protective of its natural state. Continued operation of Fort Keogh would result in permanent vegetation loss, constrained plant germination and growth, the spread of noxious weeds and altered vegetation communities.

Tongue River Reservoir State Park

The proposed Tongue River Reservoir State Park project would renovate the Pee Wee Point North, Pee Wee Point South, and Sandpoint campgrounds. The Tongue River Reservoir State Park supports a mix of vegetation, including lowland/prairie grassland, scrub and dwarf shrubland, floodplain and riparian, conifer-dominated forest and woodland, deciduous-dominated forest and woodland, and sagebrush steppe vegetation. The MEPA/NEPA Checklist indicates that there would be minor impacts on vegetation diversity, productivity, or abundance; alteration of plant communities; and establishment or spread of noxious weeds. Impacts would include permanent vegetation loss from clearing and fill placement, the spread of noxious weeds, and altered vegetation communities because of maintenance activities.

BLM Resource Management Plan

The BLM Draft RMP/EIS would continue current management activities and identify new facilities or management strategies. The BLM Draft RMP/EIS addresses livestock grazing, wildlife habitat, special-designation areas, special recreation areas, national trails, and wilderness study areas. The BLM-administered lands in the cumulative impacts study area are dominated by lowland/prairie grassland and sagebrush steppe vegetation, with small, scattered areas of forest and woodland; bluff, badland, and dune; and floodplain and riparian vegetation. The BLM Draft RMP/EIS states that historical and ongoing activities on BLM-administered lands that have affected, or are currently affecting, vegetation include energy

and mineral development, livestock grazing, on- and off-highway vehicle use, recreation, infrastructure development, fire suppression, fuels management, forestry, urbanization, invasive weed infestations, pollutants, and agriculture; these impacts are expected to continue into the future. A range of surface-disturbing activities would occur on BLM-administered lands under the BLM Draft RMP/EIS, including mineral and energy exploration, leasing, development (including renewable energy and geophysical exploration), vehicle use, rights-of-way development, land use, infrastructure development, vegetation or fuel treatment (including the sale or harvest of hay, timber, wood, or seed), establishment of wildfire fuel breaks, and implementation of a range of improvements. These activities would result in the common vegetation impacts. The extent and degree of these impacts would depend on the amount of disturbance these activities would cause on the BLM-administered lands in the cumulative impacts study area and the measures implemented to reduce impacts. The preferred alternative in the BLM Draft RMP/EIS lists several mitigation measures and requirements to reduce impacts on vegetation.

Beaver Creek Landscape Management Project

Implementation of the Beaver Creek LMP would promote a healthier and more resilient ponderosa pine ecosystem on 14,000 acres of forest by using large tree removal, fire applications, and selective vegetation thinning. These practices would promote fires that are of lower intensity and less severe than those caused by stand replacement fires. The Beaver Creek LMP is outside of the vegetation cumulative impacts study area. Therefore, no additional analysis of cumulative impacts on vegetation is warranted.

Contribution of the Build Alternatives to Cumulative Impacts on Vegetation

Fort Keogh Livestock and Range Research Laboratory

The Tongue River Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be constructed and operate near where research activities occur in Fort Keogh. The addition of common vegetation impacts from these build alternatives to the impacts of the ongoing use of Fort Keogh would result in cumulative impacts on vegetation. These impacts would be confined to areas where research activities already occur.

Tongue River Reservoir State Park

The Decker Alternatives would be constructed and would operate near the Tongue River Reservoir State Park. The addition of impacts from the Decker Alternatives to the impacts of the renovations at Tongue River Reservoir State Park would result in cumulative impacts on vegetation.

BLM Resource Management Plans

Any build alternative would be constructed and operate in landscapes affected by land management practices under the BLM Draft RMP/EIS. The addition of impacts from the build alternatives to the impacts from the BLM Draft RMP/EIS would result in cumulative impacts on vegetation. The extent and degree of these impacts would depend on the amount of vegetation disturbance in the cumulative impacts study area and the measures implemented to reduce impacts.

Energy Development

Energy Development Impacts on Vegetation

The BLM Draft RMP/EIS would promote oil and natural gas projects on 5.4 million acres of leased land in Rosebud, Custer, Powder River, and Big Horn Counties (the four-county area). OEA estimated that 1,158 CBNG wells would be developed between 2011 and 2030, and considers this estimate much higher than the number of wells that will be permitted and completed. It should be noted that none of the currently approved wells would be in the project area or near the build alternatives (Section U.3.3.4, *Energy Development*). In addition to well development on BLM-administered lands, oil and gas exploration and development continues throughout southeastern Montana on federal, state, tribal, and private lands.

The dominant vegetation in the cumulative impacts study area, which has low development potential, is lowland/prairie grassland and sagebrush steppe. Where development potential is higher, there are areas of conifer-dominated forest and woodland vegetation. Well development and reclamation would result in the common vegetation impacts. The extent and degree of these impacts would depend on the number, size, and location of the wells developed in the cumulative impacts study area.

All gas and oil projects, whether on federal or nonfederal land, must implement proper reclamation procedures when the wells are abandoned (MCA 82-10-400 *et seq.*). BLM also requires reclamation of oil and gas wells on BLM-administered lands. Reclamation is successful when a self-sustaining, diverse plant community is established with a density that will control erosion and nonnative plant invasion. BLM's ultimate objective is ecosystem restoration, including restoration of natural vegetation communities. The preferred alternative in the BLM Draft RMP/EIS lists several mitigation measures and requirements to reduce impacts on vegetation.

Contribution of the Build Alternatives to Cumulative Impacts on Vegetation

Any build alternative would be constructed and operate in landscapes affected by oil and gas development, whether on federal or nonfederal lands. Most of the region around the northern

build alternatives has a low potential for oil and gas development. There is moderate potential for development along the Decker Alternatives.

Construction of any build alternative would result in vegetation impacts. The addition of vegetation impacts from the build alternatives to vegetation impacts from energy development would result in cumulative impacts on vegetation.

Construction Projects

Construction Project Impacts on Vegetation

Tongue River Road Paving

The 32.7-mile paving project proposed for Tongue River Road would result in the removal or alteration of vegetation adjacent to the existing roadway. Vegetation along Tongue River Road between RP 17.7 and RP 50.4 is dominated by lowland/prairie grassland and sagebrush steppe vegetation. While construction, maintenance, and use of the road has already removed vegetation in the right-of-way and disturbed it by creating conditions for invasive species infestation, paving, and any road right-of-way widening would contribute additional impacts. Any proposed widening activities would encroach on and remove vegetation adjacent to the existing road right-of-way. Road paving would result in the common vegetation impacts. The extent and degree of these impacts would depend on the location, width, and distance of road widening that would occur.

Bull Pasture Subdivision Leasing

Leasing the 38.5-acre bull pasture subdivision would lead to land disturbance activities that would affect vegetation. Vegetation in the bull pasture subdivision consists of agriculture (cultivated crops). While the area is already disturbed by agricultural practices, any construction of buildings, roads, parking lots, or other infrastructure would completely remove vegetation within the footprints of those facilities. Leasing and development of the bull pasture subdivision would result in the common vegetation impacts. The extent and degree of vegetation impacts would depend on future uses of the parcel, including construction of new infrastructure.

Contribution of the Build Alternatives to Cumulative Impacts on Vegetation

Tongue River Road Paving

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be crossed by the paving project. The addition of impacts from the build alternatives to the impacts the paving project would result in cumulative impacts on vegetation. The extent and degree of vegetation impacts would depend on the

location, width, and distance of road widening and the measures implemented to reduce impacts.

Bull Pasture Subdivision Leasing

The Tongue River Alternatives and Tongue River Road Alternatives would be closest to the Bull Pasture Subdivision Leasing project. The addition of impacts from the build alternatives to the impacts from leasing the bull pasture subdivision and potential development would result in cumulative impacts on vegetation. The extent and degree of vegetation impacts would depend on the activities on the subdivision parcel, the amount of disturbance caused by the activities, and the measures implemented to reduce impacts.

Cumulative Impact Summary: Vegetation

The proposed rail line would affect vegetation and would combine with impacts from the other projects to result in cumulative impacts on vegetation in the study area. The contribution of the proposed rail line to cumulative impacts is summarized as follows.

- **Existing coal mines and Colstrip Power Plant.** The Colstrip Alternatives and Decker Alternatives would contribute to cumulative impacts on vegetation such as permanent vegetation loss from clearing and fill placement, constraints to plant germination and growth through soil compaction and erosion, contributions to the spread of noxious weeds, effects on plant growth through dust deposition, increased risk of wildfires, altered riparian and floodplain vegetation through altered hydrology, and altered vegetation communities as a result of maintenance activities. When mine reclamation is complete, compliance with MCA 82-4 Part 2 will re-establish vegetation.
- **Proposed and potentially induced coal mines.** Any build alternative would contribute to cumulative impacts on vegetation as described above for existing coal mines. When mine reclamation is complete, compliance with MCA 82-4 Part will re-establish vegetation.
- **Land management.** The Tongue River Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative impacts related to Fort Keogh such as permanent vegetation loss, constrained plant germination and growth, the spread of noxious weeds, and altered vegetation communities. The Decker Alternatives would contribute to similar cumulative impacts related to Tongue River Reservoir State Park renovation. Any build alternative would contribute to similar cumulative impacts on vegetation related to BLM Draft RMP/EIS land management plans.
- **Energy development.** Any build alternative would contribute to cumulative impacts of BLM and other energy development such as permanent vegetation loss, constraints to plant germination and growth, the spread of noxious weeds, effects on plant growth, increased risk of wildfires, altered riparian and floodplain vegetation, and altered vegetation communities.

- **Construction projects.** The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative impacts related to Tongue River Road paving such as permanent vegetation loss, constraints to plant germination and growth, the spread of noxious weeds, effects on plant growth, increased risk of wildfires, altered riparian and floodplain vegetation, and altered vegetation communities. The Tongue River Alternatives and Tongue River Road Alternatives would contribute to similar cumulative impacts on vegetation related to leasing the bull pasture subdivision.

In summary, construction and operation of any build alternative would result in cumulative impacts on vegetation when combined with impacts from proposed and potentially induced coal mines, land management, and energy development. Some build alternatives would result in cumulative impacts on vegetation when combined with impacts from existing coal mines, Fort Keogh activities, Tongue River Reservoir State Park renovations, Tongue River Road paving project, and bull pasture subdivision leasing. These projects would have to comply with Montana DEQ and other state permits and approvals as well as BLM-required mitigation measures. OEA concludes that the direct impacts from the proposed rail line, when combined with impacts from past, present, and reasonably foreseeable projects and actions, would result in minor adverse cumulative impacts on vegetation.

U.4.6.2 Wildlife

Construction and operation of the proposed rail line would result in the wildlife impacts of increased mortality rates, habitat loss, habitat degradation, habitat alteration, habitat fragmentation, displacement of wildlife, creation of barriers to movement, and changes in species composition (referred to hereafter as the *common wildlife impacts*). Any build alternative would contribute to cumulative impacts on wildlife by adding to impacts from other foreseeable projects. The following subsections describe the impacts of other projects and how potential impacts from the proposed rail line, when added to the impacts of these projects, would result in cumulative impacts on wildlife.

The other projects are described in Section U.3.3, *Projects Analyzed*. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and wildlife is described in Chapter 8, Section 8.3, *Wildlife*. OEA defined the study area for impacts of the proposed rail line on wildlife as the rights-of-way for the build alternatives plus the following distances from the right-of-way edge: 0.5 mile (small species such as amphibians and reptiles), 1 mile (medium-sized mammals and bird species), 2 miles (raptors and large species such as big game), and 4 miles (sharp-tailed grouse leks) (Chapter 8, Section 8.3, *Wildlife*). The wildlife cumulative impacts study area is defined as the areas where the 2-mile study area for wildlife overlaps with the areas of potential impact of each of the other projects. The study areas are different because OEA took a conservative approach for the cumulative impacts analyses by using the 2-mile study area and by examining those areas of overlap to ensure that all impacts to general wildlife were considered.

Existing Coal Mines and Colstrip Power Plant

Existing Coal Mines and Colstrip Power Plant Impacts on Wildlife

The existing coal mines and Colstrip Power Plant are already operating in the wildlife cumulative impacts study area.

Rosebud Mine

The Rosebud Mine area contains mule deer high-value winter range (Montana Fish, Wildlife & Parks 2013c). Current mine operations involve both surface disturbances and reclamation activities and some reclaimed areas do provide habitat. In 2012, mining activities and infrastructure had disturbed 17,674 acres while 14,022 acres were in various stages of reclamation (Western Energy Company 2013).

Contractors for the Rosebud Mine have monitored wildlife as part of their mine monitoring plan since the early 1970s. In recent years, annual surveys have been conducted for big game, upland game birds (primarily sharp-tailed grouse), raptors, and breeding birds. Overall, wildlife species using habitats adjacent to mine activities are similar to those observed by OEA because the available habitats are mostly the same.

- **Large ungulates.** Mule deer and antelope are the most common big game species observed, but elk and white-tailed deer are also documented in most years. In 2013, mule deer density was approximately 1.4 deer per square mile and antelope density was 0.6 antelope per square mile. These findings are consistent with regional data and with data from the wildlife study area.
- **Grouse leks.** Fifty-six sharp-tailed grouse leks are monitored annually for the Rosebud Mine, including 29 confirmed active, 19 confirmed inactive, and 8 confirmed extirpated (mining has destroyed the leks). In spring 2013, 2 potential new leks were identified and 18 known leks were active. These leks had a peak male count of 205 and an average of 11.4 males per lek.
- **Raptors.** One hundred six raptor nests have been monitored annually since 2003; however, due to the long-term nature of this dataset, some nests have been destroyed by natural causes and 63 nests remained in 2013. Six nests were active in 2013: four red-tailed hawk nests, one great horned owl nest, and one osprey nest. One red-tailed hawk nest was confirmed successful (ICF International 2014).

Spring Creek Mine

The Spring Creek Mine area includes shrubland, grassland, riparian, woodland, seeded and reclaimed grasslands, and agricultural habitat. Sandstone outcrops and clay cliffs are also present within the area (Thunderbird Wildlife Consulting 2013). The Spring Creek Mine area overlaps with designated high-value winter range for mule deer, white-tailed deer, and antelope (Montana Fish, Wildlife & Parks 2013b, 2013c, 2013d). Current mine operations

involve both surface disturbances and reclamation activities, and some reclaimed areas do provide habitat. In 2012, mining activities and infrastructure had disturbed 4,059 acres, while 3,086 acres were in various stages of reclamation (Cloud Peak Energy 2013).

Contractors for the Spring Creek Mine have monitored wildlife as part of their mine monitoring plan since the early 1980s. In recent years, annual surveys have been conducted for big game, raptors, sharp-tailed grouse leks and broods, waterfowl, bats, amphibians, and reptiles. Overall, wildlife species using habitats adjacent to mine activities are similar to those observed by OEA because the available habitats are mostly the same.

- **Large ungulates.** Mule deer and antelope are the primary big game species observed in the Spring Creek Mine area. In 2012, mule deer density was approximately 1.9 deer per square mile and antelope density was 3.2 antelope per square mile (Thunderbird Wildlife Consulting 2013). These findings are consistent with regional data but are higher than what OEA documented in 2013. Mule deer densities would be expected to be higher in the Spring Creek Mine area compared to regional numbers as the area lies almost completely in high-value winter range. Mule deer in the surrounding areas would be attracted to this area by the high-value habitat. Antelope population trend data is consistent in that both the region and the mine area have seen a substantial increase in antelope in the last 3 years (Montana Fish, Wildlife & Parks 2011, 2012, 2013a; Thunderbird Wildlife Consulting 2013).
- **Grouse leks.** Fifteen sharp-tailed grouse leks are monitored annually for the Spring Creek Mine. Six sharp-tailed grouse leks were active in 2012 with a peak male count of 40.
- **Raptors.** Fifty-seven raptor nests have been monitored annually; however, due to the long term nature of this dataset, some nests have been destroyed by natural or mine-related causes. Thirty nests were still present in 2012. Twelve nests were active in 2012: five red-tailed hawk nests, four osprey nests, and one great horned owl nest. All nests were successful (Thunderbird Wildlife Consulting 2013).

Decker Mine

The Decker Mine area includes riparian, woodland, shrubland, grassland, and agricultural habitat (Decker Coal Company 2013a). The Decker Mine area overlaps with designated high-value winter range for mule deer and white-tailed deer (Montana Fish, Wildlife & Parks 2013c, 2013d). Current mine operations involve both surface disturbances and reclamation activities, and some reclaimed areas do provide habitat. In 2012, mining activities and infrastructure had disturbed 7,733 acres, while 2,449 acres were in various stages of reclamation (Decker Coal Company 2013b).

Contractors for the Decker Mine have monitored big game, small and medium-sized mammals (including predators), raptors, sharp-tailed grouse leks, waterfowl, breeding birds, reptiles, and amphibians. Overall, wildlife species using habitats adjacent to mine activities are similar to those observed by OEA because available habitats are mostly the same.

- **Large ungulates.** Mule deer and antelope are commonly seen in the mine area, but white-tailed deer are often documented in areas near the Tongue River or in reclaimed areas. Over recent years, mule deer populations have declined in the mine area, which is consistent with regional population fluctuations. Antelope populations have increased within the mine area, which is also consistent with regional population fluctuations.
- **Grouse leks.** Nine sharp-tailed grouse leks are monitored annually for the Decker Mine. Three of those leks were active in 2013 with a peak male count of 16 (Decker Coal Company 2013a).
- **Raptors.** Seven osprey nests were active in the Decker Mine area in 2013 and at least three of those were successful.

Ongoing mining at the existing mines result in the common wildlife impacts of habitat loss (29,466 acres in 2012), habitat degradation due to increased dust and noise levels, and habitat alteration due to mining and subsequent revegetation of mined areas (18,075 acres in 2012). Clearing activities and noise associated with mining activities result in species displacement and avoidance of highly active areas. Also, the disturbance and associated infrastructure presents barriers to movement for wildlife species. The impacts associated with mining would continue to occur in association with mine operations. All mines have monitoring and reclamation plans in place to monitor these impacts and to avoid or reduce them (MCA 82-4 Part 2).

Contribution of the Build Alternatives to Cumulative Impacts on Wildlife

The Colstrip Alternatives would be constructed and operate near the Rosebud Mine and Colstrip Power Plant. The Decker Alternatives would be constructed and would operate near the Spring Creek and Decker Mines. Mine and power plant operations would continue during construction and operation of the build alternatives.

The addition of impacts from the build alternatives to the impacts of the coal mines would result on cumulative impacts on wildlife such as changing species distribution and species diversity in the cumulative impacts study area.

Proposed and Potentially Induced Coal Mines

Proposed and Potentially Induced Coal Mine Impacts on Wildlife

The proposed and potentially induced mines would be constructed and would operate in the wildlife cumulative impacts study area.

Proposed Otter Creek Mine

The development of the proposed Otter Creek Mine would affect primarily riparian, grassland, and shrubland habitats and would result in habitat loss, degradation, and alteration of high-value winter range for white-tailed deer, mule deer, and antelope. Approximately 81

percent of the proposed mine permit area overlaps high-value winter range for white-tailed deer, 56 percent overlaps high-value winter range for mule deer, and 40 percent overlaps high-value winter range for antelope (Montana Fish Wildlife and Parks 2013b, 2013c, 2013d). Thirty-four sharp-tailed grouse leks within 4 miles of the proposed mine disturbance area would be affected (Montana Fish Wildlife and Parks 2013e). Suitable raptor nesting habitat would be affected primarily in riparian and woodland habitats, where most nests are located. Five raptor nests occur within 2 miles of the proposed mine disturbance area include prairie falcon and red-tailed hawk nests (Bureau of Land Management 2013; Farmer 2012). Raptor foraging habitat would also be affected throughout the cumulative impacts study area.

Potentially Induced Poker Jim Creek–O’Dell Creek Mine

The development of the potentially induced Poker Jim Creek–O’Dell Creek Mine area would greatly affect riparian habitats because the coal deposit lies immediately adjacent to the Tongue River and would result in -habitat loss, degradation, and alteration of high-value winter range for white-tailed deer, mule deer, and antelope. Approximately 84 percent of the coal tract overlaps high-value winter range for white-tailed deer, 79 percent overlaps high-value winter range for mule deer, and 30 percent overlaps high-value winter range for antelope (Montana Fish Wildlife and Parks, 2013b, 2013c, 2013d). Thirty-one sharp-tailed grouse leks are known to exist within 4 miles of the area (Montana Fish Wildlife and Parks 2013e). Mine development would affect suitable raptor nesting habitat and 12 raptor nests, including great horned owl, red-tailed hawk, American kestrel, Cooper’s hawk, and long-eared owl nests (Bureau of Land Management 2013). Mine development would also affect raptor foraging habitat.

Potentially Induced Canyon Creek Mine

The development of the potentially induced Canyon Creek Mine area would affect primarily woodland and grassland habitats and would result in habitat loss, degradation, and alteration of high-value winter range for white-tailed deer and mule deer. Approximately 12 percent of the coal tract overlaps high-value winter range for white-tailed deer and 56 percent overlaps high-value winter range for mule deer (Montana Fish Wildlife and Parks 2013c, 2013d). Thirty-seven sharp-tailed grouse leks are known to exist within 4 miles of the mine area (Montana Fish Wildlife & Parks 2013e). Mine development would affect suitable raptor nesting habitat and 31 raptor nests, including great horned owl, red-tailed hawk, and prairie falcon nests (Bureau of Land Management 2013). Mine development would also affect raptor foraging habitat.

Impacts of the proposed and potentially induced mines would be reduced through compliance with the reclamation requirements of MCA 82-4 Part 2.

Contribution of the Build Alternatives to Cumulative Impacts on Wildlife

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would provide access to the proposed Otter Creek Mine and the

potentially induced Poker Jim Creek–O’Dell Creek Mine. The construction start and completion dates for the proposed Otter Creek Mine would depend on the construction schedule for the proposed rail line. The Decker Alternatives would provide access to the proposed Otter Creek Mine and to the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines. The Decker Alternatives would be the only build alternatives that would provide access to the potentially induced Canyon Creek Mine.

The build alternatives would result in the common wildlife impacts. The addition of these impacts to the impacts of the proposed and potentially induced mines could result in cumulative impacts on wildlife species. Also, changes to species distribution and diversity would result due to the additional impacts to species movement and higher mortality rates especially in small mammals, amphibians, and reptiles.

Land Management

Land Management Impacts on Wildlife

Fort Keogh Livestock and Range Research Laboratory

Fort Keogh is an operating land management project that addresses cattle management and grazing. The management practices of Fort Keogh affect wildlife species through habitat loss and alteration for hay production and experimental manipulation of vegetation. However, these impacts are limited to specific areas and associated with specific grazing projects. Historically, this region evolved with large, grazing herbivores (such as bison and deer) and when livestock grazing practices mimic this natural grazing, it can promote nutrient cycling, soil development, soil biodiversity, and vegetative ground cover. The production and storage of hay and grain for livestock can be beneficial to wildlife such as big game, upland game birds, seed-eating birds, and small mammals, as it provides a readily available food source. Grazing cattle do degrade habitat by trampling and trailing, which reduces ground cover and exposes soil to erosion and invasive plants. Also, cattle spend a disproportionate amount of time in riparian habitats and can be particularly damaging to these habitats. Fences used in cattle operations constrain movement in some wildlife populations, such as antelope. Fencing is also a collision hazard for birds that fly low to the ground, particularly in low light levels, such as nocturnal owl seeking prey. In general, management practices would not contribute to cumulative impacts on wildlife. Fort Keogh is already in existence, management activities have been ongoing since the 1930s, and Fort Keogh strives to maintain the natural state of the environment. Therefore, no additional analysis of cumulative impacts on wildlife is warranted.

Tongue River Reservoir State Park

The proposed Tongue River Reservoir State Park project would renovate the Pee Wee Point North, Pee Wee Point South, and Sandpoint campgrounds. The renovation at Tongue River Reservoir State Park would affect wildlife species by causing habitat loss or degradation

from facility installation. Human presence and activities encouraged by the renovations would disturb and displace species. However, based on the conclusions of the MEPA/NEPA Checklist, the Tongue River Reservoir State Park would not affect wildlife. Therefore, no additional analysis of cumulative impacts on wildlife is warranted.

BLM Resource Management Plan

The BLM Draft RMP/EIS would continue current management activities and identify new facilities or management strategies. The BLM Draft RMP/EIS addresses livestock grazing, wildlife habitat, special-designation areas, special recreation areas, national trails, and wilderness study areas. Changes to land management practices on BLM-administered lands would affect wildlife species. The BLM Draft RMP/EIS would increase areas available for livestock grazing and agriculture, affecting wildlife habitat and especially riparian areas. The objectives of the BLM Draft RMP/EIS include enhancing and protecting wildlife habitat, identifying special-designation areas and special recreation areas, and establishing national trails and wilderness study areas. The BLM preferred alternative would allow for the use of public lands and resources while protecting and enhancing wildlife habitat.

Beaver Creek Landscape Management Project

The Beaver Creek LMP is outside of the cumulative impacts study area. Therefore, no additional analysis of cumulative impacts on wildlife is warranted.

Contribution of the Build Alternatives to Cumulative Impacts on Wildlife

BLM Resource Management Plans

Any build alternative would operate in landscapes affected by land management practices under the BLM Draft RMP/EIS. The addition of impacts from the build alternatives to the impacts of the BLM land management would result in cumulative impacts on wildlife. If BLM increased lands allotted to agriculture and grazing, cumulative impacts would include habitat loss and degradation, especially in riparian areas.

Energy Development

Energy Development Impacts on Wildlife

The BLM Draft RMP/EIS would promote oil and natural gas projects on 5.4 million acres of leased land in Rosebud, Custer, Powder River, and Big Horn Counties (the four-county area). OEA estimated that 1,158 CBNG wells would be developed between 2011 and 2030, and considers this estimate much higher than the number of wells that will be permitted and completed. It should be noted that none of the currently approved wells would be in the project area or near the build alternatives (Section U.3.3.4, *Energy Development*). In addition to well development on BLM-administered lands, oil and gas exploration and

development continues throughout southeastern Montana on federal, state, tribal, and private lands.

Impacts on wildlife from energy development include the common wildlife impacts. Impacts on habitats result from vegetation removal for road construction, pad installation, and ditch-digging. Species displacement due to noise occurs during construction and drilling activities and from continuous mechanical well operations. Mortality rates generally increase in conjunction with oil and gas development especially in smaller species that have more difficulty escaping the vegetation-clearing activities. Specific disturbance areas vary depending on type of development, type of well used, and the needed infrastructure for development and production. The lifespan of a project would also vary and would depend on many factors.

All gas and oil projects, whether on federal or nonfederal land, must implement proper reclamation procedures when the wells are abandoned (MCA 82-10-400 *et seq.*). BLM also requires reclamation of oil and gas wells on BLM-administered lands.

Contribution of the Build Alternatives to Cumulative Impacts on Wildlife

Any build alternative would be constructed and operate in landscapes affected by oil and gas development, whether on federal or nonfederal lands. Most of the region around the northern build alternatives has a low potential for oil and gas development. There is moderate potential for development along the Decker Alternatives.

The build alternatives would result in the common wildlife impacts, although such impacts would be reduced by timing stipulations, wildlife monitoring, and coordination with state agencies. In addition, none of the currently approved wells would be in the project area or near the build alternatives (Section U.3.3.4, *Energy Development*). The addition of impacts from the build alternatives to impacts from energy development would result in cumulative impacts on wildlife.

Construction Projects

Construction Project Impacts on Wildlife

Tongue River Road Paving

The 32.7-mile paving project proposed for Tongue River Road would have impacts on wildlife or wildlife habitat. Wildlife mortality might increase along Tongue River Road as vehicle speeds or traffic volume increase. However, the Tongue River Road is already in existence and the local wildlife population has habituated to traffic conditions. During construction, the right-of-way would be widened in places, causing additional habitat loss. Paving of this mostly dirt and gravel road would lessen dust impacts, making forage close to the road more suitable for wildlife.

Bull Pasture Subdivision Leasing

The Bull Pasture Subdivision Leasing project is outside of the cumulative impacts study area. Therefore, no additional analysis of cumulative impacts on wildlife is warranted.

Contribution of the Build Alternatives to Cumulative Impacts on Wildlife

Tongue River Road Paving

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be crossed by the paving project. The addition of impacts from the build alternatives to impacts from the road paving project would result in cumulative impacts on habitat loss. Higher mortality rates would result from wildlife collisions with vehicles and trains.

Cumulative Impact Summary: Wildlife

The proposed rail line would affect wildlife and would combine with impacts from the other projects to result in cumulative impacts on wildlife in the cumulative impacts study area. The contribution of the proposed rail line to cumulative impacts is summarized as follows.

- **Existing coal mines and Colstrip Power Plant.** The Colstrip Alternatives and Decker Alternatives would contribute to cumulative impacts by causing habitat loss, degradation, and alteration as well as increases in mortality rates and changes to species distribution and composition.
- **Proposed and potentially induced coal mines.** Any build alternative would contribute to cumulative impacts as described above for existing mines.
- **Land management.** Any build alternative would contribute to cumulative impacts related to BLM land management plans by potentially causing habitat degradation, especially in riparian habitats.
- **Energy development.** Any build alternative would contribute to cumulative impacts by causing habitat loss, degradation, and alteration as well as increases in mortality rates and causing changes to species distribution and composition.
- **Construction projects.** The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative impacts related to the paving of Tongue River Road by increasing mortality rates and causing loss of habitat due to road widening.

In summary, construction and operation of any build alternative would result in cumulative impacts on wildlife when combined with impacts from proposed and potentially induced coal mines, land management, and energy development. Some build alternatives would result in cumulative impacts on wildlife when combined with impacts from existing coal mines and the Tongue River Road paving project, including some or all of the common wildlife

impacts. These projects would have to comply with Montana DEQ and other state permits and approvals as well as BLM-required mitigation measures. OEA concludes that the direct impacts from the proposed rail line, when combined with impacts from past, present, and reasonably foreseeable projects and actions, would result in minor adverse cumulative impacts on wildlife.

U.4.6.3 Fish

Construction and operation of the proposed rail line would result in the following impacts on fish: mortality from instream construction, temporary blockage of fish movement, temporary stream dewatering and fish relocation, noise and vibration, water quality (sedimentation and turbidity, and construction materials and petroleum products), removal and alteration of instream and riparian habitats, and altered stream hydraulics (referred to hereafter as the *common fish impacts*). Any build alternative would contribute to cumulative impacts on fish by adding to impacts from other projects. The following subsections describe the impacts of the other projects and how impacts from the proposed rail line, when added to the impacts of these projects, would result in cumulative impacts on fish.

The other projects are described in Section U.3.3, *Projects Analyzed*. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and fish is described in Chapter 8, Section 8.4, *Fish*, and in Appendix K, *Fish Resources*. OEA defined the study area for impacts of the proposed rail line on fish as the area within 2 miles of either side of the centerline of each right-of-way. The fish cumulative impacts study area includes two components. For specific construction projects (e.g., road paving) the local cumulative impacts study area includes locations where a 985-foot (300-meter) buffer around a build alternative right-of-way would overlap with a similar buffer around the project footprint. This impact buffer was recommended by Montana FWP to identify impacts from right-of-way construction and operation. This impact buffer is also appropriate for projects and project elements with localized impacts like road paving, small site development, and stream crossings.

For broadly dispersed projects like proposed and potentially induced mines, land management, and energy development, the cumulative impacts study area includes fish-bearing subwatersheds containing both the physical footprints of the other projects and a build alternative right-of-way. This broader cumulative impacts study area encompasses all streams subject to the downstream or down-gradient impacts of the other projects and the proposed rail line on fish and aquatic habitat. This includes four fish-bearing subwatersheds in the lower Tongue River Subbasin, the Spring Creek Subwatershed in the upper Tongue River Subbasin, and the lower Moon Creek Subwatershed. The cumulative impacts study area differs from the study area defined in Chapter 8, Section 8.4, *Fish*.

More than 50 species of fish are known to or may occur in the cumulative impacts study area. OEA identified indicator species that provide examples of impacts on the fish community as a whole. OEA categorized fish assemblages and their indicator species by fish-bearing

stream to align with sensitivity or susceptibility to four general impact types: water quality, sediment, habitat modifications, and migration barriers (Table U-45). Migratory species are most susceptible to migration barrier impacts. Ecologically sensitive species are most susceptible to any kind of change in habitat conditions. Other indicator species are less sensitive and less susceptible to water quality, sediment and habitat modification impacts.

Table U-45. Indicator Species in Study Area Water Bodies and Their Sensitivities

Water Body (AES Class)	Associated Water Body in Cumulative Impacts Study Area	Sensitivities of Indicator Species Known or Likely to Occur in Water Body
Large Prairie River (A003)	Tongue River	Migratory and ecologically sensitive: Goldeye, paddlefish, shorthead redhorse, shovelnose sturgeon, stonecat Migratory: Blue sucker, flathead chub, plains minnow, river carpsucker, sand shiner, sauger, white sucker Other indicator species: Channel catfish, creek chub, emerald shiner, fathead minnow, freshwater drum, sturgeon chub
Medium Prairie River (B005)	Rosebud Creek	Migratory and ecologically sensitive: goldeye, shorthead redhorse, stonecat Migratory: Flathead chub, river carpsucker, sauger, white sucker Other indicator species: Channel catfish, fathead minnow, lake chub, river carpsucker, sauger, stonecat, white sucker
Core Prairie Stream (C005)	Otter Creek	Migratory and ecologically sensitive: Shorthead redhorse, stonecat Migratory: Flathead chub, plains minnow, sand shiner, white sucker Other indicator species: Channel catfish, fathead minnow
	Beaver Creek	Migratory: Flathead chub, plains minnow, white sucker Other indicator species: Fathead minnow, lake chub, western silvery minnow
	Ash Creek	Migratory and ecologically sensitive: Shorthead redhorse, stonecat Migratory: Flathead chub, plains minnow, sand shiner, white sucker Other indicator species: Channel catfish, fathead minnow, lake chub
	Foster Creek	Migratory: Plains minnow, sand shiner, white sucker Other indicator species: Channel catfish, fathead minnow
Fish-bearing Intermittent Stream (D005)	Moon Creek	Other indicator species: Fathead minnow, brook stickleback, lake chub
Reservoirs and Lakes	Tongue River Reservoir	Other indicator species: Sauger, rock bass, smallmouth bass
Notes: AES = aquatic ecosystem		

Existing Coal Mines and Colstrip Power Plant

Existing Coal Mines and Colstrip Power Plant Impacts on Fish

The Rosebud Mine and Colstrip Power Plant are outside of the cumulative impacts study area and therefore would not contribute to cumulative impacts. The Spring Creek and Decker Mines operate in the cumulative impacts study area, which includes the Tongue River Reservoir. A small portion (less than 100 acres) of the Decker Mine is separated from the Tongue River Reservoir by more than 4,000 feet of intermittent stream channel. A similarly small portion of the Spring Creek Mine overlaps the headwaters of a second intermittent drainage in the same subwatershed. These existing coal mines do not affect fish or aquatic habitat in the cumulative impacts study area. Therefore, no additional analysis of cumulative impacts on fish is warranted.

Proposed and Potentially Induced Coal Mines

Proposed and Potentially Induced Coal Mine Impacts on Fish

The proposed and potentially induced mines would be constructed and would operate in the fish cumulative impacts study area. Two perennial fish-bearing water bodies in the cumulative impacts study area would be affected by the proposed and potentially induced coal mines: Otter Creek (affected by the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek Mine) and Tongue River (affected by the proposed Otter Creek Mine and both potentially induced mines). In addition, eight smaller intermittent fish-bearing streams in the cumulative impact study area would be affected by the induced mines: Prairie Dog Creek, Whitten Creek, and an unnamed stream by the induced Canyon Creek Mine; and Black Eagle Creek, Dry Creek, King Creek, Bridge Creek, and an unnamed creek by the induced Poker Jim Creek–O’Dell Creek Mine.

- The proposed Otter Creek Mine’s footprint is in the Otter Creek watershed and includes fish-bearing intermittent drainages that flow into Otter Creek. An access road with culverts would be constructed over Otter Creek for mine construction and operations.
- The potentially induced Poker Jim Creek–O’Dell Creek Mine is the only potentially induced mine with a fish-bearing stream in the deposit footprint; the boundaries of this deposit extend into and across the Tongue River. The RFD area is extensive; however, it is unlikely that the entirety of the deposit would be fully developed for mining at any given time. Coal deposits of this type are typically mined in stages and reclaimed as mining progresses. Therefore, the area subject to impacts and the related extent of cumulative impacts at any given time would be smaller than suggested by the cumulative impacts study area as a whole.
- Some portions of the potentially induced Canyon Creek Mine and Poker Jim Creek–O’Dell Creek Mine footprints lie within smaller intermittent fish-bearing streams that flow into the Tongue River.

Activities from mining activities at the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek Mine would result in hydrologic modification of intermittent streams and groundwater that flow into fish-bearing water bodies. The actual impacts on fish would depend on the nature of the impact, type of habitat affected, and the fish species that are likely to use that habitat. In general, proposed and potentially induced mining activities would affect fish habitat through the following common fish impacts.

- **Alteration, fragmentation, or loss of habitat.** Direct habitat alteration, fragmentation, or loss is expected to be limited primarily to fish-bearing water bodies in the footprint of proposed mining activities and any associated development, such as access roads. The Poker Jim Creek–O’Dell Creek Mine is the only potentially induced mine with a perennial fish-bearing water body located in the footprint of its associated coal deposit. However, Montana state regulations do not allow for surface mining activities in floodplains that would alter or interfere with flood conveyance (MCA 76-5, MCA 82-4 part 2). Federal regulations similarly restrict development of drainages supporting larger fish-bearing streams or on floodplains of larger stream and river systems like the Tongue River and Otter Creek (AECOM 2013a, 2013b). These restrictions would prevent active mining in the floodplain but would allow for the development of mining-related bridges, access roads, or other supporting infrastructure. In addition, the Poker Jim Creek–O’Dell Creek Mine and Canyon Creek Mine footprints also overlap with eight intermittent fish-bearing streams.
- **Changes in hydrologic or geomorphic conditions.** Changes in available habitat area resulting from drainage-level hydrologic and geomorphic impacts are difficult to predict because they require specific information about the location and extent of water diversions, withdrawals, or discharges associated with mining activity and the affected drainages. The withdrawal, injection, or redirection of surface water and groundwater would affect streamflows in perennial water bodies, which would then reduce the quality and quantity of available habitat. In contrast, pumping and discharge or reinjection of groundwater would measurably increase streamflows in receiving waters. This would transform an intermittent water body into a perennial stream or expand the amount of habitat available in perennial streams for the duration of mine operations, creating and/or expanding fish habitat for an extended period. For the proposed Otter Creek Mine, impacts on surface water quantity and hydrologic flow—and on fish—would be reduced through a drainage control structure system (Section U.4.7.1 *Surface Water, Proposed and Potentially Induced Coal Mine Impacts on Surface Water*).
- **Changes in water quality.** Water quality impacts associated with surface disturbance and contaminant spills may occur in fish-bearing water bodies in the same subwatersheds located down-gradient from the mining footprint and 985 feet (300 meters) from any access roads or supporting infrastructure. The potential for extensive down-gradient effects is based on the Otter Creek Mine permit application which suggested considering down-gradient impacts on the Tongue River over 8 miles distant from the mine footprint (Montana Department of Environmental Quality 2013). This indicates the potential for

surface flow and water quality-related impacts in an approximately 65-mile segment of the Tongue River adjacent to the potentially induced Poker Jim Creek–O’Dell Creek Mine, and an approximately 15-mile segment of Otter Creek adjacent to the proposed Otter Creek Mine and potentially induced Poker Jim Creek–O’Dell Creek Mine. For the proposed Otter Creek Mine, impacts on surface water quality—and on fish—would be reduced through a drainage control structure system (Section U.4.7.1 *Surface Water, Proposed and Potentially Induced Coal Mine Impacts on Surface Water*).

- **Noise and vibration impacts.** Localized noise and vibration impacts from proposed and potentially induced mining would occur where access roads are constructed to cross fish-bearing streams, or where mining-related blasting occurs within the same watershed.

Several factors would limit the extent of such impacts.

- A mine footprint would never be fully developed at any given time. Instead, limited areas of each deposit would be actively mined while previously mined areas progress through various stages of reclamation. Therefore, impacts would be spread out over long periods but would be more limited in scale and extent.
- State mining regulations (ARM 17.24.634; ARM 17.24.651; ARM 17.24.751) require avoiding impacts on fish-bearing water bodies and maintaining habitat function.
- The Montana Strip and Underground Mine Reclamation Act (MCA 82-4 Part 2) requires reducing disturbances to hydrologic balance and water quality at the mine site and adjacent areas. This is achieved by the treatment and management of drainage and mined and reclaimed areas, restoration of recharge capacity to approximate premining conditions in mine areas, preservation of hydrologic functions in alluvial valley floods, and design and construction of reclaimed intermittent and perennial stream channels and critical uplands areas within those drainages necessary to maintain critical hydrologic, water quality, and habitat functions (ARM 17.24.313).

Contribution of the Build Alternatives to Cumulative Impacts on Fish

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would provide access to the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek Mine. The construction start and completion dates for the proposed Otter Creek Mine would depend on the construction schedule for the proposed rail line. The Decker Alternatives would provide access to the proposed Otter Creek Mine and to the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines. The Decker Alternatives would be the only build alternatives that would provide access to the potentially induced Canyon Creek Mine.

The build alternatives would result in the common fish impacts. The addition of impacts from the build alternatives to the impacts from the proposed and potentially induced mines would result in cumulative impacts on fish habitat in the Tongue River, Otter Creek, and several small intermittent fish-bearing streams. Cumulative impacts would result from

combined hydrologic, geomorphic, and water quality effects of mining activities and right-of-way construction and operation. These impacts are likely to be more pronounced in Otter Creek, a smaller water body that is more sensitive to drainage-scale effects. The cumulative impacts at any given time would depend on where specific mining activities are occurring, the proximity of those activities to the build alternative, and the combined proximity of hydrologic, geomorphic, and water quality impacts on fish-bearing aquatic habitat. Per Montana FWP guidance, localized cumulative impacts at stream crossings would occur where mining and build alternative-related stream crossings are within 985 feet of one another. Mining-related blasting would result in periodic noise and vibration impacts when blasting occurs in watersheds where the build alternative right-of-way crosses fish-bearing streams.

Land Management

Land Management Impacts on Fish

Fort Keogh Livestock and Range Research Laboratory

Fort Keogh is an operating land management project that addresses cattle management and grazing. Fish-bearing streams in the cumulative impacts study area include Tongue River, Moon Creek, Paddy Fay Creek, and an unnamed stream. No planned activities would develop or disturb Fort Keogh beyond its current condition because the facility is protective of areas that are in a natural state. If future research activities encroach into riparian areas, water quality impacts would occur (from cattle defecation or cattle trampling soil on streambank/within stream and causing sedimentation). Contaminants would reach the Tongue River, depending on where the potential impact would occur and the distance from the channel.

Tongue River Reservoir State Park

The proposed Tongue River Reservoir State Park project would renovate the Pee Wee Point North, Pee Wee Point South, and Sandpoint campgrounds. Various fish species are documented in the Tongue River Reservoir. The MEPA/NEPA Checklist indicates that the renovations would have no impact on fish. Therefore, no additional analysis of cumulative impacts on fish is warranted.

BLM Resource Management Plan

The BLM Draft RMP/EIS would continue current management activities and identify new facilities or management strategies. The Draft RMP/EIS addresses livestock grazing, wildlife habitat, special-designation areas, special recreation areas, national trails, and wilderness study areas. Fish-bearing streams are documented in BLM-administered lands in the cumulative impacts study area; two parcels of BLM-administered land are adjacent to

lower Beaver Creek, several parcels are close to Otter Creek, and other parcels are adjacent to or upslope from the Tongue River.

Surface-disturbing activities on BLM-administered lands would result in the common fish impacts should they encroach on fish-bearing streams or tributaries to fish-bearing streams. The Draft RMP/EIS preferred alternative states that activities that would affect streams or would not benefit the functionality of streams would be avoided. If avoidance is not possible, the activity would only be approved with specialized design features to minimize impacts on water quality and fisheries. BLM would also ensure that all newly constructed or replaced stream crossing structures would allow fish passage and protect fish habitat from erosion and damming.

Activities that disturb the ground surface outside of fish-bearing streams and tributaries would affect the quality of nearby fish-bearing waters (e.g., sediment mobilization or petrochemical spills). The extent and degree of this impact would depend on the type of activity and the location of surface water and fish-bearing stream relative to the activity. However, the Draft RMP/EIS states that all BLM activities would ensure that standards for water quality, properly functioning riparian areas, and habitat requirements for fish would be met or exceeded. An overall goal of the Draft RMP/EIS is to maintain water quality, water quantity, and watershed functionality.

Beaver Creek Landscape Management Project

Implementation of the Beaver Creek LMP would promote a healthier and more resilient ponderosa pine ecosystem on 14,000 acres of forest by using large tree removal, fire applications, and selective vegetation thinning. These practices would promote fires that are of lower intensity and less severe than those caused by stand replacement fires. No fish are in or immediately adjacent to the Beaver Creek LMP area (U.S. Forest Service 2011). The chosen alternative in the plan's Record of Decision indicates that one stream would be directly affected by a road crossing, but that the stream crossing would be short-term, lasting only for the duration of the harvesting activities. Other surface water impacts would include sedimentation in streams from harvesting and surface disturbance activities. These impacts would be short-term and avoided or reduced through best management practices. The U.S. Forest Service does not anticipate long-term impacts on surface waters. Any impact on streams in the Beaver Creek LMP area would be separated from downstream fish habitat by several miles of intermittent stream, a distance beyond which these potential impacts would reach. Therefore, no additional analysis of cumulative impacts on fish is warranted.

Contribution of the Build Alternatives to Cumulative Impacts on Fish

Fort Keogh Livestock and Range Research Laboratory

The Tongue River Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be constructed and operate near where research activities occur in Fort Keogh. The addition of impacts from the build alternatives to impacts from Fort Keogh

management activities would result in cumulative impacts on water quality, contributing to cumulative impacts on fish.

BLM Resource Management Plans

Any build alternative would be constructed and operate in landscapes affected by land management practices under the BLM Draft RMP/EIS. The addition of impacts from the build alternatives to the impacts of the BLM Draft RMP/EIS would result in cumulative impacts on fish.

Energy Development

Energy Development Impacts on Fish

The BLM Draft RMP/EIS would promote oil and natural gas projects on 5.4 million acres of leased land in Rosebud, Custer, Powder River, and Big Horn Counties (the four-county area). OEA estimated that 1,158 CBNG wells would be developed between 2011 and 2030, and considers this estimate much higher than the number of wells that will be permitted and completed. It should be noted that none of the currently approved wells would be in the project area or near the build alternatives (Section U.3.3.4, *Energy Development*). In addition to well development on BLM-administered lands, oil and gas exploration and development continues throughout southeastern Montana on federal, state, tribal, and private lands.

According to geographic information system (GIS) data from the Montana Board of Oil and Gas Conservation data (no date), no existing or abandoned wells are located in surface waters in the cumulative impacts study area. Any encroachment of oil and gas well development areas into surface waters, whether on federal or nonfederal land, would affect fish. The fish species most likely to be affected by these activities belong to assemblages found in the Tongue River, core prairie streams including Hanging Woman Creek and Otter Creek, and other intermittent fish-bearing tributary streams.

CBNG wells can significantly alter groundwater and surface water flows, as described in Section U.4.7.1, *Surface Water*, thus affecting both habitat availability for fish and water quality. Studies of CBNG extraction activities in the Tongue River and Powder River Subbasins have documented electrical conductivity (EC) and sodium adsorption ratio (SAR)-related impacts on surface water chemistry, but they were not associated with any clear negative effects on fish abundance or community composition (Davis et al. 2009, 2010). However, these studies concluded that the observed water quality effects were sufficient to limit habitat suitability for fish species that are ecologically sensitive (Davis et al. 2009, 2010; Dauwalter 2013). Groundwater discharge can also indirectly affect fish habitat suitability by altering riparian conditions. High salinity and sodium levels in water produced from wells may degrade riparian vegetation by replacing salt-intolerant species with more tolerant invasive species, changing riparian composition in ways that negatively affect aquatic habitat conditions.

CBNG well development is also associated with physical habitat changes that can alter conditions for fish. Access roads and well pads associated with well development can alter physical habitat conditions through a number of direct and indirect mechanisms. Several studies (Dauwalter 2013) observed that fish abundance and diversity change in conjunction with increased density of roads and wellheads. The nature and extent of these changes varies depending on the type of environment affected and species-specific ecological sensitivity and habitat requirements. Impacts are primarily a result of increased delivery of fine sediments to surface waters, passage barriers created at stream crossings, habitat modifications associated with erosion protection and loss of riparian vegetation, and changes in water quality. Unpaved roads are known sources of erosion and fine sediment delivery to stream channels in the Tongue River Subbasin (Bureau of Land Management 2013, U.S. Forest Service 2011), supporting the likelihood of dispersed chronic effects on water quality in the study area. Chemical spills are another source of contamination to surface waters.

Collectively, these physical and water quality-related changes are likely to have the most impact on fish species that are moderately or highly sensitive to ecological degradation and/or are migratory and rely on smaller tributaries during some portion of their life history (Table U-45). However, the extent and degree of impacts would depend on whether oil and gas wells are developed in a fish-bearing drainage, and the size, location, and number of wells developed.

Impacts on fish from energy development would be precluded or reduced through regulatory compliance or other measures. For development on BLM-administered lands, the preferred alternative in the Draft RMP/EIS stipulates that a no surface occurrence (NSO) restriction be placed on oil and gas well development for surface waters. This NSO means that oil and gas well development would not be allowed in any surface water (or fish-bearing water bodies).

Several statutes and guidelines protect surface water quality and flow impacts. Montana DEQ has established water quality standards specifically for Tongue River and Rosebud Creek and all of their tributaries in order to address water use and discharges from CBNG wells. Any waters discharged into a surface water body would require a Montana Pollutant Discharge Elimination System (MPDES) permit to ensure protection of surface water quality. All gas and oil projects, whether on federal or nonfederal land, must implement proper reclamation procedures when the wells are abandoned (MCA 82-10-400 *et seq.*). BLM also requires reclamation of oil and gas wells on BLM-administered lands. These protective measures and some amount of surface water restoration would reduce impacts on fish.

Contribution of the Build Alternatives to Cumulative Impacts on Fish

Any build alternative would operate in landscapes affected by future oil and gas development. Most of the region around the proposed rail line has a low potential for development. There is moderate potential for development around the Decker Alternatives. Construction and operation of the build alternatives would result in the common fish impacts.

The addition of impacts from the build alternatives to impacts from energy development would result in cumulative impacts on fish. Cumulative impacts are most likely in fish-bearing tributary drainages that would be crossed by a build alternative and subject to energy development. Hanging Woman Creek and the headwaters of Otter Creek are the only fish-bearing tributary streams in the cumulative impacts study area upstream of Ashland, making these water bodies important to the overall diversity of aquatic habitat in this portion of the Tongue River Basin. The Decker Alternatives would directly overlap the area of potential oil and gas development but these build alternatives would cross relatively few fish-bearing streams and would have relatively limited potential for cumulative effect interactions except in specific areas on the Tongue River mainstem within 985 feet of the right-of-way. Any build alternative would intersect the lower Otter Creek watershed, increasing the potential for cumulative impacts on habitat conditions in Otter Creek that would compound the effects of CBNG development in the headwaters. Habitat degradation in these two tributaries would limit the extent of core prairie stream habitat available to highly migratory or ecologically sensitive fish species.

Construction Projects

Construction Project Impacts on Fish

Tongue River Road Paving

The 32.7-mile paving project proposed for Tongue River Road would affect 15 fish-bearing streams, including Tongue River, and 14 intermittent streams, including Ash Creek and Foster Creek. While construction of the road has likely already affected these fish-bearing streams (e.g., habitat impacts at culvert crossings), additional impacts would result from paving and any road and right-of-way widening that encroaches into these fish-bearing streams. Impacts would generally include water quality degradation, sedimentation, habitat modification, and migration barriers.

Fine sediment erosion from unpaved roadways is identified as a common source of water quality degradation. The effects diminish at distances greater than 50 feet between roadways and surface waters due to the filtering effects of vegetation (U.S. Forest Service 2011). Paving would reduce fine sediment erosion and associated impacts where the road is close to surface waters. However, paving would increase the runoff rate from the road surface, potentially increasing bed and bank erosion at discharge points, affecting water quality and fish habitat. Impervious road surfaces are also associated with the increased discharge of stormwater pollutants to surface waters, including metals, petroleum products, and related chemicals (EnviroVision et al. 2008, Washington State Department of Transportation 2011). These impacts are likely to be magnified in smaller perennial and fish-bearing intermittent streams because these streams would receive more stormwater runoff per unit of volume than the Tongue River. During construction, fish habitat would also be modified if riparian habitat were removed and if culverts were extended at the fish-bearing stream crossings. In addition, instream work would require short-term migration barriers. The extent and degree

of these common fish impacts would depend on the location, width, and distance of road widening relative to the location of the fish-bearing streams.

Bull Pasture Subdivision Leasing

Leasing the 38.55-acre bull pasture subdivision would not affect fish or aquatic habitat because no surface waters are mapped on the land parcel and the land parcel is outside of the cumulative impacts study area. Therefore, no additional analysis of cumulative impacts on fish is warranted.

Contribution of the Build Alternatives to Cumulative Impacts on Fish

Tongue River Road Paving

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be crossed by the paving project. The addition of impacts from the build alternatives to impacts from the road paving project would result in cumulative impacts on fish. Applying the 985-foot (300-meter) buffer defined by Montana FWP, cumulative impacts on fish and fish habitat may occur where the road paving project and a build alternative right-of-way both fall within 985 feet of a fish-bearing water body. This overlap would occur at two locations along the Tongue River for the Moon Creek Alternatives and Tongue River Alternatives, and on three intermittent fish-bearing streams (including Foster Creek and Ash Creek), and three locations on the Tongue River and 10 intermittent fish-bearing streams for the Tongue River Road Alternatives. The extent and degree of impacts would depend on where and how these impacts overlap, the amount of disturbance caused by the paving and widening, and the measures implemented to reduce impacts.

Cumulative Impact Summary: Fish

The proposed rail line would affect fish and would combine with impacts from the other projects to result in cumulative impacts on fish in the study area. The contribution of the proposed rail line to cumulative impacts in each affected project category is summarized as follows.

- **Proposed and potentially induced coal mines.** Any build alternative would contribute to cumulative hydrologic, geomorphic, and water quality impacts in conjunction with mining activities and construction and operation of access roads and other facilities. These impacts are likely to be most pronounced in Otter Creek, but may also occur in the Tongue River adjacent to coal deposits that would be developed, and in eight smaller intermittent fish-bearing streams that would be affected by the potentially induced Poker Jim Creek–O'Dell Creek Mine and Canyon Creek Mine.
- **Land management.** The Tongue River Alternatives and Tongue River Road Alternatives would contribute to cumulative water quality impacts in conjunction with

existing research and land management at Fort Keogh. Any build alternative would contribute to cumulative water quality impacts in conjunction with actions under the BLM Draft RMP/EIS.

- **Energy development.** Any build alternative would contribute to cumulative impacts related to energy development on federal and nonfederal lands, including water quality degradation and habitat alteration.
- **Construction projects.** The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative impacts on hydrology and water quality in conjunction with the road paving project. These impacts would occur at up to twelve locations associated with the Tongue River and eleven intermittent fish-bearing streams for the Tongue River Road Alternatives. The Tongue River, Colstrip, and Moon Creek Alternatives would affect up to four fish-bearing streams that would also be affected by the Tongue River road paving project.

In summary, construction and operation of any build alternative would result in cumulative impacts on fish when combined with impacts from proposed and potentially induced coal mines, land management, and energy development. Some build alternatives would result in cumulative impacts on fish when combined with impacts from Fort Keogh activities and the Tongue River Road paving project. These projects would have to comply with Montana DEQ and other state permits and approvals as well as any BLM-required mitigation measures. OEA concludes that the direct impacts from the proposed rail line, when combined with impacts from past, present, and reasonably foreseeable projects and actions, would result in minor adverse cumulative impacts on fish.

U.4.6.4 Special-Status Species

Construction and operation of the proposed rail line would result in impacts on special-status plant, wildlife, and fish species.¹⁴ Impacts on special-status wildlife and fish species would include increased mortality, habitat loss, habitat degradation, habitat alteration, habitat fragmentation, displacement, obstruction of movement, and changes in species composition (referred to hereafter as the *common special-status wildlife and fish impacts*). Impacts on special-status plant species would include permanent vegetation loss from clearing and fill placement, constraints to plant germination and growth through soil compaction and erosion, contributions to the spread of noxious weeds, effects on plant growth through dust deposition, increased risk of wildfires, altered riparian and floodplain vegetation through changing hydrology, and altered vegetation communities as a result of maintenance activities (referred to hereafter as the *common special-status plant species impacts*). Any build alternative would contribute to cumulative impacts on special-status species by adding to

¹⁴ Special-status species are species listed as endangered or threatened under the federal Endangered Species Act (ESA), candidate species for ESA listing, sensitive species listed by the Bureau of Land Management (BLM) Miles City Field Office, and Montana State Species of Concern (administered by Montana Fish, Wildlife & Parks).

impacts from other projects. The following subsections describe the impacts of other projects and how impacts from the proposed rail line, when added to the impacts of these projects, would result in cumulative impacts on special-status species.

The other projects are described in Section U.3.3, *Projects Analyzed*. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and special-status species are described in Chapter 8, Section 8.5, *Special-Status Species*. OEA defined the study area for impacts of the proposed rail line on special-status wildlife as areas within 0.5 to 4 miles of the rights-of-way, depending on species category; on special-status fish as the area within 2 miles of the centerline of the rights-of-way; and on special-status plants as known occurrences of such species in watersheds that would be crossed by a right-of-way and predicted suitable habitat within 5 miles of a right-of-way (Chapter 8, Section 8.5.1, *Special-Status Species, Study Area*). OEA defined the cumulative impacts study areas for special-status wildlife species and fish species as described in Section U.2.6.2, *Wildlife*, and Section U.2.6.3, *Fish*. OEA defined the cumulative impacts study area for special-status plants as the area where the study area for plants (Chapter 8, Section 8.5.1, *Special-Status Species, Study Area*) overlaps the areas of potential impact of each of the other projects. The study areas are different because the cumulative impacts study area focuses only on the areas of overlap.

Cumulative impacts on special-status fish species would be similar to impacts on any fish in the cumulative impacts study area. Special-status fish species that would be affected in the cumulative impacts study area, their known and likely habitats, and the build alternatives that would contribute to cumulative impacts are identified in Table U-46. Because these fish would be affected as any other fish species, discussions of these impacts and other projects are provided in Section U.4.6.3, *Fish*, and no further discussion of special-status fish species is provided in this section.

Table U-46. Characteristics of Special-Status Fish Species Known or Likely to be Present in the Cumulative Impacts Study Area

Special-Status Fish Species ^a	Ecological Characteristics		Known or Likely Distribution in Cumulative Impacts Study Area	Build Alternatives with Potential Cumulative Impacts	Cumulative Impact Other Projects
	Migratory	Ecological Sensitivity			
Sauger	Yes	Moderate	Tongue River (RM 21-207)	All build alternatives	Land Management (Fort Keogh, BLM) Energy Development Construction (Road Paving)
			Rosebud Creek (RM 0-103)	Colstrip	Existing Coal Mines/ Colstrip Power Plant Land Management (BLM) Energy Development
Blue sucker	Yes	High	Tongue River (RM 0-21)	Tongue River	Land Management (Fort Keogh, BLM)
				Tongue River Road	Land Management (Fort Keogh, BLM)
				Moon Creek	Land Management (Fort Keogh, BLM)
Paddlefish	Yes	Moderate	Tongue River (RM 0-21)	Tongue River	Land Management (Fort Keogh, BLM)
				Tongue River Road	Land Management (Fort Keogh, BLM)
				Moon Creek	Land Management (Fort Keogh, BLM)
Sturgeon chub	No	Moderate	Tongue River (RM 0-15)	Tongue River	Land Management (Fort Keogh, BLM)
				Tongue River Road	Land Management (Fort Keogh, BLM)
				Moon Creek	Land Management (Fort Keogh, BLM)

Notes:
^a These species would be affected in the cumulative impacts study area. The proposed rail line would have no impact on the pallid sturgeon; therefore, pallid sturgeon is not included in this table. See Appendix L, *Biological Assessment*, for the analysis of the pallid sturgeon
 RM = river mile; BLM = Bureau of Land Management

Existing Coal Mines and Colstrip Power Plant

Existing Coal Mines and Colstrip Power Plant Impacts on Special-Status Species

The existing coal mines and Colstrip Power Plant are already operating in the special-status species cumulative impacts study area.

Wildlife Species

Rosebud Mine

The Rosebud Mine area overlaps greater sage-grouse general habitat (Montana Fish, Wildlife & Parks 2013a). Current mine operations involve both surface disturbances and reclamation activities and some reclaimed areas do provide habitat. In 2012, mining activities and infrastructure had disturbed 17,674 acres while 14,022 acres were in various stages of reclamation (Western Energy Company 2013).

Contractors for the Rosebud Mine have monitored wildlife as part of their mine monitoring plan since the early 1970s. In recent years, annual surveys that include sensitive wildlife species have been conducted for raptors and breeding birds. Sensitive species that have been recorded within the mine survey area in the last 10 years include hoary bat, fringed myotis, pallid bat, Townsend's big-eared bat, black-tailed prairie dog, horned grebe, American white pelican, great blue heron, American bittern, black-crowned night heron, golden eagle, northern goshawk, greater sage-grouse, common loon, long-billed curlew, Caspian tern, common tern, Forster's tern, Franklin's gull, burrowing owl, red-headed woodpecker, Lewis's woodpecker, pinyon jay, Clark's nutcracker, sage thrasher, loggerhead shrike, lark bunting, Brewer's sparrow, McCown's longspur, gray-crowned rosy finch, northern leopard frog, plains spadefoot, great plains toad, and western smooth greensnake. Overall, sensitive species using habitats adjacent to mine activities are similar to those observed by OEA because the available habitats are mostly the same. Key data for special-status species are summarized as follows.

- **Grouse leks.** No greater sage-grouse leks exist within the Rosebud Mine wildlife survey area and the last observation of a greater sage-grouse in this area was in 1999.
- **Raptors.** One hundred six raptor nest sites (some of which may be occupied by special-status species) have been monitored annually since 2003. However, due to the long-term nature of this dataset, some nests have been destroyed by natural causes; 63 nest sites were still present in 2013. Sensitive raptor species that have historically used this area include the golden eagle and burrowing owl. However, none was documented in 2013.

Spring Creek Mine

The Spring Creek Mine area includes shrubland, grassland, riparian, woodland, seeded and reclaimed grasslands, and agricultural habitat. Sandstone outcrops and clay cliffs are also present within the area (Thunderbird Wildlife Consulting 2013). The Spring Creek Mine area overlaps greater sage-grouse general and core habitats (Montana Fish Wildlife and Parks 2013a, 2013b). Current mine operations involve both surface disturbances and reclamation activities, and some reclaimed areas do provide habitat. In 2012, mining activities and infrastructure had disturbed 4,059 acres, while 1,604 acres were in various stages of reclamation (Cloud Peak Energy 2014).

Contractors for the Spring Creek Mine have monitored wildlife as part of their mine monitoring plan since the early 1980s. In recent years, annual surveys that include sensitive wildlife species have been conducted for greater sage-grouse leks and broods, raptors, waterfowl, bats, amphibians, and reptiles. Sensitive species that have been recorded within the mine survey area in the last 10 years include black-tailed prairie dog, hoary bat, fringed myotis, American white pelican, great blue heron, bald eagle, golden eagle, northern goshawk, ferruginous hawk, peregrine falcon, greater sage-grouse, burrowing owl, Lewis's woodpecker, red-headed woodpecker, pinyon jay, sage thrasher, loggerhead shrike, Brewer's sparrow, grasshopper sparrow, plains spadefoot, great plains toad, northern leopard frog, common sagebrush lizard, greater short-horned lizard (Montana Natural Heritage Program 2015; Thunderbird Wildlife Consulting 2013). Overall, special-status wildlife species using habitats adjacent to mine activities are similar to those observed by OEA for the proposed rail line as available habitats are mostly the same. Key data for special-status species are summarized as follows.

- **Black-footed ferrets and black-tailed prairie dogs.** Six black-tailed prairie dog colonies occur in the mine area over approximately 100 noncontiguous acres. Active colonies are not large enough to support black-footed ferrets and no ferrets or signs thereof have been documented within the mine survey area.
- **Grouse leks.** Ten greater sage-grouse leks are monitored annually for the Spring Creek Mine. One greater sage-grouse lek was active in 2012, but only one male was observed. Long-term monitoring of leks within 2 miles of the mine area shows greater sage-grouse populations are cyclic and have been declining in the area, consistent with regional and range-wide trends. Population declines are, in large part, due to habitat loss and alteration from natural causes (e.g., fire, drought) and human causes (Connelly & Braun 1997, Connelly et al. 2004).
- **Raptors.** Fifty-seven raptor nest sites (some of which may be occupied by special-status species) have been monitored annually. Due to the long-term nature of this dataset, some nests have been destroyed by natural or mine-related causes; 30 nest sites were still present in 2012. Twelve nests, including one golden eagle nest and one burrowing owl nest were active in 2012. The burrowing owl nest was successful with fledged young and the golden eagle nest failed as no young successfully made it out of the nest.

Decker Mine

The Decker Mine area includes riparian, woodland, shrubland, grassland, and agricultural habitat (Decker Coal Company 2013a). The Decker Mine area overlaps greater sage-grouse general and core habitats (Montana Fish Wildlife and Parks 2013a, 2013b). Current mine operations involve both surface disturbances and reclamation activities, and some reclaimed areas do provide habitat. In 2012, mining activities and infrastructure had disturbed 7,733 acres, while 2,449 acres were in various stages of reclamation (Decker Coal Company 2013b).

Contractors for the Decker Mine have conducted surveys (including special-status species) of small and medium-sized mammals (including predators), raptors, greater sage-grouse leks, breeding birds, reptiles, and amphibians. Other special-status species documented within the mine survey area include black-tailed prairie dog, hoary bat, great blue heron, and American white pelican (Decker Coal Company 2013b; Montana Natural Heritage Program 2015). Overall, special-status wildlife species using habitats adjacent to mine activities are similar to those observed by OEA because the available habitats are mostly the same. Key data for special-status species are summarized as follows.

- **Grouse leks.** Four greater sage-grouse leks are monitored annually. No greater sage-grouse leks were active in 2013; however, three females were observed at one of the historical leks.
- **Raptors.** Sensitive raptor species that have historically used this area include the bald eagle and golden eagle.

Impacts of ongoing mining on special-status species include habitat loss (29,466 acres in 2012), habitat degradation due to increased dust and noise levels, and habitat alteration due to mining and subsequent revegetation of mined areas (18,075 acres in 2012). Clearing and noise associated with mining activities result in species displacement and avoidance of highly active areas. Impacts on special-status species also include changes in species distribution and diversity as wildlife respond and move in relation to mine-related activities. The amount of disturbance and associated infrastructure presents barriers to movement for special-status species.

Plant Species

The RFD area for the Rosebud Mine and Colstrip Power Plant is outside of the cumulative impacts study area and this mine and power plant would not contribute to cumulative impacts on special-status plants.

Continued development of the Spring Creek and Decker Mines would continue to affect vegetation as mining progresses into the mines' RFD areas, which overlap the cumulative impacts study area. Mining and reclamation would result in the common special-status plant impacts. The Montana Natural Heritage Program (MNHP) (2013) documented Nuttall desert-parsley in the Spring Creek and Decker Mine RFD areas. MNHP (2009) also mapped suitable habitat for Barr's milkvetch (131 acres), woolly twinpod (2,908 acres), slender-branched popcorn-flower (2 acres), and heavy sedge (35 acres). These special-status plants would be affected assuming the entire RFD area is disturbed.

Vegetation removal does not occur all at once because mining slowly progresses and plant and vegetation reclamation is required (MCA 82-4 Part 2). Reclamation includes planting and revegetating mined lands under a plan approved by Montana DEQ "to make those lands capable of supporting the uses that those lands were capable of supporting prior to any mining or to higher or better uses." Reclamation occurs concurrently with mining and the reestablished plant and vegetation communities must include native plant species that are at

least equal in extent and cover to the natural vegetation in the area, have the same growth characteristics as the original vegetation, and are compatible with plant and animal species in the area (MCA 82-4-233). At the end of each mine life, all disturbed mining areas will have been reclaimed and vegetation communities reestablished (MCA 82-4 Part 2).

Contribution of the Build Alternatives to Cumulative Impacts on Special-Status Species

The Colstrip Alternatives would be constructed and would operate near the Rosebud Mine and Colstrip Power Plant. Mine and power plant operations would continue during construction and operation of the build alternatives. The Decker Alternatives would be constructed and would operate near the Spring Creek and Decker Mines. Mine operations would continue during construction and operation of the build alternatives; coal transport from the mines would happen during operation of the build alternatives.

Wildlife Species

The build alternatives would result in the common special-status wildlife and fish impacts. The impacts of the build alternatives, when added to the impacts of the existing coal mines, would result in cumulative impacts on special-status wildlife species.

Plant Species

The build alternatives would result in the common special-status plant impacts. The impacts of the Decker Alternatives, when added to the impacts of the existing coal mines, would result in cumulative impacts on MNHP-documented Nuttall desert-parsley because the species has been documented in the RFD area of the Spring Creek and Decker Mines and in the Decker Alternatives' rights-of-way. The Decker Alternatives and the RFD area of the Spring Creek and Decker Mines would also affect suitable habitat for Barr's milkvetch, woolly twinpod, slender-branched popcorn-flower, and heavy sedge. Should these species be present in both the rail line right-of-way and the RFD area, there would be a cumulative impact on these plants.

Proposed and Potentially Induced Coal Mines

Proposed and Potentially Induced Coal Mine Impacts on Special-Status Species

The proposed and potentially induced mines would be constructed and would operate in the special-status species cumulative impacts study areas.

Wildlife Species

Proposed Otter Creek Mine

The development of the proposed Otter Creek Mine area would affect primarily riparian, grassland, and shrubland habitats. Key data for special-status species are summarized as follows.

- **Grouse leks.** Development of this mine would result in habitat loss, degradation, and alteration of greater sage-grouse habitat. All of the proposed mine permit area overlaps general greater sage-grouse habitat; however, only one known greater sage-grouse lek occurs within 4 miles of the proposed mine disturbance area.
- **Raptors.** Suitable raptor nesting habitat would be affected primarily in riparian and woodland habitats, where most nests are located. Raptor foraging habitat would also be affected throughout the cumulative impacts study area. Three raptor nests occur within 2 miles of the proposed mine disturbance area including one burrowing owl nest and two golden eagle nests.

Potentially Induced Poker Jim Creek–O’Dell Creek Mine

The development of the potentially induced Poker Jim Creek–O’Dell Creek Mine area would affect riparian habitats because the coal deposit lies immediately adjacent to the Tongue River.

- **Grouse leks.** Development of this mine would cause loss, degradation, and alteration of general greater sage-grouse habitat. Approximately 96 percent of the area overlaps general greater sage-grouse habitat; however, only three known greater sage-grouse leks occur within 4 miles of the area.
- **Raptors.** Suitable raptor nesting habitat and 12 raptor nests would be affected, including golden eagle and bald eagle nests. Raptor foraging habitat would also be affected throughout the cumulative impacts study area.

Potentially Induced Canyon Creek Mine

The development of the potentially induced Canyon Creek Mine area would affect primarily woodland and grassland habitats. Key data for special-status species are summarized as follows.

- **Grouse leks.** Development of this mine would result in habitat loss, degradation, and alteration of general greater sage-grouse habitat. Approximately 9 percent of the mine area overlaps general greater sage-grouse habitat and no known greater sage-grouse leks occur within 4 miles of the area.
- **Raptors.** Suitable raptor nesting habitat and foraging habitat would be affected throughout the cumulative impacts study area, but no known special-status species raptor nests exist within 2 miles of this mine area.

Mining activities and infrastructure would result in the common special-status wildlife and fish species impacts. Vegetation and overburden removal would increase mortality rates especially in small special-status species (i.e., mammals or amphibians) Because surface disturbance and reclamation activities occur simultaneously, habitat loss, degradation, and alteration would only occur in part of the total mine area at a given time.

Plant Species

No special-status plants are documented by MNHP near the proposed Otter Creek Mine in the cumulative impacts study area. Westech Environmental Services, Inc. conducted vegetation surveys for the proposed Otter Creek Mine, which included special-status plants. These surveys involved thorough searches and seasonal investigations during spring and summer months (May to September), including quantitative sampling, and qualitative and mapping surveys. Particular attention was given to the search for special-status plant species, including species currently listed by the MNHP. One special-status plant, the little Indian breadroot, was documented during the survey. This species is identified by MNHP as a potential species of concern because it is ranked as an S3/S4 species, meaning the species is potentially at risk but probably secure.

Development of the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines would affect MNHP (2013)-documented special-status plants in the cumulative impacts study area. The potentially induced Poker Jim Creek–O’Dell Creek Mine would affect 12 separate areas of MNHP- documented Barr’s milkvetch (7.5 acres). The potentially induced Canyon Creek Mine would affect one area of MNHP-documented woolly twinpod (4 acres) and two areas of MNHP-documented Barr’s milkvetch (2 acres). These special-status plants would be affected assuming the entire area of the mines will be disturbed at some point. Predicted suitable habitat for several special-status plants is mapped in these mine areas in the cumulative impacts study area (Table U-47).

Mining and reclamation would result in the common special-status plant impacts. When reclamation is complete, vegetation would be reestablished (MCA 82-4 Part 2).

Table U-47. Impacts on Predicted Suitable Special-Status Plant Habitat in Proposed and Potentially Induced Mine Areas (acres)

Special-Status Plant	Proposed Otter Creek Mine^a	Potentially Induced Poker Jim Creek–O’Dell Creek Mine	Potentially Induced Canyon Creek Mine
Barr’s milkvetch	-	1,535	5,671
Double bladderpod	-	3	453
Heavy sedge	-	291	125
Large-flowered beard tongue	-	99	164
Nuttall desert-parsley	-	-	109
Slender-branched popcorn-flower	-	3	-
Woolly twinpod	-	2,085	5,209
Total	-	4,016	11,731

Notes:

^a Predicted suitable habitat data is not provided for the proposed Otter Creek Mine because the vegetation field surveys conducted by Westech Environmental Services, Inc., surpass and is better than any predicted suitable habitat model.

Sources: MNHP predicted suitable habitat models (2009) for Barr’s milkvetch, woolly twinpod, Nuttall desert-parsley, and double bladderpod. Predicted suitable habitat for heavy sedge based on the MNHP’s Montana Land Cover Framework (2013), specifically the Great Plains Wooded Draw and Ravine and Great Plains Riparian vegetation cover classes data. Predicted suitable habitat for slender-branched popcorn-flower based on OEA wetlands field work (2013), specifically palustrine emergent (PEM), palustrine aquatic bed (PAB), palustrine unconsolidated bottom and palustrine unconsolidated shoreline (PUS) wetland types. Predicted suitable habitat for large-flowered beardtongue based on the MNHP’s Montana Land Cover Framework (2013), specifically the Great Plains Sand Prairie vegetation cover class. For species with MNHP (2009) predicted suitable habitat models—acres for low, medium, and high suitable habitat potential are combined and reported as one acreage in the table.

MNHP = Montana Natural Heritage Program

Contribution of the Build Alternatives to Cumulative Impacts on Special-Status Species

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would provide access to the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek Mine. The construction start and completion dates for the proposed Otter Creek Mine would depend on the construction schedule for the proposed rail line. The Decker Alternatives would provide access to the proposed Otter Creek Mine and to the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines. The Decker Alternatives would be the only build alternatives that would provide access to the potentially induced Canyon Creek Mine.

Wildlife Species

The build alternatives would result in the common special-status wildlife and fish impacts. The addition of these impacts to impacts from the proposed and potentially induced mines would result in cumulative impacts on special-status species.

Plant Species

Although one special-status plant species has been documented in the Otter Creek Mine cumulative impacts study area (little Indian breadroot), this species has not been identified as occurring in the rights-of-way. It is located on the mine's limit of disturbance boundary and can likely be avoided during final mine design planning; therefore, development of Otter Creek Mine. Although an MNHP-documented species (Barr's milkvetch) is located in the potentially induced Poker Jim Creek–O'Dell Creek Mine area, it is not documented in the rights-of-way for the build alternatives. No cumulative impacts are expected. No special-status plant species documented in the potentially induced Canyon Creek Mine area are also documented in the Decker Alternatives' rights-of-way. No cumulative impacts are expected.

The addition of impacts from the build alternatives and impacts from the potentially induced mines would result in cumulative impacts on predicted suitable habitat for Barr's milkvetch, double bladderpod, woolly twinpod, large-flowered beard tongue, slender-branched popcorn-flower, and heavy sedge. Predictable suitable habitat for Nuttall desert-parsley would be affected in the cumulative impacts area of just the Decker Alternatives and the potentially induced Poker Jim Creek–O'Dell Creek and Canyon Creek Mines. Should these species be present in both the rail rights-of-way and the mine areas, there would be a cumulative impact on these plants.

Land Management

Land Management Impacts on Special-Status Species

Fort Keogh Livestock and Range Research Laboratory

Fort Keogh is an operating land management project that addresses cattle management and grazing.

Wildlife Species

The management practices of Fort Keogh affect special-status species such as the black-tailed prairie dog and songbirds through habitat loss and alteration for hay production and experimental manipulation of vegetation. However, these impacts are limited to specific areas and associated with specific research projects. No future activities are planned that would expand these activities into new areas. Historically, this region evolved with large, grazing herbivores (such as bison and deer) and when livestock grazing practices mimic this natural grazing, it can promote nutrient cycling, soil development, soil biodiversity, and vegetative ground cover. The production and storage of hay and grain for livestock is beneficial to wildlife such as seed-eating birds and small mammals, as it provides a readily available food source. Grazing cattle do cause habitat degradation by trampling and trailing, which reduces ground cover and exposes soil to erosion and invasive plants. Also, cattle spend a disproportionate amount of time in riparian habitats and can be particularly damaging to these habitats. In general, management practices would not contribute to

cumulative impacts on wildlife. Fort Keogh is already in existence, management activities have been ongoing since the 1930s, and Fort Keogh strives to maintain the natural state of the environment. Therefore, no additional analysis of cumulative impacts on special-status wildlife species is warranted.

Plant Species

The majority of the Fort Keogh consists of native rangeland that is dominated by lowland/prairie grassland and sagebrush steppe vegetation. The vast majority of Fort Keogh is in a natural state, with agricultural research activities confined to areas between the Yellowstone River and I-94, and along the west side of the Tongue River. Although future activities at Fort Keogh would consist of continued and new research projects in areas where research activities already occur, no planned activities would develop or disturb Fort Keogh beyond its current condition because the facility is protective of its natural state. MNHP (2013) has documented slender-branched popcorn-flower, large-flowered beard tongue, bractless blazingstar, and Schweinitz' flatsedge on Fort Keogh, but these areas are outside of the active research areas. Predicted suitable habitat for woolly twinpod, Nuttall desert-parsley, heavy sedge, slender-branched popcorn-flower, and large-flowered beard tongue is mapped on Fort Keogh, but the areas are very small and sparse, of low suitability, and generally outside of the active research areas. Continued operation of Fort Keogh would result in the common special-status plant impacts.

Tongue River Reservoir State Park

The proposed Tongue River Reservoir State Park project would renovate the Pee Wee Point North, Pee Wee Point South, and Sandpoint campgrounds.

Wildlife Species

The renovations at Tongue River Reservoir State Park would not directly affect special-status wildlife species. Human presence and activities encouraged by the renovations would disturb and displace species. Some habitat loss, degradation, or alteration would result from renovation activities. However, the MEPA/NEPA Checklist indicates that this project would not affect special-status species. Therefore, no additional analysis of cumulative impacts on special-status wildlife species is warranted.

Plant Species

The MNHP (2013) has not documented any special-status plants in the Tongue River Reservoir State Park. Predicted suitable habitat for woolly twinpod, Nuttall desert-parsley, Barr's milkvetch, heavy sedge, and slender-branched popcorn-flower is mapped at Tongue River Reservoir State Park. However, the MEPA/NEPA Checklist indicates that this project would not affect special-status species. Therefore, no additional analysis of cumulative impacts on special-status plant species is warranted.

BLM Resource Management Plan

The BLM Draft RMP/EIS would continue current management activities and identify new facilities or management strategies. The Draft RMP/EIS addresses livestock grazing, wildlife habitat, special-designation areas, special recreation areas, national trails, and wilderness study areas.

Wildlife Species

Changes to land management practices on BLM-administered lands would affect special-status wildlife species. The BLM preferred alternative would allow for the use of public lands and resources while protecting and enhancing wildlife habitat. The BLM Draft RMP/EIS would increase areas available for livestock grazing and agriculture, affecting wildlife habitat and especially riparian areas. Other BLM management actions also protect and enhance wildlife habitat, especially habitats required by greater sage-grouse. The impacts of these actions would restore, protect, and enhance habitats on BLM-administered lands.

Plant Species

The MNHP (2013) had documented four special-status plants on some BLM-administered parcels in the study area: Barr's milkvetch, woolly twinpod, narrowleaf milkweed, and Nuttall desert-parsley. Predicted suitable habitat for special-status plants is also mapped on BLM-administered parcels throughout the cumulative impacts study area, including for Barr's milkvetch, double bladderpod, heavy sedge, large-flowered beard tongue, Nuttall desert-parsley, slender-branched popcorn-flower, woolly twinpod, and narrowleaf milkweed.

A range of surface-disturbing activities would occur on BLM-administered lands under the BLM Draft RMP/EIS, including mineral and energy exploration, leasing, development (including renewable energy and geophysical exploration), vehicle use, rights-of-way development, land use, infrastructure development, vegetation or fuel treatment (including the sale or harvest of hay, timber, wood, or seed), establishment of wildfire fuel breaks, and implementation of a range of improvements. These activities would result in the common special-status plan impacts, including impacts on special-status plant species or habitat. The extent and degree of these impacts would depend on the amount of disturbance these activities would cause on the BLM-administered lands in the cumulative impacts study area and the measures implemented to reduce impacts.

The preferred alternative in the BLM Draft RMP/EIS lists several mitigation measures and requirements to reduce impacts on vegetation. However, all of the Draft RMP/EIS alternatives would maintain the MNHP-documented occurrences of special-status plants. When special-status plants might be affected by an activity, BLM would adjust the management activity to protect or enhance the species occurrence. BLM also implements a special-status plant clearance protocol for activities proposed on their lands that includes preconstruction surveys to identify known special-status plant locations and predicted

suitable habitat for special-status plant. As a result, any BLM activity that would affect special-status plants would maintain the presence of the documented species or enhance the species occurrence.

Beaver Creek Landscape Management Project

Implementation of the Beaver Creek LMP would promote a healthier and more resilient ponderosa pine ecosystem on 14,000 acres of forest by using large tree removal, fire applications, and selective vegetation thinning. These practices would promote fires that are of lower intensity and less severe than those caused by stand replacement fires.

Wildlife Species

The Beaver Creek LMP is outside of the cumulative impacts study area. Therefore, no additional analysis of cumulative impacts on special-status wildlife species is warranted.

Plant Species

The Beaver Creek LMP is outside of the cumulative impacts study area. Therefore, no additional analysis of cumulative impacts on special-status plant species is warranted.

Contribution of the Build Alternatives to Cumulative Impacts on Special-Status Species

Fort Keogh Livestock and Range Research Laboratory

The Tongue River Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be constructed and operate near where research activities occur in Fort Keogh.

Plant Species

The addition of impacts from the build alternatives to the impacts from the ongoing use of Fort Keogh would result in cumulative impacts on special-status species habitat because there is predicted habitat in both the rights-of-way and in the areas of Fort Keogh activities. Should these species be present in both the rail right-of-way and Fort Keogh in the cumulative impacts study area, there would be cumulative impacts on these plants. However, these areas have low potential to support the species.

No cumulative impacts on MNHP-documented occurrences of special-status plants are expected because these occurrences are outside of the areas of Fort Keogh activities.

BLM Resource Management Plans

Any build alternative would operate in landscapes affected by land management practices under the BLM Draft RMP/EIS.

Wildlife Species

The addition of impacts from the build alternatives to the impacts of the BLM land management would result in cumulative impacts on special-status wildlife. If BLM increases lands allotted to agriculture and grazing, cumulative impacts would include habitat loss and degradation, especially in riparian areas. However, cumulative impacts are not expected as any BLM decision would account for and maintain the occurrence of special-status species in the area.

Plant Species

The addition of impacts from the build alternatives to the impacts of BLM activities would result in cumulative impacts on habitat for special-status plant species. However, no cumulative impacts on special-status plant occurrences are expected because BLM activities would maintain the presence of documented special-status plants or enhance their occurrence.

Energy Development

Energy Development Impacts on Special-Status Species

The BLM Draft RMP/EIS would promote oil and natural gas projects on 5.4 million acres of leased land in Rosebud, Custer, Powder River, and Big Horn Counties (the four-county area). OEA estimated that 1,158 CBNG wells would be developed between 2011 and 2030, and considers this estimate much higher than the number of wells that will be permitted and completed. It should be noted that none of the currently approved wells would be in the project area or near the build alternatives (Section U.3.3.4, *Energy Development*). In addition to well development on BLM-administered lands, oil and gas exploration and development continues throughout southeastern Montana on federal, state, tribal, and private lands.

All gas and oil projects, whether on federal or nonfederal land, must implement proper reclamation procedures when the wells are abandoned (MCA 82-10-400 *et seq.*). BLM also requires reclamation of oil and gas wells on BLM-administered lands.

Wildlife Species

Impacts on habitats would result from vegetation removal for road construction, pad installation, and ditch-digging. Species displacement due to noise occurs during construction and drilling activities and from continuous mechanical well operations. Mortality rates generally increase in conjunction with oil and gas development, especially in smaller species that have more difficulty escaping the vegetation-clearing activities. Specific disturbance areas vary, depending on the lifespan of a project, type of development, type of well used, and the needed infrastructure for development and production.

Plant Species

According to data from the Montana Board of Oil and Gas Conservation (no date), no existing or abandoned wells are located in the special-status plants cumulative impacts study area where MNHP has documented known occurrences of special-status plants. MNHP (2013) has documented special-status plant species and predicted suitable habitat for special-status plant species throughout the cumulative impacts study area, including on some BLM-administered lands. The extent and degree of impacts caused by energy development on federal and nonfederal would depend on the amount of disturbance and the measures implemented to reduce impacts.

The BLM Draft RMP/EIS provides certain protections for special-status species, as described for BLM land management projects. As a result, any BLM energy development activity that would affect special-status plants would maintain the presence of the documented species or enhance the species occurrence. This protection would not be afforded on nonfederal lands, where impacts on special-status plant species would occur. Upon conclusion of reclamation, whether on federal or nonfederal land, vegetation would be reestablished (MCA 82-10-400 *et seq.*).

Contribution of the Build Alternatives to Cumulative Impacts on Special-Status Species

Any build alternative would operate in landscapes affected by oil and gas development on BLM lands. Most of the region around the northern build alternatives has a low potential for oil and gas development. There is moderate potential for development along the Decker Alternatives.

Wildlife Species

Construction and operation of the build alternatives would result in the common special-status wildlife and fish impacts. The addition of impacts from the build alternatives to impacts from energy development would result in cumulative impacts on special-status wildlife species. Requirements such as timing stipulations, wildlife monitoring, and coordination with state agencies would reduce these impacts.

Plant Species

Construction and operation of the build alternatives would result in the common special-status plant impacts. The addition of impacts from the build alternatives to impacts from energy development on nonfederal lands would result in cumulative impacts on special-status plant species. No cumulative impacts on special-status plants would occur on BLM-administered lands because BLM activities would maintain the presence of documented special-status plants or enhance the species occurrence.

Construction Projects

Construction Project Impacts on Special-Status Species

Tongue River Road Paving

The 32.7-mile paving project proposed for Tongue River Road would affect special-status species.

Wildlife Species

While construction, maintenance, and use of the road has already caused habitat loss, degradation, and alteration, additional impacts from paving and any road and right-of-way widening would occur. Wildlife mortality might increase along Tongue River Road as vehicle speeds or traffic volume increase. During construction, the right-of-way would be widened in places, causing additional habitat loss. Paving of this mostly dirt and gravel road would lessen dust impacts, making forage close to the road more suitable for wildlife.

Plant Species

The 32.7-mile paving project proposed for Tongue River Road would result in the removal or alteration of vegetation adjacent to the existing roadway. MNHP (2013) has not documented any special-status plants along Tongue River Road between RP 17.7 and RP 50.4. Predicted suitable habitat for special-status woolly twinpod, slender-branched popcorn-flower and large-flowered beard tongue is mapped in this segment adjacent to Tongue River Road. While construction, maintenance, and use of the road has already removed vegetation in the right-of-way and disturbed it by creating conditions for invasive species infestation, paving and any road right-of-way widening would contribute additional impacts. Any proposed widening activities would encroach on and remove vegetation adjacent to the existing road right-of-way. Road paving would result in the common special-status plant impacts. The extent and degree of these impacts would depend on the location, width, and distance of road widening that would occur.

Bull Pasture Subdivision Leasing

Wildlife Species

The Bull Pasture Subdivision Leasing project is outside of the cumulative impacts study area. Therefore, no additional analysis of cumulative impacts on special-status wildlife species is warranted.

Plant Species

MNHP (2013) has not documented any special-status plants on the Bull Pasture Subdivision Leasing project parcel, and there is no predicted suitable habitat for any special-status plant.

Therefore, no additional analysis of cumulative impacts on special-status plant species is warranted.

Contribution of the Build Alternatives to Cumulative Impacts on Special-Status Species

Tongue River Road Paving

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be crossed by the paving project.

Wildlife Species

The addition of impacts from the build alternatives to the impacts of the paving project would result in cumulative impacts on habitat loss, degradation, and alteration. Also, higher mortality rates for wildlife would result from an increase in strikes from vehicles and trains.

Plant Species

The addition of impacts from the build alternatives to the impacts of the paving project would result in cumulative impacts on predicted suitable habitat for woolly twinpod, slender-branched popcorn-flower, and large-flowered beard tongue. Should these species be present in both the rail rights-of-way and the impact area of the paving project, there would be a cumulative impact on these plants.

Cumulative Impact Summary: Special-Status Species

The proposed rail line would affect special-status species and would combine with impacts from the other projects to result in cumulative impacts on special-status species in the cumulative impacts study area. The contribution of the proposed rail line to cumulative impacts is summarized as follows.

- **Existing coal mines and Colstrip Power Plant**
 - **Special-status wildlife species.** The Colstrip Alternatives and Decker Alternatives would contribute to cumulative impacts by causing habitat loss, degradation, and alteration; and by increasing mortality rates and causing changes to species distribution and composition.
 - **Special-status plant species.** The Decker Alternatives would contribute to cumulative impacts on Nuttall desert-parsley and on predicted suitable habitat for multiple special-status plant species. These impacts would include clearing vegetation, constraining plant germination and growth through soil compaction and erosion, contributing to the spread of noxious weeds, affecting plant growth through dust deposition, increasing the risk of wildland fires, altering riparian and floodplain vegetation by changing hydrology, and altering vegetation communities as a result of maintenance activities.

- **Proposed and potentially induced coal mines**
 - **Special-status wildlife species.** Any build alternative would contribute to cumulative impacts as described for existing mines.
 - **Special-status plant species.** None of the build alternatives would contribute to cumulative impacts on occurrences of special-status plant species. Any build alternative would contribute to cumulative impacts on predicted suitable habitat for multiple special-status species, as described for existing mines.
- **Land management**
 - **Special-status wildlife species.** Any build alternative would contribute to cumulative impacts related to BLM land management plans by causing habitat degradation, especially in riparian habitats.
 - **Special-status plant species.** The Tongue River Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative impacts related to Fort Keogh operations by causing permanent vegetation loss, constraining plant germination and growth through soil compaction and erosion, contributing to the spread of noxious weeds, and altering vegetation communities because of maintenance activities.
- **Energy development**
 - **Special-status wildlife species.** Any build alternative would contribute to cumulative impacts by causing habitat loss, degradation, and alteration and by increasing mortality rates and causing changes to species distribution and composition. These cumulative impacts would be reduced on BLM-administered lands because BLM strives to maintain special-status species occurrence and habitat.
 - None of the build alternatives would contribute to cumulative impacts in conjunction with BLM energy development because BLM activities would maintain or enhance the presence of documented special-status plants. Any build alternative would contribute to cumulative impacts in conjunction with energy development outside of BLM-administered land, clearing vegetation, constraining plant germination and growth through soil compaction and erosion, contributing to the spread of noxious weeds, affecting plant growth through dust deposition, increasing the risk of wildland fires, altering riparian and floodplain vegetation by changing hydrology, and altering vegetation communities as a result of maintenance activities.
- **Construction projects**
 - **Special-status wildlife species.** The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative impacts related to Tongue River Road paving by increasing mortality rates and causing loss of habitats due to widening of the road.

- **Special-status plant species.** The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative impacts related to Tongue River Road paving by clearing vegetation, constraining plant germination and growth through soil compaction and erosion, contributing to the spread of noxious weeds, affecting plant growth through dust deposition, increasing the risk of wildland fires, altering riparian and floodplain vegetation by changing hydrology, and altering vegetation communities as a result of maintenance activities.

In summary, construction and operation of any build alternative would result in cumulative impacts on special-status species when combined with impacts from proposed and potentially induced coal mines, BLM land management, and energy development. Some build alternatives would result in cumulative impacts on special-status species when combined with impacts from existing coal mines, Fort Keogh activities, and the Tongue River Road paving project. These projects would have to comply with Montana DEQ and other state permits and approvals as well as BLM-required mitigation measures. OEA concludes that the direct impacts from the proposed rail line, when combined with impacts from past, present, and reasonably foreseeable projects and actions, would result in minor adverse cumulative impacts on special-status species.

U.4.7 Water Resources

U.4.7.1 Surface Water

Construction and operation of the proposed rail line would result in the following surface water impacts: physical alteration of surface water, degradation of water quality, and temporary surface water use (referred to hereafter as the *common surface water impacts*). Any build alternative would contribute to cumulative impacts on surface water by adding to impacts from other projects. The following subsections describe the impacts of other projects and how impacts from the proposed rail line, when added to the impacts of these projects, would result in cumulative impacts on surface water.

The other projects are described in Section U.3.3, *Projects Analyzed*. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and surface water is described in Chapter 9, Section 9.2, *Surface Water*. OEA defined the study area for impacts of the proposed rail line on surface water as two areas: the primary watersheds that would be crossed by the build alternatives, and the rights-of-way plus 400 feet of buffer on either side of the right-of-way (Chapter 9, Section 9.2.1, *Surface Water, Study Area*). The surface water cumulative impacts study area is defined as the watershed(s) in which both a build alternative and another relevant project would exist. This area accounts for the downstream or down-gradient impacts of the proposed rail line and other projects on surface water. OEA used the 10-digit hydrologic unit code from the Watershed Boundary Dataset for Montana as the watershed size for the study area. The study areas are different because surface water impacts throughout a watershed that are separated by a distance can have an effect on surface

waters in the watershed(s) that are outside of the immediate impact area. This is because surface waters do not function as separate and isolated components of the watershed, but rather as a single, integrated natural system. Disruption of any one part of this system would have consequences on the functioning of the entire system. The greater the area of impact in a watershed, the greater the potential to disrupt the system.

Existing Coal Mines and Colstrip Power Plant

Existing Coal Mines and Colstrip Power Plant Impacts on Surface Water

The existing coal mines and Colstrip Power Plant are already operating in the surface water cumulative impacts study area. Surface water is mapped throughout the RFD areas of the Rosebud, Spring Creek, and Decker Mines in the cumulative impacts study area (Section U.4.7.4, *Wetlands*). Assuming the entire RFD areas would be disturbed at some point during mining, development of the mines in these areas would encroach into these surface water bodies. Mining and related coal transportation at these existing mines would result in the common surface water impacts. Hydrologic and geomorphic impacts result from the elimination, interception (such as surface water withdrawals or impoundments), or redirection of surface water and groundwater, and changes in how surface water and sediment are transported across the landscape. Water quality impacts result from increased fine sediment erosion associated with landscape-level disturbance and vegetation clearing, construction and operation of access roads and staging areas, and coal and overburden processing and storage. Water quality impacts can also result from the discharge of saline groundwater to surface water during mine dewatering.

Mine impacts on surface water are not permanent because the mines operate in compliance with MCA 82-4 Part 2 and associated rules (ARM 17.24 – *Reclamation*). These rules protect hydrology, water quality, and water quantity of surface water and groundwater that may be affected by mining. For example, no land within 100 feet of a perennial stream or intermittent stream may be disturbed by mining operations, nor may the stream itself be disturbed, unless the original stream function is restored. During and after mining, the surface water quantity and quality, and other environmental resources of the stream and lands within 100 feet of the stream, cannot be adversely affected. Reclamation per MCA 82-4 Part 2 requires reducing disturbances to the prevailing hydrologic balance and water quality both at the mine site and in adjacent areas. This is achieved with the treatment and management of drainage and mined and reclaimed areas, restoration of recharge capacity to approximate premining conditions in mine areas, preservation of hydrologic functions in alluvial valley floods, and design and construction of reclaimed intermittent and perennial stream channels. Channel design plans are not limited to streams that are of critical hydrologic and ecologic importance, but also address alluvial valley floors, wetlands, steep erosive upland drainages, drainages named on U.S. Geological Survey (USGS) topographic maps, and intermittent and perennial streams (ARM 17.24.313). Because reclamation occurs concurrently with mine development, the related extent of impacts at any given time would be smaller than suggested

by the cumulative impacts study area as a whole. In addition, under the federal Clean Water Act (CWA), mitigation would be required to offset any loss of jurisdictional surface water.

The Colstrip Power Plant uses surface water for operations, which is withdrawn from Castle Rock Lake. Water from the Yellowstone River is pumped through two 30-mile pipelines to Castle Rock Lake, where it is stored for use at the power plant and by the City of Colstrip. Approximately 6,000 gallons per minute (8.64 million gallons per day) are pumped from Castle Rock Lake to the Colstrip Power Plant (City of Colstrip 2008).

Contribution of the Build Alternatives to Cumulative Impacts on Surface Water

The Colstrip Alternatives would be constructed and would operate near the Rosebud Mine and Colstrip Power Plant. Mine and power plant operations would continue during construction and operation of the build alternatives. The Decker Alternatives would be constructed and would operate near the Spring Creek and Decker Mines. Mine operations would continue during construction and operation of the build alternative; coal transport from the mines would coincide with operation of the build alternatives.

Impacts of the Colstrip Alternatives would include the common surface water impacts. The addition of impacts from the build alternatives to impacts from mining in the Rosebud Mine RFD area would result in cumulative impacts on surface water during mining. The addition of surface water impacts from the Decker Alternatives to the surface water impacts in the Spring Creek Mine and Decker Mine RFD areas would result in cumulative impacts on surface water during mining.

Proposed and Potentially Induced Coal Mines

Proposed and Potentially Induced Coal Mine Impacts on Surface Water

The proposed and potentially induced mines would be constructed and would operate in the surface water cumulative impacts study area. Development of the mine area would affect surface water, which is found through these mine areas (Section U.4.7.4, *Wetlands*). Mining and related coal transportation at the proposed and potentially induced mines would result in the common surface water impacts.

As with the existing mines, regulatory compliance would protect hydrology, water quality, and water quantity of surface and groundwater from mining. This is reflected in the permit application for the proposed Otter Creek Mine (Otter Creek Coal, LLC 2014), which describes how these impacts would be avoided and minimized. Impacts on surface water quantity and hydrologic flow would be reduced through a drainage control and containment system. Surface runoff would be directed to designed containment structures and water would be managed to optimize benefits to the hydrologic system. Discharge to surface water would not be planned during normal operations but would occur on rare occasions in response to runoff events that exceed the design capacity of the drainage control system. The

containment and control of runoff would reduce peak flows from the mine area to Otter Creek. Management of runoff water through the stormwater containment system would regulate the timing and magnitude of releases to Otter Creek. Approximately 1 percent of the entire Otter Creek drainage area would be under these control and containment measures. Any changes in flow from the drainage control system would be imperceptible and within the natural variability of flow observed in Otter Creek (Otter Creek Coal, LLC 2014).

The Otter Creek Mine permit application also states that impacts on water quality would be reduced through a containment and drainage control system. Baseline data for Otter Creek indicate that current conditions favor high amounts of sediment loading—as well as the metals they contain—during and following intense storm events. Under current conditions, this sediment can reach active waterways, including Otter Creek. The control and containment system would reduce sediment and metal loading into Otter Creek and associated tributaries. The result would be a net reduction in sediment load to Otter Creek. Any changes in water quality in Otter Creek due to mining would be imperceptible and within the natural variability of sediment load observed in Otter Creek (Otter Creek Coal, LLC 2014). No change in downstream existing surface water use, such as irrigation or livestock use, is anticipated from the proposed Otter Creek Mine, as there would be a similar amount of drainage for use before, during, and after mining.

The proposed and potentially induced mines would comply with all regulatory standards for the protection of surface water as described for existing mines, including MCA 82-4 Part 2 and the CWA mitigation requirements.

Contribution of the Build Alternatives to Cumulative Impacts on Surface Water

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would provide access to the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek Mine. The construction start and completion dates for the proposed Otter Creek Mine would depend on the construction schedule for the proposed rail line. The Decker Alternatives would provide access to the proposed Otter Creek Mine and to the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines. The Decker Alternatives would be the only build alternatives that would provide access to the potentially induced Canyon Creek Mine.

The build alternatives would result in the common surface water impacts. The addition of impacts from the build alternatives to impacts from the proposed and potentially induced mines would result in cumulative impacts on surface water during mining.

Land Management

Land Management Impacts on Surface Water

Fort Keogh Livestock and Range Research Laboratory

Fort Keogh is a land management project in operation that addresses cattle management and grazing. Surface water is found throughout Fort Keogh in the cumulative impacts study area. The vast majority of Fort Keogh is in a natural state, with agricultural research activities confined to areas between the Yellowstone River and I-94, and along the west side of the Tongue River. Future activities at Fort Keogh would consist of continued and new research projects in areas where research activities already occur. No planned activities would develop or disturb Fort Keogh beyond its current condition because the facility is protective of its natural state. If future research activities occur in or adjacent to surface water, water quality impacts would result from cattle defecation or nonpoint source pollutant inputs from equipment operations).

Tongue River Reservoir State Park

The proposed Tongue River Reservoir State Park project would renovate the Pee Wee Point North, Pee Wee Point South, and Sandpoint campgrounds. The MEPA/NEPA Checklist indicates that there would be minor impacts on drainage patterns or the rate and amount of surface runoff. Montana FWP also states that an increase of hard surface sites and roads would result in a minimal increase of runoff during major weather events, but it is unknown whether discharge into surface water or alteration of surface water quality would result. In their MEPA/NEPA Checklist, Montana FWP states that best management practices will be used during design and construction to reduce impacts on surface water.

BLM Resource Management Plan

The BLM Draft RMP/EIS would continue current management activities and identify new facilities or management strategies. The BLM Draft RMP/EIS addresses livestock grazing, wildlife habitat, special-designation areas, special recreation areas, national trails, and wilderness study areas. Surface water is found throughout BLM-administered lands in the cumulative impacts study area. A wide range of surface-disturbing activities would occur on BLM-administered lands under the RMP, including mineral and energy exploration; leasing; development (including renewable energy and geophysical exploration); vehicle use; developing rights-of-way; land use; developing infrastructure; vegetation or fuel treatment (including the sale or harvest of hay, timber, wood, or seed); establishing wildfire fuel breaks, and implementing a range of improvements. These activities would result in surface water impacts should they encroach on surface water on BLM-administered lands in the cumulative impacts study area. The preferred alternative in the BLM Draft RMP/EIS states that activities that would affect surface water or that would not benefit the functionality of surface water would be avoided in those areas; if avoidance is not possible, the activity

would require special design to minimize impacts. Activities that would disturb the ground surface or that would affect nearby surface water (via sediment mobilization or petrochemical spills) would result in the common surface water impacts. The extent and degree of impacts would depend on the type of activity and the location of surface water relative to the activity. However, the goal of the BLM Draft RMP/EIS is to maintain water quality, water quantity, and watershed functionality. BLM would implement measures (including best management practices and reclamation) to avoid and reduce surface water impacts. Such actions would include restricting off-highway vehicle use, using buffers to reduce nonpoint source pollution, and restricting or prohibiting surface disturbance, particularly near surface water.

Beaver Creek Landscape Management Project

Implementation of the Beaver Creek LMP would promote a healthier and more resilient ponderosa pine ecosystem on 14,000 acres of forest by using large tree removal, fire applications, and selective vegetation thinning. These practices would promote fires that are of lower intensity and less severe than those caused by stand replacement fires. The U.S. Forest Service's chosen alternative in the plan's Record of Decision indicates that one stream would be directly affected by a road crossing, but only during the harvesting activities. Other surface water impacts would include sedimentation in streams from harvesting and surface disturbance activities. These would be short-term impact and would be avoided and reduced through best management practices. Because of the short-term nature of these impacts, the U.S. Forest Service states that no long-term impacts on surface water would be anticipated.

Contribution of the Build Alternatives to Cumulative Impacts on Surface Water

Fort Keogh Livestock and Range Research Laboratory

The Tongue River Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be constructed and operate near where research activities occur in Fort Keogh. The addition of impacts from the build alternatives to the impacts from Fort Keogh management activities would result in cumulative impacts on surface waters, including physical alteration of surface water, degradation of water quality, and temporary surface water use.

Tongue River Reservoir State Park

The Decker Alternatives would be constructed and would operate near the Tongue River Reservoir State Park. The build alternatives would result in the common surface water impacts. The addition of impacts from the build alternatives to impacts from the renovation project would contribute to cumulative impacts on surface water, including physical alteration of surface water, degradation of water quality, and temporary surface water use.

BLM Resource Management Plans

Any build alternative would be constructed and operate in landscapes affected by land management practices under the BLM Draft RMP/EIS. The build alternatives would result in the common surface water impacts. The addition of impacts from the build alternatives to impacts from BLM management practices would contribute to cumulative impacts on surface water, including physical alteration of surface water, degradation of water quality, and temporary surface water use.

Beaver Creek Landscape Management Project

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be constructed and operate near the forest managed under the Beaver Creek LMP. The build alternatives would result in the common surface water impacts. The addition of impacts from the build alternatives to impacts from the Beaver Creek LMP would result in short-term cumulative impacts on surface water.

Energy Development

Energy Development Impacts on Surface Water

The BLM Draft RMP/EIS would promote oil and natural gas projects on 5.4 million acres of leased land in Rosebud, Custer, Powder River, and Big Horn Counties (the four-county area). OEA estimated that 1,158 CBNG wells would be developed between 2011 and 2030, and considers this estimate much higher than the number of wells that will be permitted and completed. It should be noted that none of the currently approved wells would be in the project area or near the build alternatives (Section U.3.3.4, *Energy Development*). In addition to well development on BLM-administered lands, oil and gas exploration and development continues throughout southeastern Montana on federal, state, tribal, and private lands.

According to GIS data from the Montana Board of Oil and Gas Conservation (no date), no existing or abandoned wells are located in surface water in the cumulative impacts study area. Any encroachment into surface water from oil and gas well development would affect surface water. Associated well development activities and infrastructure (such as constructing access roads and operating equipment) that would disturb the ground surface outside of a surface water body would also affect nearby surface water if sediment is mobilized or petrochemicals are spilled. The extent and degree of such an impact would depend on the type of activity and the location of surface water relative to the activity.

Water produced from CBNG wells would also affect surface water. CBNG wells extract large amounts of water from aquifers overlying coal seams, allowing pressurized gas to escape through the wellhead to the surface. This groundwater extraction can alter hydrologic conditions in surrounding water bodies. Excessive groundwater pumping in systems that are primarily fed by groundwater can deplete streamflows. However, the discharge of process

water into nearby drainages can also increase streamflows (Davis et al. 2010, Wyoming Game and Fish Department 2010). These discharges can also alter water quality, as water from CBNG wells is typically more saline, has higher conductivity, and contains higher concentrations of carbonate and bicarbonate ions than surface water. The primary constituents of concern in produced water are salinity concentrations as measured by EC and SAR (Bureau of Land Management 2013). The extent and degree of impacts from water produced by CBNG wells would depend on where produced waters would be discharged to a surface water body.

Impacts on surface water from energy development would be reduced through regulatory compliance or other measures. For development on BLM-administered lands, the preferred alternative in the Draft RMP/EIS stipulates that a NSO restriction be placed on oil and gas well development for surface water. This restricts all oil and gas well development in any surface water. The goal of the BLM Draft RMP/EIS is to maintain water quality, water quantity, and watershed functionality. BLM would implement measures (best management practices and reclamation) to avoid and reduce surface water impacts. Such actions would include using buffers to reduce nonpoint source pollution and restricting or prohibiting surface disturbance, particularly near surface water. These actions would reduce the impacts of energy development on surface water.

Several statutes and guidelines protect surface water impacts. Montana DEQ (in 2003 and revised in 2006) established EC and SAR water quality standards specifically for all streams in the Tongue River and Rosebud Creek Basins (ARM 17.30.670); this includes the mainstem Tongue River and Rosebud Creek and all of their tributaries. In addition, any discharge of produced waters into a surface water body would require a MPDES permit to protect surface water quality. Compliance with ARM 17.30.670 and MPDES permits would reduce impacts from CBNG-produced water.

Reclamation is a component of natural gas and oil well development in Montana, and all areas disturbed by such development must comply with MCA 82-10-400 *et seq.* Mitigation would be required for jurisdiction surface water under the CWA.

Contribution of the Build Alternatives to Cumulative Impacts on Surface Water

Any build alternative would be constructed and would operate in landscapes affected by future oil and gas development. Most of the region around the proposed rail line has a low potential for development. There is moderate potential for development around the Decker Alternatives.

Build alternatives would result in the common surface water impacts. The addition of impacts from the build alternatives to impacts from energy development would result in cumulative impacts on surface water. The extent and degree of cumulative surface water impacts would depend on the amount of disturbance (the size, location, and number of wells actually developed) and the measures implemented to reduce impacts.

Construction Projects

Construction Project Impacts on Surface Water

Tongue River Road Paving

The 32.7-mile paving project proposed for Tongue River Road would affect surface water adjacent to the road. Surface water along Tongue River Road is more prevalent where the road approaches the Tongue River. The most likely impacts would be water quality impacts. Fine sediment erosion from unpaved roadways is a common source of water quality degradation, with the effects diminishing at distances greater than 50 feet between roadways and surface water due to the filtering effects of vegetation (U.S. Forest Service 2011). Roadway paving would reduce fine sediment erosion and associated impacts where the road is near surface water. In contrast, paving would increase the runoff rate from the road surface, potentially increasing bed and bank erosion at discharge points. This would result in water quality impacts. Impervious road surfaces are also associated with the increased discharge of stormwater pollutants to surface water, including metals, petroleum products, and related chemicals (EnviroVision et al. 2008, Washington State Department of Transportation 2011). These impacts would be magnified in smaller perennial and intermittent streams because they would receive a larger amount of stormwater runoff per unit of volume than in larger streams or rivers (e.g., Tongue River). While construction and operation of the road has likely already affected surface water, additional impacts would result from paving and road and right-of-way widening that encroaches into surface water. The impacts would include the common surface water impacts. The extent and degree of these impacts would depend on the location, width, and distance of road widening. Impacts to jurisdictional surface water under the CWA would require mitigation to offset surface water impacts.

Bull Pasture Subdivision Leasing

Leasing the 38.55-acre bull pasture subdivision would not affect surface water because no surface water is mapped on the land parcel. In addition, the bull pasture subdivision is not located in the cumulative impacts study area. Therefore, no additional analysis of cumulative impacts on surface water is warranted.

Contribution of the Build Alternatives to Cumulative Impacts on Surface Water

Tongue River Road Paving

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be crossed by the paving project. The addition of impacts from the build alternatives to the impacts of the paving project would result in cumulative impacts on surface water. The impacts would include the common surface water impacts.

The extent and degree of these impacts would depend on the locations of paving and widening, the amount of disturbance, and the measures implemented to reduce impacts.

Cumulative Impact Summary: Surface Water

The proposed rail line would affect surface water and would combine with impacts from the other projects to result in cumulative impacts on surface water in the study area. The contribution of the proposed rail line to cumulative impacts is summarized as follows.

- **Existing coal mines and Colstrip Power Plant.** The Colstrip Alternatives and Decker Alternatives would contribute to cumulative impacts on surface water through physical alteration of surface water, degradation of water quality, and temporary surface water use.
- **Proposed and potentially induced coal mines.** Any build alternative would contribute to cumulative impacts on surface water as described for existing mines.
- **Land management.** The Tongue River Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative impacts on surface water related to Fort Keogh by degradation of water quality. The Decker Alternatives would contribute to cumulative impacts related to Tongue River Reservoir State Park renovation by physical alteration of surface water and degradation of water quality. Any build alternative would contribute to cumulative impacts related to BLM land management plans through degradation of water quality. The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative impacts related to forest management under the Beaver Creek LMP through physical alteration of surface water and degradation of water quality.
- **Energy development.** Any build alternative would contribute to cumulative impacts related to BLM energy development, including degradation of water quality. Any build alternative would contribute to cumulative impacts related to energy development outside of BLM-administered lands by physical alteration of surface water, degradation of water quality, and temporary surface water use.
- **Construction projects.** The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative impacts related to road paving by physical alteration of surface water, degradation of water quality, and temporary surface water use.

In summary, construction and operation of any build alternative would result in cumulative impacts on surface water when combined with impacts from proposed and potentially induced coal mines, land management, and energy development. Some build alternatives would result in cumulative impacts on surface water when combined with impacts from existing coal mines, Fort Keogh activities, Tongue River Reservoir State Park renovations, Beaver Creek LMP, and the Tongue River Road paving project. These projects would have to comply with Montana DEQ and other state permits and approvals, BLM-required

mitigation measures, and Clean Water Act mitigation requirements. OEA concludes that the direct impacts from the proposed rail line when combined with impacts from past, present, and reasonably foreseeable projects and actions would result in adverse cumulative impacts on surface water.

U.4.7.2 Groundwater

Construction and operation of the proposed rail line would result in the following groundwater impacts: altered infiltration and recharge characteristics, temporarily degraded groundwater quality, and temporarily disrupted groundwater balances (referred to hereafter as the *common groundwater impacts*). Permanently closed groundwater wells within the right-of-way for each build alternative may also occur. Any build alternative would contribute to cumulative impacts on groundwater by adding to impacts from other projects. The following subsections describe the impacts of these other projects and how potential impacts from the proposed rail line, when added to the impacts of these projects, would result in cumulative impacts on groundwater. Regarding temporarily disrupted groundwater balances affecting groundwater availability, an appropriator's (water right holder's) plan must demonstrate that the proposed lease can be implemented and operated to prevent an adverse effect¹⁵ as specified by ARM, 36.12.2101.

The other projects are described in Section U.3.3, *Projects Analyzed*. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and groundwater is described in Chapter 9, Section 9.3, *Groundwater*. OEA defined the study area for the impacts of the proposed rail line on groundwater as the Nonglaciaded Central Groundwater Region¹⁶ in Big Horn, Custer, Powder River, and Rosebud Counties (Chapter 9, Section 9.3, *Groundwater*, Figure 9.3-1). The groundwater cumulative impacts study area is consistent with this study area.

Existing Coal Mines and Colstrip Power Plant

Existing Coal Mines and Colstrip Power Plant Impacts on Groundwater

The existing coal mines and Colstrip Power Plant are already operating in the groundwater cumulative impacts study area. Coal mining results in the removal of the lowest aquifer mined and all aquifers above it. Short-term impacts of coal mining include a decline in groundwater level, drawdown in the adjacent aquifer, and a decline in water quality (e.g., increased amounts of total dissolved solids [TDS]). Long-term or permanent impacts include

¹⁵ The term *adverse effect* is specific to ARM 36.12.2101 and is used in this analysis in reference to the requirements of those rules.

¹⁶ There are three groundwater regions in Montana: Western Mountain Ranges, Glaciaded Central Region, and Nonglaciaded Central Region. The state is divided into these three groundwater regions based on the different landforms and geology in the area.

removal or modification of the aquifer, creation of a spoil aquifer,¹⁷ a change in hydrologic properties (e.g., hydraulic conductivity, or the aquifer's ability to transmit water), a change in local recharge, and destruction of groundwater wells. Destroyed groundwater wells must be replaced after mining (ARM 17.24.1116).

BLM prepared an EIS to assess the impacts of coal mining in the Powder River region, which includes Rosebud, Powder River, and Big Horn Counties (Bureau of Land Management 1984). The Rosebud, Spring Creek, and Decker Mines were included in this BLM EIS, which estimated that mine operations would require 3.04 to 4.1 billion gallons (9,340 to 12,590 acre-feet) of groundwater per year, depending on the mining alternative. BLM stated that most of the needed water would be supplied from pit dewatering operations, although additional wells would be required for potable supplies. The BLM EIS estimated that approximately 275 to 425 existing groundwater wells would be destroyed or impaired. BLM concluded that coal mining impacts from the existing mines on groundwater are restricted to an area within a few miles of the mine sites, and have little effect on regional groundwater systems. Water levels in wells near the mines are lowered during mining but would return to near premining levels after the mine was reclaimed. Recharge would probably increase in many areas because the post-mining slope of the land surface would be less steep and because reclamation practices to retain moisture and prevent erosion would increase infiltration (Bureau of Land Management 1984). The change in the groundwater level surrounding the mine depends on aquifer characteristics, recharge rates, and pumping rates. The decline is greatest in the mine itself; it decreases with distance from the mine edges to negligible amounts within a few miles of the mine boundary (Bureau of Land Management 1984).

The water in the spoil aquifer is of poorer quality than the water in the original aquifers. The water quality in this area would eventually return to premining conditions, but this would take many years, even thousands of years (Bureau of Land Management 1984). Although groundwater TDS levels may show appreciable change (Williams and Clark 1994), the degraded water quality would not substantially reduce the utility of the water for its current main use (stock water) in this area of Montana (Interstate Commerce Commission 1985).

As mentioned in Section U.3.3.2, *Proposed and Potentially Induced Coal Mines*, Montana law requires that all mines be reclaimed under a reclamation plan approved by Montana DEQ. Mining companies are required to post performance bonds, or financial assurance, large enough to cover the full costs of reclamation, to ensure the public is not left responsible for cleaning up abandoned mines if a company fails to complete its reclamation plan. To achieve final bond release (referred to as phase IV) in Montana, an entire drainage must meet all reclamation standards, including restoration of the hydrologic balance. With respect to

¹⁷ Coal mining removes the coal and replaces it with overburden (spoil or waste). Over time, aquifers are reestablished in a rubble zone at the base of the spoil.

groundwater and the hydrologic balance, reclamation phase IV is deemed to have been completed when the following steps have been met.

- Disturbance has been minimized and offsite material damage has been prevented in accordance with the Montana Strip and Underground Mine Reclamation Act, ARM, and the approved permit.
- Alternative water sources to replace water supplies that have been adversely affected by mining and reclamation operations have been developed and are functional in accordance with the Act, ARM, and the approved permit.
- The re-establishment of essential hydrologic functions and agricultural productivity on alluvial valley floors has been achieved (ARM 17.24.1116).

Contribution of the Build Alternatives to Cumulative Impacts on Groundwater

The Colstrip Alternatives would be constructed and would operate near the Rosebud Mine and Colstrip Power Plant. Mine and power plant operations would continue during construction and operation of the build alternative. The Decker Alternatives would be constructed and would operate near the Spring Creek and Decker Mines. Mine operations would continue during construction and operation of the build alternative; coal transport from the mines would coincide with operation of the build alternative.

The Colstrip Alternatives and Decker Alternatives would result in the common groundwater impacts. All of these impacts (except temporarily degraded groundwater quality) are associated with construction of the build alternative. Although unlikely, rail operation would temporarily degrade groundwater quality if any contaminants (e.g., diesel fuel) were released and reached groundwater through infiltration.

Construction of the Colstrip and Colstrip East Alternatives would permanently close 11 and 9 wells, respectively, and would require an estimated 297.2 and 390.4 million gallons (912 and 1,198 acre-feet) of water, respectively. Construction of the Decker and Decker East Alternatives would permanently close one well each, and would require an estimated 726.0 million and 736.8 million gallons (2,228 and 2,261 acre-feet) of water, respectively (Montana Bureau of Mines and Geology 2013). Additional wells would be closed in the area near the coal mines. The Decker Alternatives would close one groundwater well within 5 miles of the Spring Creek and Decker Mines (Figure U-2). The Colstrip Alternatives would close three groundwater wells within 5 miles of the Rosebud Mine and Colstrip Power Plant.

The addition of impacts from the build alternatives to impacts from the existing mines and power plants would result in cumulative impacts on groundwater quantity. The extent of these cumulative impacts would depend on whether TRRC withdraws groundwater from wells located near the existing mines. However, because the proposed rail line would be long and wells must draw on a limited capacity, not all water would be obtained in the same area and or even from the same aquifer. Assuming that groundwater is withdrawn in the

areas near the mines, this withdrawal would not affect the existing groundwater uses in the area. The appropriator's permit application must demonstrate two conditions: operation of the proposed lease will not exceed historic use, including flow rate, historic diverted volume, and historic consumptive volume; and the proposed lease is capable of being implemented and operated to prevent an adverse effect under ARM 36.12.2101. Cumulative impacts would be reduced through compliance with related laws, regulations, and permits; and implementation of other measures.

The addition of impacts from the build alternatives to impacts from the existing mines and power plants would also result in cumulative impacts on groundwater quality. These impacts would be limited to the areas where the build alternatives are near the existing mines: in the areas near the northern segment of the Colstrip Alternatives and near the southern segment of the Decker Alternatives (Figure U-2). Cumulative impacts would include all of the common groundwater impacts plus well closures. The extent of a build alternative's contribution to altered infiltration and recharge would be related to its footprint near the existing mines and power plant. This footprint would be small compared to the size of the coal mines.

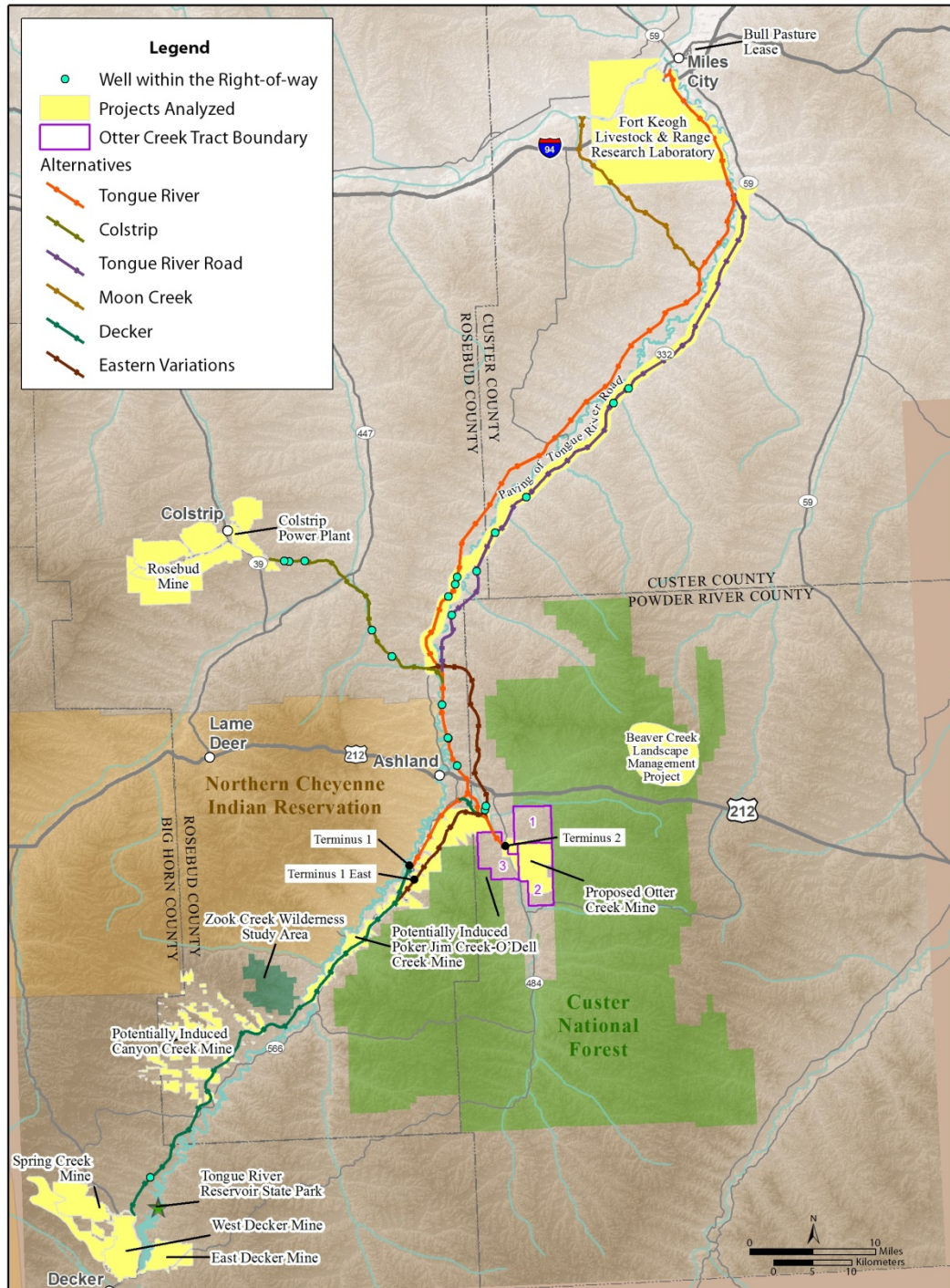


Figure U-2. Groundwater Wells within the Build Alternatives' Rights-of-Way

Proposed and Potentially Induced Coal Mines

Proposed and Potentially Induced Coal Mine Impacts on Groundwater

The proposed and potentially induced mines would be constructed and would operate in the groundwater cumulative impacts study area. Construction and operation of these mines would result in the common groundwater impacts, as described for existing mines.

The strip mining permit application for the proposed Otter Creek Mine (Otter Creek Coal, LLC 20124) describes the probable hydrologic consequences of the mine project as well as measures to protect groundwater quantity and quality (MCA 82-4-222 and associated ARM). A groundwater model was developed to aid evaluation of potential hydrologic impacts associated with groundwater flow, groundwater quality, and re-establishment of groundwater levels. Mine dewatering rates are expected to be greatest during the first 2 to 5 years of pit development. Regarding groundwater quantity, mining would not change current groundwater uses in the area. Modeled drawdown was greatest within 1 mile of the dewatering simulation. Modeling indicates that water levels in alluvium would be fully recovered approximately 20 to 30 years after the end of mine dewatering. Regarding groundwater quality, an initial increase in TDS is expected. Given an approximate average TDS of 1,750 milligrams per liter (mg/L) for the Knobloch coal,¹⁸ TDS in spoils groundwater would range from 2,650 to 5,250 mg/L. The proposed Otter Creek Mine mining and reclamation plan incorporates measures to protect groundwater quality and quantity.

The proposed Otter Creek Mine would remove four wells, and eleven wells might experience slight to moderate drawdown (Otter Creek Coal, LLC 2014). Replacement wells would be installed if the post-mine use requires wells or for monitoring purposes. The cumulative hydrologic impact analysis of the proposed mine states that the mine plan has been designed to minimize hydrologic impacts and prevent material damage to hydrologic resources outside the permit area, and the nature of the hydrologic system is such that projected impacts would be so slight as to be undiscernible. Groundwater dewatering and water management practices would provide additional data on cumulative impacts from expanded coal mining in the area. However, any impacts associated with mining are not expected to violate water quality standards, degrade water quality, or reduce the volume of water to a point that the current uses would be impaired or damaged (Otter Creek Coal, LLC 2014).

Contribution of the Build Alternatives to Cumulative Impacts on Groundwater

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would provide access to the proposed Otter Creek Mine and the

¹⁸ The only coal seam of economic interest on the Otter Creek coal tracts is called the Knobloch coal seam. The Knobloch ranges from 59 to 72 feet in thickness (Otter Creek Coal, LLC 2014).

potentially induced Poker Jim Creek–O’Dell Creek Mine. The construction start and completion dates for the proposed Otter Creek Mine would depend on the construction schedule for the proposed rail line. The Decker Alternatives would provide access to the proposed Otter Creek Mine and to the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines. The Decker Alternatives would be the only build alternatives that would provide access to the potentially induced Canyon Creek Mine.

The build alternatives would result in the common groundwater impacts. Table U-48 shows the estimated number of wells that would be closed and estimated amount of water needed during construction of the build alternatives that would provide access to the proposed Otter Creek Mine and contribute to cumulative impacts (Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives).

Table U-48. Water Wells within the Build Alternatives’ Rights-of-Way and Estimated Water Use for Construction

Build Alternative	Number of Wells Displaced	Construction Water Use (million gallons)
Tongue River	7	395.6
Tongue River East	5	591.4
Colstrip	11	297.2
Colstrip East	9	390.4
Tongue River Road	10	592.1
Tongue River Road East	8	677.1
Moon Creek	7	587.5
Moon Creek East	5	783.3

The addition of the impacts from the build alternatives to the impacts of the proposed and potentially induced mines would result in cumulative impacts. Any cumulative impacts related to groundwater quantity or quality would be limited geographically and would not be permanent, lasting only during construction of the build alternative in these areas. Both the proposed Otter Creek Mine and the proposed rail line would involve closing wells. The Tongue River East Alternative, Colstrip East Alternative, Tongue River Road East Alternative, and Moon Creek East Alternative would close two groundwater wells within 5 miles of the proposed Otter Creek Mine (Figure U-2). The Tongue River Alternative, Colstrip Alternative, Tongue River Road Alternative, and Moon Creek Alternative would close one groundwater well within 5 miles of the proposed Otter Creek Mine. None of the build alternatives would close a groundwater well near the potentially induced mines.

The extent of cumulative impacts on groundwater quantity would depend on whether TRRC withdraws groundwater from wells located near the proposed Otter Creek Mine. However, because the proposed rail line would be long and wells must draw on a limited capacity, not all water would be obtained in the same area or even from the same aquifer. Assuming that groundwater is withdrawn in the area near the proposed Otter Creek Mine, this withdrawal would not affect the existing groundwater uses in the area (per required compliance with

ARM 36.12.2101). Cumulative impacts would be reduced through compliance with related laws, regulations, and permits and implementation of other measures.

Construction of either of the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines is not expected to begin until 2021 and 2025, respectively. Therefore, any cumulative groundwater impacts associated with these two mines would be limited to impacts caused by operation of the Decker Alternatives. Although unlikely, rail operation impacts would include temporary water quality degradation if any contaminants (e.g., diesel fuel) were released and reached groundwater through infiltration. When combined with the groundwater quality impacts from these two potentially induced mines (increased TDS), the Decker Alternatives would not contribute to any measureable long-term cumulative impact on groundwater.

Land Management

Land Management Impacts on Groundwater

Fort Keogh Livestock and Range Research Laboratory

Fort Keogh is an operating land management project that addresses cattle management and grazing. Fort Keogh has federal reserved water rights for the following uses: irrigation, stock, administrative, and emergency fire suppression (MCA 85-20-1101). A federal reserved water right is a right to use water under federal law based on a Congressional act or treaty that reserved lands for a specific purpose.

The Montana Reserved Water Rights Compact Commission was created by the Montana Legislature in 1979 to act on behalf of the state and its water users to settle the water rights associated with reserved federal land, such as Fort Keogh. The commission negotiates with federal agencies (and Indian tribes) that claim federal reserved water rights within Montana. The commission and Fort Keogh are currently negotiating to increase Fort Keogh’s water use. A proposed negotiated settlement would quantify the federal reserved water rights for Fort Keogh as summarized below (Montana Department of Natural Resources and Conservation 2014).

- **Stockwater rights.** Small dams, wells, and direct stockwater use at specified locations at Fort Keogh have historically (and currently) supplied water for 2,500 animal units in Fort Keogh. Stock may increase by an additional 2,500 animal units in the future under the proposed agreement.
- **Administrative use rights.** Fort Keogh would use up to 36 acre-feet (11.7 million gallons) per year (currently allowed to use up to 26.7 acre-feet [8.7 million gallons] per year) from surface water and/or groundwater for conducting research, dust abatement, reclamation, or other administrative purposes. Irrigation water comes from surface water (Yellowstone River).

Tongue River Reservoir State Park

The proposed Tongue River Reservoir State Park project would renovate the Pee Wee Point North, Pee Wee Point South, and Sandpoint campgrounds. According to the MEPA/NEPA Checklist, the project would not affect groundwater quantity and would not increase the risk of groundwater contamination. The MEPA/NEPA Checklist also states that the project would not affect any existing water right or reservation. Therefore, no additional analysis of cumulative impacts on groundwater is warranted.

BLM Resource Management Plan

The BLM RMP/ EIS would continue current management activities and identify new facilities or management strategies. The BLM RMP/ EIS addresses livestock grazing, wildlife habitat, special-designation areas, special recreation areas, national trails, and wilderness study areas. The BLM RMP/ EIS states that changes in vegetation structure and composition would alter the quantity and quality of groundwater and the rate of groundwater recharge, but does not provide a quantitative assessment. These impacts would be a natural result of healthier vegetation. Because evapotranspiration rates, rooting depth, and vegetative cover vary by species, a change would affect water (e.g., changes in erosion and sedimentation rates, infiltration, amount of overland flow, evaporation, and turbidity). In the long term, treatments would promote watershed function and improve water quality. Herbicide treatments would affect groundwater quality. Generally, shallow groundwater aquifers would be at greater risk for contamination.

Beaver Creek Landscape Management Project

Implementation of the Beaver Creek LMP would promote a healthier and more resilient ponderosa pine ecosystem on 14,000 acres of forest by using large tree removal, fire applications, and selective vegetation thinning. These practices would promote fires that are of lower intensity and less severe than those caused by stand replacement fires. Based on the location of the Beaver Creek LMP, there would be no overlap of areas. Therefore, no additional analysis of cumulative impacts on groundwater is warranted.

Contribution of the Build Alternatives to Cumulative Impacts on Groundwater

Fort Keogh Livestock and Range Research Laboratory

The Tongue River Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be constructed and operate near where research activities occur in Fort Keogh. If construction of the build alternative requires water withdrawals from wells near Fort Keogh, the build alternatives would affect groundwater. The addition of these impacts to the impacts from Fort Keogh would result in short-term cumulative drawdown impacts that would last throughout construction. However, this withdrawal would not affect the

existing groundwater uses in the area (per required compliance with ARM 36.12.2101). Long-term cumulative impacts are not expected.

BLM Resource Management Plan

Any build alternative would operate in landscapes affected by land management practices under the BLM Draft RMP/EIS. The build alternatives would result in the common groundwater impacts. If construction or operation of any build alternative overlaps in time and space with the BLM's vegetation management activities on BLM-administered land, cumulative impacts on groundwater would result. However, even when combined with a potential reduction in the rate of groundwater recharge from BLM's vegetation management activities, groundwater withdrawal during construction of the build alternative would not affect the existing groundwater uses in the area. Combined with potential improvements in groundwater quality from improved watershed conditions, the contaminant releases during rail line operation would not result in measurable impacts on groundwater quality. No long-term cumulative impacts are expected.

Energy Development

Energy Development Impacts on Groundwater

The BLM Draft RMP/EIS would promote oil and natural gas projects on 5.4 million acres of leased land in Rosebud, Custer, Powder River, and Big Horn Counties (the four-county area). OEA estimated that 1,158 CBNG wells would be developed between 2011 and 2030, and considers this estimate much higher than the number of wells that will be permitted and completed. It should be noted that none of the currently approved wells would be in the project area or near the build alternatives (Section U.3.3.4, *Energy Development*). In addition to well development on BLM-administered lands, oil and gas exploration and development continues throughout southeastern Montana on federal, state, tribal, and private lands.

CBNG wells produce large amounts of water (*produced water*), which is extracted from aquifers overlying coal seams that release enough pressure to allow the gas to escape through the well head to the surface. Produced water from CBNG well development affects the quality of groundwater through impoundments, injection, and potential discharge to surface water. Left untreated, produced water discharge and infiltration or leaking produced-water disposal pits can reach stream channels via subsurface flow, which decreases water quality. Permits from BLM, Montana Board of Oil and Gas Conservation, and Montana DEQ include requirements to minimize or mitigate these impacts. Underground injection control regulations isolate injection zones from useable or potentially useable aquifers, which limit the impacts (Bureau of Land Management 2013).

If aquifers were hydraulically connected to nearby streams and springs, the drawdown of groundwater would result in flow depletion. Coal beds in the Powder River Basin are generally separated from other aquifers by shale units that act as confining beds or aquitards

(compacted soils near an aquifer that retard flow) (Montana Department of Natural Resources and Conservation 2009). Due to these confining shale units, significant drawdown in response to CBNG production would be limited to the coal aquifers. Groundwater is not expected to migrate vertically to affect overlying or underlying aquifers in most areas (Wheaton et al. 2006). Typically, produced water from conventional oil and gas wells would originate from a depth below useable aquifers or coal seams.

In 1999, in anticipation of expected groundwater withdrawals associated with CBNG development, the DNRC issued a Final Order establishing a controlled groundwater area in the Powder River Basin under MCA 85-2-506 (Montana Department of Natural Resources and Conservation 1999). This designation only applies to wells designed and installed for the extraction of CBNG. CBNG operators must offer water mitigation agreements to owners of water wells or natural springs within 0.5 mile of a CBNG field proposed for approval by the Montana Board of Oil and Gas Conservation or within the area that the operator reasonably believes may be affected by CBNG production, whichever is greater. The mitigation agreement must provide for prompt supplementation or replacement of water from any natural spring or water well adversely affected by the CBNG well. Mutually agreed-upon mitigation agreements are intended to address the reduction or loss of water resources (Montana Department of Natural Resources and Conservation 1999).

Contribution of the Build Alternatives to Cumulative Impacts on Groundwater

Any build alternative would operate in landscapes affected by future oil and gas development. Most of the region around the proposed rail line has a low potential for development. There is moderate potential for development around the Decker Alternatives. Build alternatives would result in the common groundwater impacts.

The addition of impacts from the build alternatives to impacts from energy development would result in cumulative impacts on groundwater. However, few oil wells would be located near the build alternatives (Figure U-1). Twelve gas wells are located in the northern portion of the cumulative impacts study area and a similar number of CBNG wells are located near the southern end in an area with medium to high oil and gas development potential (Figure U-2). Any cumulative impacts related to groundwater quantity or quality would be limited geographically and would last only during construction of the proposed rail line.

The extent of cumulative impacts on groundwater quantity would depend on whether TRCC withdraws groundwater from wells located near the existing or future oil and gas wells. However, because the proposed rail line would be long and wells must draw on a limited capacity, not all water would be obtained in the same area or even from the same aquifer. Also, groundwater withdrawn from energy development projects comes from aquifers that are deeper than those used for rail line construction. Groundwater withdrawal would not affect the existing groundwater uses in the area (per required compliance with ARM

36.12.2101) and cumulative impacts on groundwater quality would not be permanent. Cumulative impacts would be reduced through compliance with related laws and regulations, including the requirements associated with the Powder River Basin Controlled Groundwater Area, as well as permits and implementation of the mitigation measures described in Chapter 19, *Mitigation*.

Construction Projects

Construction Project Impacts on Groundwater

Tongue River Road Paving

The 32.7-mile paving project proposed for Tongue River Road would result in long-term altered infiltration because of soil compaction and impervious pavement.

Bull Pasture Subdivision Leasing

Leasing the 38.55-acre bull pasture subdivision would lead to a variety of land disturbance activities that would affect groundwater. The extent and degree of the impacts would depend on what the lessor would decide to do with the land parcel. The bull pasture subdivision currently contains two groundwater wells (Montana Bureau of Mines and Geology 2013). Additional wells would be drilled on the property in the future that would draw down on the aquifer. Construction of buildings, roads, parking lots, or other infrastructure would also alter water infiltration locally.

Contribution of the Build Alternatives to Cumulative Impacts on Groundwater

Tongue River Road Paving

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be crossed by the paving project. The addition of impacts from the build alternatives to impacts from the road paving project would result in cumulative impacts associated with altered infiltration of water into the ground. The extent of the altered infiltration would be correlated with the footprints (length and width) of the road and proposed rail line, which represent a small area within the groundwater study area. Any cumulative impacts associated with local groundwater recharge are not likely to be measurable.

Bull Pasture Subdivision Leasing

The Tongue River Alternatives and Tongue River Road Alternatives would be closest to the Bull Pasture Subdivision Leasing project. The addition of impacts from the build alternatives to impacts from the road paving project would result in cumulative impacts on groundwater. Any cumulative impacts related to groundwater quantity or quality would be limited

geographically and most impacts would not be permanent, lasting only during construction of the proposed rail line in these areas. The extent and degree of these impacts would depend on what the future lessor would decide to do with the land parcel.

Cumulative Impact Summary: Groundwater

The proposed rail line would affect groundwater and would combine with impacts from the other projects to result in cumulative impacts on groundwater in the cumulative impacts study area. The contribution of the proposed rail line to cumulative impacts is summarized as follows.

- **Existing coal mines and Colstrip Power Plant.** The Colstrip Alternatives and Decker Alternatives would contribute to cumulative impacts by altering infiltration and recharge characteristics, temporarily disrupting water balances, closing wells, and temporarily degrading water quality. Cumulative groundwater impacts would occur in the area near the northern segment of the Colstrip Alternatives and in the area near the southern segment of the Decker Alternatives.
- **Proposed and potentially induced coal mines.** Any build alternative would contribute to cumulative impacts on groundwater as described for the existing mines. Because the rail line is proposed to be completed by 2018, cumulative groundwater impacts would combine with impacts from construction and operation of the proposed Otter Creek Mine. Build alternatives overlapping in time and space with the proposed Otter Creek Mine include the Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives. Because construction of the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines is not expected to begin until 2021 and 2025, respectively, any cumulative groundwater impacts associated with these two mines would be limited to impacts resulting from operation of the Decker Alternatives. Although unlikely, operations impacts would include temporary water quality degradation if any contaminants (e.g., diesel fuel) released were to reach groundwater through infiltration.
- **Land management.** The Tongue River Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative impacts related to Fort Keogh by temporarily disrupting water balances as water is drawn from nearby wells for construction of the proposed rail line. These impacts would last the duration of construction and would not affect the existing groundwater uses in the area.
- Any build alternative would contribute to cumulative impacts related to the BLM Draft RMP/EIS by disrupting water balances and degrading water quality. Combined with a potential reduction in the rate of groundwater recharge from BLM’s vegetation management activities, groundwater withdrawal during construction of the build alternative would not affect the existing groundwater uses in the area. Cumulative impacts on groundwater quality that would result from contaminant released during

operations combined with potential improvements in groundwater quality from improved watershed conditions because of the land management projects would not be measurable.

- **Energy development.** Any build alternative would contribute to cumulative impacts by disrupting water balances and degrading water quality. These impacts would not be permanent. The extent of cumulative impacts on groundwater quantity would depend on whether construction of the proposed rail line withdraws groundwater from wells that are located near the existing or future oil and gas wells.
- **Construction projects.** The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative impacts related to road paving by altering infiltration and recharge characteristics. The extent of the altered infiltration would be correlated with the footprints (length and width) of the road and rail line, which represent a small area within the groundwater study area. Any cumulative impacts associated with local groundwater recharge are not likely to be measurable.

In summary, construction and operation of any build alternative would result in cumulative impacts on groundwater when combined with impacts from proposed and potentially induced coal mines, land management, and energy development. Some build alternatives would result in cumulative impacts on groundwater when combined with impacts from existing coal mines, Fort Keogh activities, bull pasture subdivision leasing, and the Tongue River Road paving project. These projects would have to comply with Montana DEQ and other state permits and approvals, BLM-required mitigation measures, and Clean Water Act mitigation requirements. OEA concludes that the direct impacts from the proposed rail line, when combined with impacts from past, present, and reasonably foreseeable projects and actions, would result in minor adverse cumulative impacts on groundwater.

U.4.7.3 Floodplains

Construction and operation of the proposed rail line would result in the following floodplain impacts: decreased floodplain storage capacity and diverted flood flows with fill placement, constricted flood flows with bridge and culvert construction, decreased floodplain water retention, and altered flood dynamics from presence of rail infrastructure (referred to hereafter as the *common floodplain impacts*). Any build alternative would contribute to cumulative impacts on floodplains by adding to impacts from other projects. The following subsections describe the impacts of other projects and how potential impacts from the proposed rail line, when added to the impacts of these projects, would result in cumulative impacts on floodplains.

The other projects are described in Section U.3.3, *Projects Analyzed*. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and floodplains are described in Chapter 9, Section 9.4, *Floodplains*. OEA defined the study area for impacts of the proposed rail line on floodplains as the rights-of-way of build alternatives that cross mapped floodplains at stream crossings, and the rights-of-way that run parallel to a stream, where the

stream's associated floodplain encroaches into a right-of-way (Chapter 9, Section 9.4.1, *Floodplains, Study Area*). The floodplain cumulative impacts study area is defined as floodplains with connected surface waters (or floodplains themselves) that occur in both the right-of-way for build alternatives and in the areas of potential impacts for the other projects. The study areas are different because the cumulative impacts study area accounts for impacts that would occur outside of the impact locations or immediate vicinity. Floodplains do not function as separate and isolated components, but rather as an interconnected system where an impact in one or more areas would affect flood flows downstream or upstream of the area of impact. Cumulative floodplain impacts would occur in the same construction period or in different periods (i.e., the potentially induced mines' impacts on floodplains would occur after the proposed rail line is constructed). However, the incremental impact on floodplains, regardless of temporal overlap, would still affect the overall floodplain system.

Existing Coal Mines and Colstrip Power Plant

Existing Coal Mines and Colstrip Power Plant Impacts on Floodplains

The existing coal mines and Colstrip Power Plant are already operating in the floodplains cumulative impacts study area. The Federal Emergency Management Agency (FEMA) has not mapped floodplains in the RFD areas of the Rosebud Mine and Colstrip Power Plant, Spring Creek Mine, or Decker Mine. Flood Insurance Rate Map (FIRM) panels have been mapped by FEMA but not printed because there are no 100-year floodplains to show for National Flood Insurance Program (NFIP) purposes (see Chapter 9, Section 9.4.2, *Analysis Methods* on how FEMA maps floodplains in context of FIRMs). Natural Resources Conservation Service (NRCS)-mapped soils indicate that approximately 69 acres of floodplain occur in the RFD area of the Rosebud Mine. The streams associated with this area drain to Rosebud Creek. No NRCS-mapped soils indicate floodplains in the RFD areas of Decker or Spring Creek Mines, but many streams within the RFD area drain to the Tongue River Reservoir.

If RFD areas are disturbed during mining, continued development of the mines would encroach into floodplains. Mining activities would result in the common floodplain impacts except those associated with the presence of rail infrastructure. Some floodplain restoration would occur as mining progresses and as reclamation actions restore mined areas (MCA 82-4 Part 2).

Contribution of the Build Alternatives to Cumulative Impacts on Floodplains

The Colstrip Alternatives would be constructed and would operate near the Rosebud Mine and Colstrip Power Plant and would cross Rosebud Creek. Mine and power plant operations would continue during construction and operation of the build alternatives. The Decker Alternatives would be constructed and would operate near the Spring Creek and Decker

Mines and would cross streams that drain to the Tongue River Reservoir. Mine operations would continue during construction and operation of the build alternatives; coal transport from the mines would coincide with operation of the build alternatives.

The floodplain impacts of the Colstrip Alternatives, when added to the floodplain impacts in the Rosebud Mine RFD area, would result in cumulative impacts on floodplains during mining. The floodplain impacts of the Decker Alternatives, when added to the floodplain impacts in the Spring Creek Mine and Decker Mine RFD areas, would result in cumulative impacts on floodplains during mining.

Proposed and Potentially Induced Coal Mines

Proposed and Potentially Induced Coal Mine Impacts on Floodplains

Potentially induced mines would be constructed and would operate in the floodplains cumulative impacts study area. FEMA has not mapped the 100-year floodplain in the three mine areas. This means that there are no 100-year floodplains to show for the purposes of the NFIP. Floodplains in the proposed Otter Creek Mine have been mapped for the mine permit application (Otter Creek Coal, LLC 2014). The NRCS-mapped soils indicate that floodplains occur within the potentially induced Poker Jim Creek–O’Dell Creek Mine area (Table U-49) and would be affected assuming the entire area would be disturbed at some point during the life of the mine. The NRCS-mapped soils do not indicate floodplains in the potentially induced Canyon Creek Mine RFD area but streams in the mine area drain to the Tongue River and would be crossed by the Decker Alternatives. Mining at the proposed or potentially induced mines would result in the common floodplain impacts except those associated with the presence of rail infrastructure. In addition, mining would result in excavating floodplain areas.

Floodplain restoration would occur as mining progresses and as reclamation actions restore mined areas (MCA 82-4 Part 2). Compliance with these regulations would reduce floodplain impacts.

Table U-49. FEMA and NRCS-Mapped Floodplains in the Proposed and Potentially Induced Mine Boundaries (acres)

Proposed and Potentially Induced Mines	NRCS NRCS-Mapped Floodplains (acres)^a	FEMA FEMA-Mapped 100-Year Floodplains (acres)
Otter Creek Mine (proposed) ^b	45-	0
Poker Jim Creek–O’Dell Creek Mine (potentially induced)	488	0
Canyon Creek Mine (potentially induced)	0	0

Notes:

^a Includes *frequent*, *occasional*, and *rare* flooded NRCS-mapped soils

Floodplain mapping completed for the Otter Creek Mine permit application surpasses NRCS-mapped floodplain data

NRCS = Natural Resources Conservation Service; FEMA = Federal Emergency Management Agency

Source: Natural Resources Conservation Service 2014

Contribution of the Build Alternatives to Cumulative Impacts on Floodplains

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would provide access to the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek Mine. The construction start and completion dates for the proposed Otter Creek Mine would depend on the construction schedule for the proposed rail line. The Decker Alternatives would provide access to the proposed Otter Creek Mine and to the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines. The Decker Alternatives would be the only build alternatives that would provide access to the potentially Canyon Creek Mine.

The build alternatives would result in the common floodplain impacts. The addition of the impacts from the build alternatives to the impacts from the proposed and potentially induced mines would result in cumulative impacts on floodplains during mining activities.

Land Management

Land Management Impacts on Floodplains

Fort Keogh Livestock and Range Research Laboratory

Fort Keogh is an operating land management project that addresses cattle management and grazing. FEMA has mapped 100-year floodplains within the boundary of Fort Keogh along the Tongue River, Yellowstone River, and Coal Creek (tributary to Yellowstone River); NRCS-mapped soils indicate that floodplains occur mostly along the Yellowstone River, with some areas mapped along Moon Creek and Tongue River. The vast majority of Fort Keogh is in a natural state, with agricultural research activities confined to areas between the Yellowstone River and I-94, and along the west side of the Tongue River. Future activities at Fort Keogh would consist of continued and new research projects in areas where research activities already occur. No planned activities would develop or disturb Fort Keogh beyond its current condition because the facility is protective of its natural state. If future research activities occur in floodplain areas, impacts on floodplains would consist of floodplain vegetation impacts (vegetation removal for maintenance or trampling by cattle), which would affect floodplain retention. USDA, as a federal agency, must comply with Executive Order 11988, Floodplain Management, which requires the avoidance and minimization of floodplain impacts.

Tongue River Reservoir State Park

The proposed Tongue River Reservoir State Park project would renovate the Pee Wee Point North, Pee Wee Point South, and Sandpoint campgrounds. FEMA has mapped a 100-year floodplain around the shore of the Tongue River Reservoir, which includes the shoreline areas within the Tongue River Reservoir State Park; NRCS-mapped soils also indicate that floodplains occur along the Tongue River Reservoir shoreline within the Tongue River

Reservoir State Park. However, the MEPA/NEPA Checklist indicates that the renovations would not affect designated floodplains, would not alter the course or magnitude of floodwater or other flows, and would not expose people or property to water-related hazards such as flooding. Therefore, no additional analysis of cumulative impacts on floodplains is warranted.

BLM Resource Management Plan

The BLM Draft RMP/EIS would continue current management activities and identify new facilities or management strategies. The BLM Draft RMP/EIS addresses livestock grazing, wildlife habitat, special-designation areas, special recreation areas, national trails, and wilderness study areas. FEMA has mapped a 100-year floodplain on one BLM-administered parcel in the cumulative impacts study area on the east side of the Tongue River at the city of Miles City. NRCS-mapped soils indicate that floodplains occur on several BLM-administered parcels. A wide range of surface-disturbing activities would occur on BLM-administered lands under the RMP, including mineral and energy exploration; leasing; development (including renewable energy and geophysical exploration); vehicle use; developing rights-of-way; land use; developing infrastructure; treating vegetation or fuel (including the sale or harvest of hay, timber, wood, or seed); establishing wildfire fuel breaks; and implementing of a range of improvements. These activities would encroach on and affect floodplains on BLM-administered lands. The preferred alternative in the BLM Draft RMP/EIS states that floodplains would be avoided (if feasible), and if floodplains cannot be avoided, the activity must be designed in a way to maintain or improve the functionality and resiliency of the floodplain. Any BLM activity would result in maintaining or improving the functionality of a floodplain. Therefore, no additional analysis of cumulative impacts on floodplains is warranted.

Beaver Creek Landscape Management Project

Implementation of the Beaver Creek LMP would promote a healthier and more resilient ponderosa pine ecosystem on 14,000 acres of forest by using large tree removal, fire applications, and selective vegetation thinning. These practices would promote fires that are of lower intensity and less severe than those caused by stand replacement fires. The Beaver Creek LMP area has no mapped FEMA or NRCS floodplains, and would not affect floodplains that overlap with floodplains affected by any build alternative. Therefore, no additional analysis of cumulative impacts on floodplains is warranted.

Contribution of the Build Alternatives to Cumulative Impacts on Floodplains

Fort Keogh Livestock and Range Research Laboratory

The Tongue River Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be constructed and operate near where research activities occur in Fort

Keogh. The addition of impacts from these build alternatives to the impacts of the ongoing and future use of Fort Keogh would result in cumulative impacts on floodplains.

Energy Development

Energy Development Impacts on Floodplains

The BLM Draft RMP/EIS would promote oil and natural gas projects on 5.4 million acres of leased land in Rosebud, Custer, Powder River, and Big Horn Counties (the four-county area). OEA estimated that 1,158 CBNG wells would be developed between 2011 and 2030, and considers this estimate much higher than the number of wells that will be permitted and completed. It should be noted that none of the currently approved wells would be in the project area or near the build alternatives (Section U.3.3.4, *Energy Development*). In addition to well development on BLM-administered lands, oil and gas exploration and development continues throughout southeastern Montana on federal, state, tribal, and private lands.

According to GIS data from the Montana Board of Oil and Gas Conservation (no date), no existing or abandoned wells are located in floodplains in the cumulative impacts study area. One CBNG well was completed in 2008 in an NRCS-mapped soil that is susceptible to flooding adjacent to the Tongue River about 4.3 miles northeast of the Tongue River Reservoir. However, this well's status is "shut-in," which means it is capable of producing but currently is not producing. Based on production records, this well has never produced since completion.

The preferred alternative in the BLM Draft RMP/EIS stipulates that a NSO restriction be placed on oil and gas development for floodplains. This restricts all oil and gas development in any floodplain. Energy development on BLM-administered lands would not affect floodplains, and floodplain functionality would be maintained. On nonfederal lands not protected by the BLM NSO stipulation, any encroachment into floodplain areas from new well development and associated infrastructure would result in the common floodplain impacts. The extent and degree of floodplain impacts would depend on the size of the wells, location, and number of wells developed in the cumulative impacts study area. All projects that cause disturbances from gas and oil well development must implement proper reclamation procedures when the wells are abandoned (MCA 82-10-400 *et seq.*).

Contribution of the Build Alternatives to Cumulative Impacts on Floodplains

Any build alternative would be constructed and would operate in landscapes affected by future oil and gas development. Most of the region around the northern build alternatives has a low potential for oil and gas development. There is moderate potential for development along the Decker Alternatives.

The addition of impacts from the build alternatives to impacts from energy development would result in cumulative impacts on surface water. The extent and degree of cumulative floodplain impacts would depend on whether the development activity occurs in an area connecting with mapped floodplains of the build alternative; the size, location, and number of wells actually developed; and the measures implemented to reduce impacts.

Construction Projects

Construction Project Impacts on Floodplains

Tongue River Road Paving

The 32.7-mile paving project proposed for Tongue River Road would result in impacts on floodplains. FEMA has not mapped any 100-year floodplains along Tongue River Road where the paving project would occur; FEMA has assessed the area for 100-year floodplains, but has not printed the FIRM panel because there are no 100-year floodplains to show for NFIP purposes. The NRCS-mapped soils indicate areas of floodplain adjacent to and crossed by Tongue River Road. While construction of the road has likely already affected and filled floodplains, paving would cause additional impacts where the road would encroach into floodplains. The paving project would result in common floodplain impacts except those associated with the presence of rail infrastructure. The extent and degree of these impacts would depend on the location, width, and distance of road widening.

Bull Pasture Subdivision Leasing

Leasing the 38.55-acre bull pasture subdivision would lead to a variety of land disturbance activities that would affect floodplains. FEMA has mapped 100-year floodplains on just over half of the parcel. While the area is already disturbed by agricultural practices, any construction of buildings, roads, parking lots or other infrastructure would likely require fill within the footprints of those facilities in the floodplain. At a minimum, these structures would need to be designed per the approved Montana State and FEMA NFIP floodplain development standards to ensure minimal risk from potential floods. The DNRC has approved floodplain development standards for the state requiring that nonresidential buildings elevate the lowest floor of the structure 2 feet above the base flood elevation or the building must be adequately dry flood-proofed (Montana Department of Natural Resources and Conservation 2014). The leasing project would result in common floodplain impacts except those associated with the presence of rail infrastructure. The extent and degree of these impacts would depend on future uses of the parcel, including construction of new infrastructure.

Contribution of the Build Alternatives to Cumulative Impacts on Floodplains

Tongue River Road Paving

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be crossed by the paving project. The addition of impacts from the build alternatives to impacts from the road paving project would result in cumulative impacts on floodplains. The extent and degree of floodplain impacts would depend on the location, width, and distance of road widening and the measures implemented to reduce impacts.

Bull Pasture Subdivision Leasing

The Tongue River and Tongue River Road Alternatives would be closest to the Bull Pasture Subdivision Leasing project. The addition of impacts from the build alternatives to impacts from the Bull Pasture Subdivision Leasing project would result in cumulative impacts on floodplains. The extent and degree of these floodplain impacts would depend on the activities on the subdivision parcel, the amount of disturbance caused by the activities, and the measures implemented to reduce impacts.

Cumulative Impact Summary: Floodplains

The proposed rail line would affect floodplains and would combine with impacts from the other projects to result in cumulative impacts on floodplains in the study area. The contribution of the proposed rail line to cumulative impacts is summarized as follows.

- **Existing coal mines and Colstrip Power Plant.** The Colstrip Alternatives and Decker Alternatives would contribute to cumulative impacts on floodplains by causing a decrease in floodplain storage capacity, a diversion of flood flows, a constriction of flood flows, and a decrease in floodplain floodwater retention.
- **Proposed and potentially induced coal mines.** Any build alternative would contribute to cumulative impacts on floodplains as described for existing mines.
- **Land management.** The Tongue River Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative impacts related to Fort Keogh by causing a decrease in floodplain floodwater retention.
- **Energy development.** None of the build alternatives would contribute to cumulative impacts related to BLM energy development because BLM would not allow development in floodplains. Energy development outside of BLM-administered land would contribute to cumulative impacts by causing a decrease in floodplain storage capacity, diversion of flood flows, constriction of flood flows, and decrease in floodplain floodwater retention.
- **Construction projects.** The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative

impacts related to road paving by causing a decrease in floodplain storage capacity, a diversion of flood flows, a constriction of flood flows, and a decrease in floodplain floodwater retention. The Tongue River Alternatives and Tongue River Road Alternatives would contribute to cumulative impacts related to leasing the bull pasture subdivision as described for the Tongue River Road paving project.

In summary, construction and operation of any build alternative would result in cumulative impacts on floodplains when combined with impacts from proposed and potentially induced coal mines and energy development (non-BLM lands), including the common floodplain impacts. Some build alternatives would result in cumulative impacts on floodplains when combined with impacts from existing coal mines, Fort Keogh activities, the Tongue River Road paving project, and bull pasture subdivision leasing. These projects would have to comply with Montana DEQ and other state permits and approvals, BLM-required mitigation measures, and Clean Water Act mitigation requirements. OEA concludes that the direct impacts from the proposed rail line, when combined with impacts from past, present, and reasonably foreseeable projects and actions, would result in minor adverse cumulative impacts on floodplains.

U.4.7.4 Wetlands

Construction and operation of the proposed rail line would result in the following wetland impacts: reduce wetland habitat through fill placement, compromise water quality function and degrade wetland water quality, decrease wetland stormwater and floodwater storage capacity, alter wetlands through maintenance activities, and cause the deposition of pollutants from rail operation (referred to hereafter as the *common wetland impacts*). Any build alternative would contribute to cumulative impacts on wetlands by adding to impacts from other projects. The following subsections describe the impacts of these other projects and how impacts from the proposed rail line, when added to the impacts of these projects, would result in cumulative impacts on wetlands.

The other projects are described in Section U.3.3, *Projects Analyzed*. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and wetlands are described in Chapter 9, Section 9.5, *Wetlands*. OEA defined the study area for impacts of the proposed rail line on wetlands as the right-of-way for each build alternative plus 400 feet of buffer on either side of the right-of-way (Chapter 9, Section 9.5.1, *Wetlands, Study Area*). The wetlands cumulative impacts study area is defined as the watershed(s) in which both a build alternative and another relevant project would operate. OEA examined impacts on wetlands at the watershed level, as defined by the 10-digit hydrologic unit code from the Watershed Boundary Dataset for Montana (Natural Resource Conservation Service 2014). The study areas are different because wetland impacts throughout a watershed that are separated by a distance can have an effect on wetlands (and other surface waters) in the watershed that are outside of the immediate impact area. This is because wetlands (and other surface waters) do not function as separate and isolated components of the watershed, but rather as a single, integrated natural system. Disruption of any one part of this system would have

consequences on the functioning of the entire system. The greater the area of impact in a watershed, the greater the potential that cumulative impact will disrupt the system.

Existing Coal Mines and Colstrip Power Plant

Existing Coal Mines and Colstrip Power Plant Impacts on Wetlands

The existing coal mines and Colstrip Power Plant are already operating in the wetlands cumulative impacts study area. The MNHP Wetland and Riparian Framework and the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) show mapped wetlands in the RFD areas of the Rosebud, Spring Creek, and Decker Mines in the cumulative impacts study area (Table U-50). Continued development of the three mines in these areas would encroach into these wetlands. Mining activities would result in the common wetland impacts.

Table U-50. Wetland Impacts at Existing Coal Mines

Existing Mine Area ^a	Impact by Wetland Type (acres) ^b					Total
	PEM	PSS	PAB	P	R	
Rosebud Mine	0.6	0.0	7.0	6.5	10.2	24.3
Spring Creek and Decker Mines	2.0	0.0	0.4	0.3	10.4	13.1

Notes:

^a Based on information from *Miles City Field Office Draft Resource Management Plan and Environmental Impact Statement* (Bureau of Land Management 2013). Describes the reasonably foreseeable development area.

^b Wetland types based on the wetland classification system described in *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979)

PEM = palustrine emergent; PSS = palustrine scrub-shrub; PAB = palustrine aquatic bed; P = palustrine unconsolidated shoreline and palustrine unconsolidated bottom wetlands; and R = riverine. Riverine also includes streams mapped by the USGS National Hydrography Dataset

Wetland impacts are reduced through compliance with regulatory and permitting requirements. Any discharge of dredged or fill material into jurisdictional wetlands defined under the CWA would require a federal permit under Section 404 of the CWA. Such permits cannot be issued if there is a practicable alternative that would be less damaging to aquatic resources or if significant degradation of the nation's waters would occur (40 C.F.R. Part 230). Any unavoidable impacts must be compensated for with mitigation to replace lost wetland area and functions. Such required mitigation reduces the extent of wetland impacts from mining activities. However, a subset of the wetlands within these RFD areas may not be jurisdictional under Section 404 of the CWA (e.g., isolated wetlands). While such wetlands would provide wetland functions, they would not be subject to regulation under the CWA.

Compliance with MCA 82-4 Part 2 and associated rules (ARM 17.24 – *Reclamation*) requires the reclamation of all lands disturbed by mining activities. Per MCA 82-4-231(k), such work includes minimizing disturbances to the prevailing hydrologic balance and water quality both at the mine site and in adjacent areas. This is achieved with the treatment and management of drainage from mined and reclaimed areas, restoration of recharge capacity to

approximate premining conditions in mined areas, preservation of hydrologic functions in alluvial valley floors, and the design and construction of reclaimed intermittent streams and perennial stream channels. Reclamation of hydrologic function is not limited to streams, but also includes wetlands (ARM 17.24.313). All of these required actions increase the likelihood of wetland development in reclaimed areas. As the reclamation process occurs concurrently with mine development, some degree of wetland replacement would occur in the cumulative impacts study area to offset wetland impacts. The related extent of impacts at any given time would be smaller than suggested by the cumulative impacts study area as a whole.

Contribution of the Build Alternatives to Cumulative Impacts on Wetlands

The Colstrip Alternatives would be constructed and would operate near the Rosebud Mine and Colstrip Power Plant. Mine and power plant operations would continue during construction and operation of the build alternative. The Decker Alternatives would be constructed and would operate near the Spring Creek and Decker Mines. Mine operations would continue during construction and operation of the build alternative; coal transport from the mines would coincide with operation of the build alternative.

Impacts of the Colstrip Alternatives would include the common wetland impacts. The addition of impacts from the build alternatives to the impacts from mining in the Rosebud Mine RFD area would result in cumulative impacts on wetlands during mining. The addition of impacts from the Decker Alternatives to impacts from mining in the Spring Creek Mine and Decker Mine RFD areas would result in cumulative impacts on wetlands during mining. However, under the CWA, wetland mitigation would be required to offset any loss of jurisdictional wetland through placement of fill material. Under Montana statutes and rules, the reclamation of wetlands would be required.

Proposed and Potentially Induced Coal Mines

Proposed and Potentially Induced Coal Mines Impacts on Wetlands

The proposed and potentially induced mines would be constructed and would operate in the wetlands cumulative impacts study area. Based on the MTNHP and NWI mapping and a recent wetland delineation for the proposed Otter Creek Mine (WESTECH Environmental Services 2013), wetlands are located throughout the proposed and potentially induced mine areas within the cumulative impacts study area (Table U-51). The impact acreages for the proposed Otter Creek Mine have not been finalized and are not presented in the Otter Creek Mine permit application, but based on the current disturbance footprint in the permit application and the extent of the wetland delineation, the impact numbers presented in Table U-51 overestimate the wetland impacts. These wetlands would be affected if the entire mine area is disturbed during the life of the mines. Wetland impacts that would occur during mining activities include reducing wetland habitat through fill placement, compromising water quality function, and degrading wetland water quality, decreasing wetland stormwater

and floodwater storage capacity, altering wetlands through maintenance activities, and causing the deposition of pollutants. Jurisdictional wetlands under the CWA and reclamation requirements under MCA 82-4 Part 2 and associated rules (ARM 17.24 – *Reclamation*) would reduce and offset many of these impacts.

Table U-51. Wetland Impacts at Proposed and Potentially Induced Coal Mines

Build Alternative	Proposed or Potentially Induced Coal Mine	Impact by Wetland Type (acres) ^a						
		PEM	PSS	PFO	PAB	P	R	Total
Tongue River Tongue River East Colstrip Colstrip East	Otter Creek Mine ^b (proposed)	30.2	1.0	1.1	5.0	3.5	34.1	74.9
Tongue River Road Tongue River Road East Moon Creek Moon Creek East	Poker Jim Creek–O’Dell Creek (potentially induced)	15.9	0.0	0.0	6.4	0.7	47.2	70.2
Decker Decker East	Otter Creek Mine ^a (proposed)	30.2	1.0	1.1	5.0	3.5	34.1	74.9
	Poker Jim Creek–O’Dell Creek (potentially induced)	15.9	0.0	0.0	6.4	0.7	40.5	63.5
	Canyon Creek (potentially induced)	3.3	0.0	0.0	0.0	0.7	16.6	20.6

Notes:

^a Wetland types based on the wetland classification system described in Cowardin et al. 1979

^b Wetland impact estimates for Otter Creek were obtained from Appendix A of the 2013 wetland delineation report prepared by WESTECH Environmental Services, Inc. Wetland impact estimates for Poker Jim Creek–O’Dell Creek and Canyon Creek potentially induced mines were determined using the MTNHP and NWI wetland mapping

PEM = palustrine emergent; PSS = palustrine scrub-shrub; PFO = palustrine forested; PAB = palustrine aquatic bed; P = palustrine; and R = riverine. Riverine also includes streams mapped by the USGS National Hydrography Dataset

Contribution of the Build Alternatives to Cumulative Impacts on Wetlands

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would provide access to the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek Mine. The construction start and completion dates for the proposed Otter Creek Mine would depend on the construction schedule for the proposed rail line. The Decker Alternatives would provide access to the proposed Otter Creek Mine and to the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek mines. The Decker Alternatives would be the only build alternatives that would provide access to the potentially induced Canyon Creek Mine.

The addition of wetland impacts of these build alternatives to the wetland impacts of the proposed Otter Creek and potentially induced Poker Jim Creek–O’Dell Creek Mines would result in cumulative impacts on wetlands during mining (Table U-52).

Table U-52. Cumulative Wetland Impacts

Build Alternative	Otter Creek Mine		Potentially Induced Poker Jim Creek– O’Dell Creek Mine		Potentially Induced Canyon Creek Mine	
	Build Alternative Impact (acres)	Mine Impact (acres)	Build Alternative Impact (acres)	Mine Impact (acres)	Build Alternative Impact (acres)	Mine Impact (acres)
Northern build alternative ^a	1.0	74.9	2.4	70.2	NA	NA
Northern build alternative east ^a	3.0	74.9	3.9	70.2	NA	NA
Decker	0.5	74.9	5.7	63.5	8.2	20.6
Decker East	0.4	74.9	4.9	63.5	7.5	20.6

Notes:

^a Northern build alternatives are the Tongue River Alternative, Colstrip Alternative, Tongue River Road Alternative, and Moon Creek Alternative. Northern build alternatives east are the Tongue River East Alternative, Colstrip East Alternative, Tongue River Road East Alternative, and Moon Creek East Alternative. The wetland impact acreage in the rights-of-way in the wetland cumulative impacts study is the same for all northern build alternatives and northern build alternatives east

NA = not applicable since the potentially induced Canyon Creek Mine is not within the same watersheds of the build alternatives in the cumulative impacts study area

Land Management

Land Management Impacts on Wetlands

Fort Keogh Livestock and Range Research Laboratory

Fort Keogh is an operating land management project that addresses cattle management and grazing. The MTNHP Wetland and Riparian Framework and USFWS NWI have mapped riverine (R), palustrine emergent (PEM), and palustrine aquatic bed (PAB) wetlands in Fort Keogh, mostly along the major rivers and streams. Several scattered palustrine unconsolidated shoreline (PUS) and PAB wetlands are also present in Fort Keogh behind impoundments on smaller streams. The vast majority of Fort Keogh is in a natural state, with agricultural research activities confined to areas between the Yellowstone River and I-94, and along the west side of the Tongue River. Future activities at Fort Keogh would include continued and new research projects in areas where research activities already occur. No planned activities would develop or disturb Fort Keogh beyond its current condition because the facility is protective of this natural condition. Future research or maintenance activities in wetland areas would incur impacts on wetland vegetation (maintenance activities and cattle trampling) and water quality (cattle defecation). To minimize wetland impacts, the USDA, as a federal agency, must comply with Executive Order 11990, *Protection of Wetlands*, which requires protection of all wetlands.

Tongue River Reservoir State Park

The proposed Tongue River Reservoir State Park project would renovate the Pee Wee Point North, Pee Wee Point South, and Sandpoint campgrounds. The MTNHP Wetland and Riparian Framework and USFWS NWI have mapped primarily lacustrine wetlands around the reservoir shoreline of the park. One small PAB and two small PEM wetlands are also mapped. However, the MEPA/NEPA Checklist indicates that the renovations would have no impact on wetlands. Therefore, no additional analysis of cumulative impacts on wetlands is warranted.

BLM Resource Management Plan

The BLM Draft RMP/EIS would continue current management activities and identify new facilities or management strategies. The BLM Draft RMP/EIS addresses livestock grazing, wildlife habitat, special-designation areas, special recreation areas, national trails, and wilderness study areas. The MTNHP Wetland and Riparian Framework and USFWS NWI have mapped PEM, PUS, PAB, and R wetlands on BLM-administered lands in the cumulative impacts study area. A wide range of surface-disturbing activities would occur on BLM-administered lands under the BLM Draft RMP/EIS, including mineral and energy exploration, leasing, development (including renewable energy and geophysical exploration), vehicle use, rights-of-way development, land use, infrastructure development, vegetation or fuel treatment (including the sale or harvest of hay, timber, wood, or seed), wildfire fuel breaks, and improvements. These activities would result in wetland impacts should they encroach on wetlands in the cumulative impacts study area. However, the preferred alternative in the BLM RMP/ EIS states that wetlands and a 300-foot buffer around wetlands would be avoided, if feasible. If avoidance is not feasible and impacts on wetland water quality would occur, the activity would require an approved design to maintain or exceed wetland functionality and resiliency. Therefore, any BLM activity would ultimately result in maintaining or improving the functionality of a wetland and would not contribute to long-term wetland impacts. Therefore, no additional analysis of cumulative impact on wetlands is warranted.

Beaver Creek Landscape Management Project

Implementation of the Beaver Creek LMP would promote a healthier and more resilient ponderosa pine ecosystem on 14,000 acres of forest by using large tree removal, fire applications, and selective vegetation thinning. These practices would promote fires that are of lower intensity and less severe than those caused by stand replacement fires. The MTNHP Wetland and Riparian Framework and USFWS NWI have mapped primarily PAB wetlands with a few PUS wetlands in the Beaver Creek LMP area. While many of the LMP actions would have no direct impact on these wetlands, given the types of wetlands that are mapped (i.e., no forested wetlands), construction of temporary access roads and other surface disturbances would result in sediment delivery to wetlands, which would degrade wetland water quality. However, the U.S. Forest Service states that this risk to wetlands would be

low given the adequate filter distances between wetlands and ground disturbance activities and the implementation of best management practices, and that the proposed activities would not result in long-term wetland impacts (U.S. Forest Service 2011).

Contribution of the Build Alternatives to Cumulative Impacts on Wetlands

Fort Keogh Livestock and Range Research Laboratory

The Tongue River Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be constructed and operate near where research activities occur in Fort Keogh. The addition of impacts from the build alternatives to the impacts of the ongoing and future use of Fort Keogh would result in cumulative impacts on wetlands. These impacts would be confined to areas where research activities already occur

Beaver Creek Landscape Management Project

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be constructed and operate near the forest managed under the Beaver Creek LMP. The addition of impacts from these build alternatives to the impacts of the Beaver Creek LMP would result in short-term cumulative impacts on wetlands.

Energy Development

Energy Development Impacts on Wetlands

The BLM Draft RMP/EIS would promote oil and natural gas projects on 5.4 million acres of leased land in Rosebud, Custer, Powder River, and Big Horn Counties (the four-county area). OEA estimated that 1,158 CBNG wells would be developed between 2011 and 2030, and considers this estimate much higher than the number of wells that will be permitted and completed. It should be noted that none of the currently approved wells would be in the project area or near the build alternatives (Section U.3.3.4, *Energy Development*). In addition to well development on BLM-administered lands, oil and gas exploration and development continues throughout southeastern Montana on federal, state, tribal, and private lands.

According to Montana Board of Oil and Gas Conservation (no date), no existing or abandoned wells are found in mapped wetlands in the cumulative impact area. Any encroachment into wetland areas from oil and gas well development and associated infrastructure would result in the common wetland impacts. The extent and degree of wetland impacts would depend on the size of the wells, location, and number of wells developed.

However, the preferred alternative in the BLM Draft RMP/EIS stipulates that a NSO restriction be placed on oil and gas development for wetlands. This NSO means that no part of oil and gas development would be allowed in any wetland. In addition, any activity within

300 feet of a wetland would require a plan with design features that demonstrate how actions will maintain or improve functionality of the adjacent wetland. Therefore, any oil and gas activity on BLM-administered lands would not affect wetlands.

Although energy development on nonfederal land would result in wetland impacts, impacts on jurisdictional wetlands under the CWA would require offsetting mitigation (see *Existing Coal Mines and Colstrip Power Plant Impacts on Wetlands* for a description of this regulatory requirement). In addition, reclamation is a component of natural gas and oil well development in Montana, and all areas disturbed by such development must comply with MCA 82-10-400 *et seq.* Therefore, wetland impacts would be offset through compliance with these requirements.

Contribution of the Build Alternatives to Cumulative Impacts on Wetlands

Any build alternative would be constructed and would operate in landscapes affected by future oil and gas development. Most of the region around the northern build alternatives has a low potential for oil and gas development. There is moderate potential for development along the Decker Alternatives.

The addition of impacts from the build alternatives to impacts from oil and gas development would result in cumulative impacts on wetlands. The Decker Alternatives would be closer to areas that are more likely to have oil and gas well development. The extent and degree of wetland impacts would depend on whether well development would occur in the cumulative impacts study area, if there are mapped wetlands in this area, the amount of disturbance (i.e., the size, location, and number of wells actually developed), and the measures implemented to reduce impacts. Mitigation would be required for jurisdictional wetland impacts under the CWA and reclamation is required by the state of Montana for natural gas and oil well development. Therefore, wetland impacts would be offset through compliance with these requirements. No cumulative impacts would result.

Construction Projects

Construction Project Impacts on Wetlands

Tongue River Road Paving

The 32.7-mile paving project proposed for Tongue River Road would affect wetlands adjacent to the existing road. The MTNHP Wetland and Riparian Framework and USFWS NWI have mapped wetlands along Tongue River Road, with higher densities in areas where the road is near the Tongue River. While construction of the road has likely already affected wetlands (i.e., with placement of fill in wetlands) where the road crosses or abuts wetlands, there would be additional impacts from paving or road and right-of-way widening that encroaches into wetlands. The paving project would result in the common wetland impacts. The extent and degree of these impacts would depend on the location, width, and distance of road widening. Impacts on jurisdictional wetlands under the CWA would be offset by

required mitigation (see *Existing Coal Mines and Colstrip Power Plant Impacts on Wetlands* above for description of this regulatory requirement).

Bull Pasture Subdivision Leasing

Leasing the 38.55-acre bull pasture subdivision would not affect wetlands because no wetlands are mapped on the land parcel. Therefore, no additional analysis of cumulative impacts on wetlands is warranted.

Contribution of the Build Alternatives to Cumulative Impacts on Wetlands

Tongue River Road Paving

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be crossed by the paving project. The addition of impacts from the build alternatives to impacts from the road paving project would result in cumulative impacts on wetlands. The extent and degree of these impacts would depend on the locations where paving and widening would occur, the amount of disturbance, and the measures implemented to reduce any potential impacts. Impacts on jurisdictional wetlands under the CWA would be offset through mandated mitigation.

Cumulative Impact Summary: Wetlands

The proposed rail line would affect wetlands and would combine with impacts from the other projects to result in cumulative impacts on wetlands in the study area. The contribution of the proposed rail line to cumulative impacts is summarized as follows.

- **Existing coal mines and Colstrip Power Plant.** The Colstrip Alternatives and Decker Alternatives would contribute to cumulative impacts by reducing wetland habitat through placing fill, compromising water quality function and degrading wetland water quality, decreasing wetland stormwater and floodwater storage capacity, altering wetland through maintenance activities, and depositing pollutants.
- **Proposed and potentially induced coal mines.** Any build alternative and the proposed and potentially induced coal mines would contribute to cumulative impacts on wetlands as described for the existing coal mines.
- **Land management.** The Tongue River Alternatives Tongue River Road Alternatives, and Moon Creek Alternatives and activities at Fort Keogh would contribute to cumulative impacts by degrading wetland water quality and altering wetland vegetation.

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives and the Beaver Creek LMP would contribute to short-term cumulative impacts by degrading wetland water quality.

- **Energy development.** None of the build alternatives would contribute to cumulative impacts related to energy development on BLM-administered lands because BLM would

not allow oil and gas well development in wetlands, and activities within 300 feet of wetlands would have to be designed to maintain or improve wetland functionality. The build alternatives and energy development would contribute to cumulative impacts outside of BLM-administered lands by reducing wetland habitat through fill placement, compromising water quality function, degrading wetland water quality, decreasing wetland stormwater and floodwater storage capacity, altering wetland through maintenance activities, and depositing pollutants. Any cumulative impacts would be reduced by compliance with the requirements of the CWA, Montana reclamation statutes and rules governing protection of wetlands during oil and gas well development and reclamation, and best management practices that would be implemented during construction.

- **Construction projects.** The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives and the road paving project would contribute to cumulative impacts by reducing wetland habitat through fill placement, compromising water quality function, degrading wetland water quality, decreasing wetland stormwater and floodwater storage capacity, altering wetland through maintenance activities, and depositing pollutants.

In summary, construction and operation of any build alternative would result in cumulative impacts on wetlands when combined with impacts from proposed and potentially induced coal mines and energy development, including the common wetland impacts. Some build alternatives would result in cumulative impacts on wetlands when combined with impacts from existing coal mines, Fort Keogh activities, the Beaver Creek LMP, and the Tongue River Road paving project. These projects would have to comply with Montana DEQ and other state permits and approvals, BLM-required mitigation measures, and Clean Water Act mitigation requirements. OEA concludes that the direct impacts from the proposed rail line, when combined with impacts from past, present, and reasonably foreseeable projects and actions, would result in adverse cumulative impacts on wetlands.

U.4.8 Visual Resources

Construction and operation of the proposed rail line would result in the visual resource impacts to the natural and built environments of vegetation removal along the right-of-way, alteration of existing landforms through cuts and fill, at-grade and grade-separated road crossings, and the introduction of new sources of infrastructure (such as bridges over waterways) and nighttime lighting (hereafter referred to as the *common visual resource impacts*). These impacts would alter the existing visual character and visual quality for most alternatives, affecting sensitive viewer groups. Any build alternative would contribute to cumulative impacts on visual resources by adding to impacts from other projects. The length of each build alternative is the primary quantitative indicator of visual impacts (Chapter 10, *Visual Resources*). Qualitative indicators include changes relative to current landforms and passage through or near scenic areas where viewers may be more sensitive to change. The following subsections describe the impacts of other projects and how potential impacts from

the proposed rail line, when added to the impacts of these projects, would result in cumulative impacts on visual resources.

The other projects are described in Section U.3.3, *Projects Analyzed*. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and visual resources are described in Chapter 10, *Visual Resources*. OEA defined the study area for the impacts of the proposed rail line on visual resources as the project viewshed, or the total area from which any viewer would have views of the proposed rail line (Chapter 10, Section 10.2, *Visual Resources, Study Area*). The cumulative impacts study area for visual resources is the viewshed that encompasses both the build alternatives and the other projects. The study areas differ because the broader cumulative impacts study area includes views of the projects as well as the proposed rail line.

U.4.8.1 Existing Coal Mines and Colstrip Power Plant

Existing Coal Mines and Colstrip Power Plant Impacts on Visual Resources

The existing coal mines and Colstrip Power Plant are already operating in the visual resources cumulative impacts study area. These mines operate in a natural terrain that is minimally developed. Mines of this scale result in the common visual resources impacts. The ongoing activities, large-scale excavations, pits, and associated mining infrastructure of the existing coal mines and Colstrip Power Plant will continue to have an impact on the visual environment.

Contribution of the Build Alternatives to Cumulative Impacts on Visual Resources

The Colstrip Alternatives would be constructed and would operate near the Rosebud Mine and Colstrip Power Plant. Mine and power plant operations would continue during construction and operation of these build alternatives. The Decker Alternatives would be constructed and would operate near the Spring Creek and Decker Mines. Mine operations would continue during construction and operation of the build alternative; coal transport from the mines would coincide with operation of the build alternative.

The build alternatives would increase the amount of rail-related facilities and infrastructure in the cumulative impacts study area and would result in the common visual resources impacts. The addition of impacts from the build alternatives to the impacts from the existing mines would result in cumulative impacts on visual resources.

U.4.8.2 Proposed and Potentially Induced Coal Mines

Proposed and Potentially Induced Coal Mine Impacts on Visual Resources

The proposed and potentially induced mines would be constructed and would operate in the visual resources cumulative impacts study area. Mining would introduce large-scale excavations and pits that would permanently alter landforms adjacent to and near the Tongue River Valley, Northern Cheyenne Indian Reservation, and Custer National Forest. Large-scale vegetation removal, excavations and pits, nighttime lighting, and associated mining infrastructure of potentially induced mines would affect views from the Tongue River Valley, south of Highway 212 and from the eastern edge of the Northern Cheyenne Indian Reservation. These visual changes would affect viewers who would be highly sensitive to such visual changes during the extent of mining.

In particular, the proposed Otter Creek Mine and potentially induced Poker Jim Creek–O'Dell Creek Mine would be visible from the Custer National Forest. Potentially induced mines would affect visual resources on BLM lands that are designated to preserve the existing visual environment and where limited management changes are allowed only in a manner that should not be noticed by viewers. Portions of the Canyon Creek coal deposit are in the Zook Creek Wilderness Study Area and would affect views associated with the Tongue River Valley and Birney Ranching Rural Historic Districts that overlap the wilderness study area.

Contribution of the Build Alternatives to Cumulative Impacts on Visual Resources

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and, Moon Creek Alternatives would provide access to the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O'Dell Creek Mine. The construction start and completion dates for the proposed Otter Creek Mine would depend on the construction schedule for the proposed rail line. The Decker Alternatives would provide access to the proposed Otter Creek Mine and to the potentially induced Poker Jim Creek–O'Dell Creek and Canyon Creek Mines. The Decker Alternatives would be the only build alternatives that would provide access to the Canyon Creek Mine.

Any build alternative would increase the amount of rail-related facilities and infrastructure visible in the study area and result in the common visual resources impacts. All of the rail-related facilities and infrastructure elements would be seen in a visual environment that is minimally developed and has scenic resources.

The addition of impacts from the build alternatives to impacts from the proposed and potentially induced coal mines would result in cumulative visual resource impacts.

U.4.8.3 Land Management

Land Management Impacts on Visual Resources

Fort Keogh Livestock and Range Research Laboratory

Fort Keogh is an operating land management project that addresses cattle management and grazing. Management activities of Fort Keogh are consistent with the rural visual quality and scenic resources of the study area and do not result in visual resource impacts. Therefore, no additional analysis of cumulative impacts on visual resources is warranted.

Tongue River Reservoir State Park

The proposed Tongue River Reservoir State Park project would renovate the Pee Wee Point North, Pee Wee Point South, and Sandpoint campgrounds. The renovations would improve the campgrounds to a well-managed visual state, replacing the degraded or deteriorating visual condition. Therefore, no additional analysis of cumulative impacts on visual resources is warranted.

BLM Resource Management Plans

The BLM Draft RMP/EIS would continue current management activities and identify new facilities or management strategies. The BLM Draft RMP/EIS addresses livestock grazing, wildlife habitat, special-designation areas, special recreation areas, national trails, and wilderness study areas. The current management activities are consistent with the existing visual landscape and would not affect visual resources or sensitive viewers. Therefore, no additional analysis of cumulative impacts on visual resources is warranted.

Beaver Creek Landscape Management Project

Implementation of the Beaver Creek LMP would promote a healthier and more resilient ponderosa pine ecosystem on 14,000 acres of forest by using large tree removal, fire applications, and selective vegetation thinning to promote fires that are of lower intensity and less severe than those caused by stand replacement fires. Management of forests to reduce such events would improve visual conditions by promoting reforestation. Therefore, no additional analysis of cumulative impacts on visual resources is warranted.

U.4.8.4 Energy Development

Energy Development Impacts on Visual Resources

The BLM Draft RMP/EIS would promote oil and natural gas projects on 5.4 million acres of leased land in Rosebud, Custer, Powder River, and Big Horn Counties (the four-county area). OEA estimated that 1,158 CBNG wells would be developed between 2011 and 2030, and considers this estimate much higher than the number of wells that will be permitted and

completed. It should be noted that none of the currently approved wells would be in the project area or near the build alternatives (Section U.3.3.4, *Energy Development*). In addition to well development on BLM-administered lands, oil and gas exploration and development continues throughout southeastern Montana on federal, state, tribal, and private lands.

Any energy development would result in the common visual impacts. Infrastructure such as roadways, utility lines, operations buildings, and, potentially, new sources of nighttime lighting, would be installed. These energy development projects would occur in a visual environment that is currently minimally developed and valued for its scenic resources. Oil and gas development would affect visual resources by altering and detracting from the existing visual landscape.

Contribution of the Build Alternatives to Cumulative Impacts on Visual Resources

Any build alternative would be constructed and would operate in landscapes affected by oil and gas development. Most of the region around the proposed rail project has a low potential for development. There is moderate potential for development around the Decker Alternatives. The build alternatives would introduce more rail lines and infrastructure into the visual environment and result in the common visual impacts. The addition of impacts from the build alternatives to impacts from energy development would result in cumulative impacts on visual resources.

U.4.8.5 Construction Projects

Construction Project Impacts on Visual Resources

Tongue River Road Paving

The 32.7-mile paving project proposed for Tongue River Road would improve roadway conditions and contribute to safer travel. The black or gray roadway pavement would introduce a hardscape feature that contrasts against the browns, tans, and reds of the presently unpaved roadway surface that compliments the surrounding terrain and landscape. This would be a visual impact.

Bull Pasture Subdivision Leasing

Leasing the bull pasture subdivision would improve visual conditions because agricultural land would be preserved for grazing instead of light industrial uses, for which it is currently zoned. No visual impacts would result. Therefore, no additional analysis of cumulative impacts on visual resources is warranted.

Contribution of the Build Alternatives to Cumulative Visual Impacts

Tongue River Road Paving

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be crossed by the paving project. The road paving project and these build alternatives would increase the amount of transportation infrastructure in an area where such features are minimal, resulting in cumulative visual impacts. In addition, the proposed rail line would result in vegetation removal, cut and fill, and the permanent alteration of landforms in the study area. The addition of impacts from the build alternatives to impacts from the road paving project would result in cumulative impacts on visual resources.

U.4.8.6 Cumulative Impact Summary: Visual Resources

The proposed rail line would affect visual resources and would combine with impacts from the other projects to result in cumulative impacts on visual resources in the study area. The contribution of the proposed rail line to cumulative impacts is summarized as follows.

- **Existing coal mines and Colstrip Power Plant.** The Colstrip Alternatives and Decker Alternatives would contribute to cumulative impacts on visual resources by increasing the amount of rail infrastructure near existing mines and the Colstrip Power Plant. Cumulative impacts would be associated with vegetation clearing, infrastructure associated with the mines and rail line, and grading and permanent transformation of undisturbed lands in scenic areas that have sensitive visual receptors.
- **Proposed and potentially induced coal mining.** Any build alternative would increase the amount of rail-related facilities and infrastructure in a visual environment that is minimally developed and valued for its scenic resources. Cumulative impacts would be as described for existing mines.
- **Energy development.** Any build alternative would contribute to cumulative impacts on visual resources associated with energy development projects. Cumulative impacts would be associated with vegetation removal, grading, and excavation activities, and introduce industrial equipment and structures.
- **Construction projects.** The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to impacts associated with the paving project by increasing transportation infrastructure in an area where such features are minimal. The proposed rail line would also result in vegetation removal, cut and fill, and the permanent alteration of landforms in the study area.

In summary, construction and operation of any build alternative would result in cumulative impacts on visual resources when combined with impacts from proposed and potentially induced coal mines and energy development. Some build alternatives would result in cumulative impacts on visual resources when combined with impacts from existing coal

mines, the Colstrip Power Plant, and the Tongue River Road paving project. These projects would have to comply with Montana DEQ and other state permits approvals as well as BLM-required mitigation measures. OEA concludes that the direct impacts from the proposed rail line, when combined with impacts from past, present, and reasonably foreseeable projects and actions, would result in moderate to highly adverse cumulative impacts on visual resources.

U.4.9 Cultural Resources

Construction and operation of the proposed rail line would result in the following impacts on cultural resources: destruction, removal, or alteration of resources within the right-of-way, obstructions to accessing cultural resources, and visual impacts on resources adjacent to the right-of-way (hereafter referred to as the *common cultural resources impacts*). Any build alternative would contribute to cumulative impacts on cultural resources by adding to impacts from other projects. The following subsections describe the impacts of these other projects and how impacts from the proposed rail line, when added to the impacts of these projects, would result in cumulative impacts on cultural resources.

The other projects are described in Section U.3.3, *Projects Analyzed*. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and cultural resource are described in Chapter 11, *Cultural Resources*. OEA defined two study areas for impacts of the proposed rail line on cultural resources: the study area for tribal and archaeological resources (the right-of-way plus a 200-foot buffer on either side of the edge) and the study area for built resources (the right-of-way plus a 1,500-foot buffer on either side of the edge). Not all of the study area was accessible at the time the surveys took place; therefore, the number of cultural resources noted may not fully account for all cultural resources in the study area. OEA defined the cumulative impacts study area as the geographic area roughly bounded by Miles City on the east, the proposed Otter Creek Mine on the south, the Tongue River Dam on the west, and Colstrip on the north. The cumulative impacts study area was selected to encompass the impact areas of both the other projects and the build alternatives. It differs from the study area defined in Chapter 11, *Cultural Resources*.

U.4.9.1 Existing Coal Mines and Colstrip Power Plant

Existing Coal Mines and Colstrip Power Plant Impacts on Cultural Resources

The existing coal mines and Colstrip Power Plant are already operating in the cumulative impacts study area. Mine development involves surface disturbance, excavation, blasting, and demolition of surface resources. Continued development of the Rosebud and Spring Creek mines would affect cultural resources as mining progresses into the mines' RFD areas, resulting in the common cultural resources impacts. Development of the Decker Mine would not affect cultural resources (Montana Department of Environmental Quality 1999);

however, it is reasonable to assume that cultural resources have been affected over the life of this mine in compliance with the Montana Strip and Underground Mine Reclamation Act and in consultation with the Montana State Historic Preservation Officer.

GIS data and slope information were used to determine the likelihood of unrecorded pre-contact archaeological resources, especially in areas where previous studies have not been undertaken or are on file. A degree of slope from 0 to 10 percent is considered the most likely to contain archaeological resources, followed by slopes from 10 to 20 percent. Few resources are likely present in areas with a slope of more than 20 percent. As Table U-53 indicates, based on the GIS data and slope information, the Rosebud Mine has the highest potential (with a relatively flat 4,203-acre area of 0 to 10 percent slope) to contain archaeological resources. Tribal resources—resources identified only by tribal representatives—are not included in this analysis; however, there are likely tribal resources present in all three proposed or potentially induced mine areas. In addition, built resources are not included in the slope analysis.

Table U-53. Cultural Resources Sensitivity at Existing Mines

Existing Mine	Potential Cultural Resources			
	Possible Built Resources over 50 Years Old	0-10 Degree Slope (Highly Likely) acreage	10-20 Degree Slope (Moderately Likely) acreage	Over 20 Degree Slope (Not Likely) acreage
Rosebud Mine	Unknown	4,203	2,400	1,125
Spring Creek Mine	Unknown	2,014	1,781	1,868

Contribution of the Build Alternatives to Cumulative Impacts on Cultural Resources

The Colstrip Alternatives would be constructed and operate near the Rosebud Mine and Colstrip Power Plant. Mine and power plant operations would continue during construction and operation of the build alternative. The Decker Alternatives would be constructed and would operate near the Spring Creek and Decker Mines. Mine operations would continue during construction and operation of the build alternative; coal transport from the mines would happen during operation of the build alternative. The study area includes 4,352 acres for the Colstrip Alternative, 4,421 acres for the Colstrip East Alternative, 5,427 acres for the Decker Alternative, and 5,233 acres for the Decker East Alternative.

Based on the slope analysis, construction of the Colstrip Alternative would destroy or damage cultural resources on 1,028 acres where the presence of cultural resources is highly likely. From the field surveys, OEA found that construction of the Colstrip Alternative would destroy or damage 58 archaeological, tribal, and built resources within the right-of-way where surveys were conducted. Based on the slope analysis, construction of the Colstrip East Alternative would destroy or damage cultural resource on the 1,106 acres where the presence of cultural resources is highly likely. From the field surveys, OEA found that construction of the Colstrip East Alternative would destroy or damage 79 archaeological,

tribal, and built resources where surveys were conducted in the right-of-way. An additional 59 archaeological, tribal, and built resources located where surveys were conducted adjacent to but not within the right-of-way would be affected by construction and operation of the Colstrip Alternative. The Colstrip East Alternative would affect 65 such resources where surveys were conducted outside the right-of-way but within the study area. Based on the slope analysis, construction of the Decker Alternative would destroy or damage cultural resource on the 1,150 acres where the presence of cultural resources is highly likely. From the field surveys, OEA found that construction and operation of the Decker Alternative would destroy or damage 65 archaeological, tribal, and built resources in the right-of-way and would affect an additional 30 cultural resources where surveys were conducted in the study area but outside the right-of-way. Based on the slope analysis, construction of the Decker East Alternative would destroy or damage cultural resource on the 1,097 acres where the presence of cultural resources is highly likely. From the field surveys, OEA found that construction and operation of the Decker East Alternative would destroy or damage 60 archaeological, tribal, and built resources in the right-of-way and would affect an additional 30 such resources where surveys were conducted in the study area but outside the right-of-way.

The addition of impacts from the Colstrip Alternatives to impacts from mining in the RFD areas of the Rosebud Mine and the addition of impacts from the Decker Alternatives to impacts from mining in the RFD areas of the Spring Creek Mine would result in cumulative impacts on cultural resources as a result of surface disturbance, excavation, increased traffic (rail and/or road-related), blasting, and demolition. Although cultural resources that would be affected by expansion of the Decker Mine were not identified (Montana Department of Environmental Quality 1999), it is possible that the addition of impacts from the Decker Alternatives would result in cumulative impacts on cultural resources. When combined with impacts from the Colstrip Alternatives, the Rosebud Mine would affect an area ranging from 5,231 to 5,309 acres where the presence of cultural resources is highly likely, depending on the build alternative. The Spring Creek Mine, when combined with impacts from the Decker Alternatives, would affect 3,111 to 3,164 acres where cultural resources are highly likely, depending on the build alternative.

U.4.9.2 Proposed and Potentially Induced Coal Mines

Proposed and Potentially Induced Coal Mine Impacts on Cultural Resources

The proposed and potentially induced mines would be constructed and would operate in the cultural resources cumulative impacts study area. Based on the EIS for the formerly proposed Montco Mine (U.S. Department of the Interior 1984), development of this mine would affect cultural resources in the area of the potentially induced Poker Jim Creek–O'Dell Creek Mine, including archaeological sites and built resources. Montana DEQ has not completed the EIS for the proposed Otter Creek Mine and the development of the

Canyon Creek coal deposit is not the subject of a permit application. Therefore, the exact type and number of cultural resources that these latter two projects would affect is not known and specific impacts on cultural resources at the mine sites have not been documented. However, the permit application for the proposed Otter Creek Mine stated, “There are no public parks or historic places that may be adversely affected by the proposed operations” (Otter Creek Coal, LLC 2014).

A total of 37,262 acres would be developed for the proposed and potentially induced mines: 7,639 acres for the proposed Otter Creek Mine, 17,951 acres for the potentially induced Poker Jim Creek-O’Dell Creek Mine, and 11, 672 acres for the potentially induced Canyon Creek Mine. Mine development removes aboveground built resources and would remove archaeological and tribal resources. The development of the proposed and potentially induced mines would likely result in the common cultural resources impacts.

To address possible historic built resources not previously recorded, OEA used tax assessor data to identify parcels with improvements at least 50 years old and Google Earth Pro® with satellite imagery to determine if buildings or structures were present in the proposed and potentially induced mine areas.

Archaeological resources were assessed using previously recorded site information and slope analysis to ascertain general archaeological sensitivity in the three proposed and potentially induced mine areas. Table U-54 presents, based on recorded site information and slope analysis, the number and types of archaeological resources recorded in each mine area. Impacts from these mines would result in cumulative impacts on these cultural resources because of surface disturbance, excavation, and increased traffic.

Table U-54. Previously Recorded Tribal, Archaeological, and Built Environment Resources In and Adjacent to Proposed and Potentially Induced Mines

Lithic Scatter	Lithic Scatter with other components	Stone Circle/Tipi Rings	Cairn	Historic Archaeological	Total Archaeological Sites	Historic Homestead/Ranch	Historic Water and Other	Total Built Environment	Tribal Resources	Other Non-Dated Resources
Otter Creek										
139	30	19	6	5	199	6	2	8	0	2
Poker Jim Creek–O’Dell Creek										
145	27	18	9	13	212	3	6	9	3	0
Canyon Creek										
89	2	5	3	6	105	4	0	4	5	0

GIS data and slope information were used to determine the likelihood of unrecorded pre-contact archaeological resources, especially in areas where previous studies have not been undertaken or are on file. A degree of slope from 0 to 10 percent is considered the most likely to contain archaeological resources, followed by slopes from 10 to 20 percent. Few

resources are likely present in areas with a slope of more than 20 percent. As Table U-55 indicates, based on the GIS data and slope information, the Poker Jim Creek–O’Dell Creek Mine has the highest potential (with a relatively flat 10,850-acre area of 0 to 10 percent slope) to contain archaeological resources. Tribal resources—resources identified only by tribal representatives—are not included in this analysis; however, there are likely tribal resources present in all three proposed or potentially induced mine areas. In addition, built resources are not included in the slope analysis.

Table U-55. Cultural Resources Sensitivity at Proposed and Potentially Induced Mines

Proposed or Potentially Induced Mine	Recorded Resources			Potential Cultural Resources			
	Archaeological Sites	Built Resources	Total	Possible Built Resources over 50 Years Old	0-10 Degree Slope (Highly Likely) acreage	10-20 Degree Slope (Moderately Likely) acreage	Over 20 Degree Slope (Not Likely) acreage
Otter Creek	199	8	207	Unknown	2,451	1,497	774
Poker Jim Creek–O’Dell Creek	212	9	221	Unknown	10,850	4,171	2,930
Canyon Creek	105	4	109	Unknown	3,334	3,530	4,807

Contribution of the Build Alternatives to Cumulative Impacts on Cultural Resources

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would provide access to the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek Mine. The Decker Alternatives would provide access to the proposed Otter Creek Mine and to the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines.

Based on the slope analysis, construction of the Tongue River Alternative would affect 2,164 acres where the presence of cultural resources is highly likely. Based on the field studies, construction of the Tongue River Alternative would destroy or damage 70 archaeological, tribal, and built resources where surveys were conducted within the right-of-way. Based on the slope analysis, construction of the Tongue River Alternative would affect 2,220 acres where the presence of cultural resources is highly likely. Based on the field studies, construction of the Tongue River East Alternative would destroy or damage 72 archaeological resources where surveys were conducted. Also, where surveys were conducted, an additional 66 archaeological, tribal, and built resources located adjacent to but not within the right-of-way would be affected by construction and operation of the Tongue River Alternative; 76 resources outside of the Tongue River East Alternative right-of-way but within the study area would be affected.

Based on the slope analysis, construction of the Colstrip Alternative would affect 1,028 acres where the presence of cultural resources is highly likely. Based on the field studies, construction of the Colstrip Alternative would destroy or damage 58 archaeological, tribal, and built resources where surveys were conducted in the right-of-way where surveys were conducted. Based on the slope analysis, construction of the Colstrip East Alternative would affect 1,106 acres where the presence of cultural resources is highly likely. Based on the field studies, construction of the Colstrip East Alternative would destroy or damage 79 archaeological resources where surveys were conducted. Also, where surveys were conducted, an additional 59 archaeological, tribal, and built resources located adjacent to but not within the right-of-way would be affected by construction and operation of the Colstrip Alternative; 65 tribal resources outside the Colstrip East Alternative right-of-way but within the study area would be affected.

Based on the slope analysis, construction of the Tongue River Road Alternative would affect 2,532 acres where the presence of cultural resources is highly likely. Based on the field studies, construction and operation of the Tongue River Road Alternative would destroy or damage 63 archaeological, tribal, and built resources where surveys were conducted in the right-of-way. In addition, where surveys were conducted, 69 archaeological and built resources are located in the study area but not in the right-of-way. Based on the slope analysis, construction of the Tongue River Road East Alternative would affect 2,547 acres where the presence of cultural resources is highly likely. Based on the field studies, construction and operation of the Tongue River Road East Alternative would affect 64 archaeological, tribal, and built resources in the right-of-way and 75 archaeological, tribal, and built resources outside of the right-of-way where surveys were conducted.

Based on the slope analysis, construction of the Moon Creek Alternative would affect 2,366 acres where the presence of cultural resources is highly likely. Based on the field studies, construction and operation of the Moon Creek Alternative would destroy or damage 71 archaeological, tribal, and built resources in the right-of-way where surveys were conducted. In addition, 48 archaeological, tribal, and built resources are located in the study area but not in the right-of-way. Based on the slope analysis, construction of the Moon Creek East Alternative would affect 2,422 acres where the presence of cultural resources is highly likely. Based on the field studies, construction and operation of the Moon Creek East Alternative would destroy or damage 72 archaeological, tribal, and built resources in the right-of-way where surveys were constructed. In addition, where surveys were conducted, 58 archaeological, tribal, and built resources are located in the study area but not in the right-of-way.

Based on the slope analysis, construction of the Decker Alternative would affect 1,150 acres where the presence of cultural resources is highly likely. Based on the field studies, construction and operation of the Decker Alternatives would destroy or damage 65 archaeological, tribal, and built resources in the right-of-way where surveys were conducted. Based on the slope analysis, construction of the Decker East Alternative would affect 1,097 acres where the presence of cultural resources is highly likely. Based on the

field studies, construction and operation of the Decker East Alternative would destroy or damage 60 cultural resources where surveys were conducted. In addition, where surveys were conducted, 30 archaeological, tribal, and built resources are located in the study area but not in the right-of-way would be affected by the Decker Alternative and 30 such resources would be affected by the Decker East Alternative.

The addition of impacts from the build alternatives to the impacts of the proposed and potentially induced mines would result in cumulative impacts on cultural resources, including the common cultural resources impacts. Cumulative impacts of the build alternatives may, for example, increase in number the removal or demolition of cultural resources; may cause additional damage or alteration to the resources such that they would no longer convey their significance; or may hinder accessibility of cultural resources. When combined with impacts from the build alternatives, the proposed Otter Creek Mine would affect an area ranging from 3,479 to 4,998 acres where the presence of cultural resources is highly likely, depending on the build alternative. The potentially induced Poker Jim Creek–O’Dell Creek Mine, when combined with impacts from the build alternatives, would affect from 11,878 to 13,397 acres where cultural resources are highly likely, depending on the build alternative. Lastly, combining the impacts from the Decker Alternatives and the potentially induced Canyon Creek Mine would result in impacts on cultural resources on 4,431 to 4,484 acres.

U.4.9.3 Land Management

Land Management Impacts on Cultural Resources

Fort Keogh Livestock and Range Research Laboratory

Fort Keogh is an operating land management project that addresses cattle management and grazing. Fort Keogh has been the site of agricultural uses for nearly a century. Although its continued operation would cause surface disturbance that can degrade archaeological resources, this long-term degradation is incremental.

Tongue River Reservoir State Park

The proposed Tongue River Reservoir State Park project would renovate the Pee Wee Point North, Pee Wee Point South, and Sandpoint campgrounds. According to the MEPA/NEPA Checklist, construction of new and renovation of existing campsites are not likely to affect cultural resources. Therefore, no additional analysis of cumulative impacts on cultural resources is warranted.

BLM Resource Management Plan

The BLM Draft RMP/EIS would continue current management activities and identify new facilities or management strategies. The Draft RMP/EIS addresses livestock grazing, wildlife habitat, special-designation areas, special recreation areas, national trails, and

wilderness study areas. These activities would cause surface disturbance and lead to the common cultural resources impacts.

Beaver Creek Landscape Management Project

Implementation of the Beaver Creek LMP would promote a healthier and more resilient ponderosa pine ecosystem on 14,000 acres of forest by using large tree removal, fire applications, and selective vegetation thinning. These practices would promote fires that are of lower intensity and less severe than those caused by stand replacement fires. The Beaver Creek LMP identified 67 cultural resource sites in the commercial and noncommercial treatment areas, as well as the prescribed fire areas. Additional cultural resources would be revealed as a result of the LMP. Although cultural resources are located in the project area, reducing fire risk is anticipated to protect, rather than harm, cultural and historic resources. Therefore, no additional analysis of cumulative impact on cultural resources is warranted.

Contribution of the Build Alternatives to Cumulative Impacts on Cultural Resources

Fort Keogh Livestock and Range Research Laboratory

The Tongue River Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be constructed and operate near where research activities occur in Fort Keogh. USDA is currently preparing a study to determine if Hogback Pasture is a cultural resource eligible for listing in the National Register of Historic Places. The addition of impacts from any one of the Tongue River Alternatives or Tongue River Road Alternatives to impacts related to use of Hogback Pasture would result in cumulative impacts on the Hogback Pasture and other ongoing surface disturbances that may affect cultural resources. The Moon Creek Alternatives would not affect the Hogback Pasture; however, they would contribute to cumulative impacts related to surface disturbances, which have been taking place for almost a century.

BLM Resource Management Plan

Any build alternative would be constructed and would operate in landscapes affected by land management practices under the Draft RMP/EIS. The addition of impacts from the build alternatives to impacts from BLM management practices would contribute to cumulative impacts related to ongoing plowing and grazing, operation and development of railroad corridors, vehicular roads and trails, and activities related to oil, gas, and coal development, such as excavation, blasting and surface disturbance. These activities would result in the common cultural resources impacts.

U.4.9.4 Energy Development

Energy Development Impacts on Cultural Resources

The BLM Draft RMP/EIS would promote oil and natural gas projects on 5.4 million acres of leased land in Rosebud, Custer, Powder River, and Big Horn Counties (the four-county area). OEA estimated that 1,158 CBNG wells would be developed between 2011 and 2030, and considers this estimate much higher than the number of wells that will be permitted and completed. It should be noted that none of the currently approved wells would be in the project area or near the build alternatives (Section U.3.3.4, *Energy Development*). In addition to well development on BLM-administered lands, oil and gas exploration and development continues throughout southeastern Montana on federal, state, tribal, and private lands.

The BLM Draft RMP/EIS states that approximately 4.4 percent of BLM-administered lands in the planning area have been surveyed for cultural resources, resulting in the identification of 11,273 cultural resource properties or sites. This represents an average density of 11.6 sites per 1,000 surveyed acres or, assuming an equal distribution of sites, one site per 86 surveyed acres. The Draft RMP/EIS assumes this data across the total area of the counties of the planning area would yield a total of 327,591 cultural resource properties or sites.

Cultural resources in the RMP planning area include cultural resources relating to the prehistoric period that may consist of scatters of flaked and ground stone tools and debris, stone quarry locations, hearths and other camp debris, stone circles, wooden lodges and other evidence of domestic structures, occupied or utilized rock shelters and caves, game traps and kill sites and petroglyphs, pictographs, stone cairns and alignments and other features associated with past human activities. Some of these sites contain cultural resource features that are in buried deposits. Cultural resources in the planning area that are associated with the historic period consist of fur trading posts, homesteads, settlements, historic emigrant and stage trails, Indian war period battle sites, ranch development, railroad installations, mining operations, oil and gas fields and tribal sites.

Impacts were expected to occur at an estimated 318 sites. Impacts common to all of the BLM Draft RMP/EIS alternatives would include surface and subsurface disturbance from conventional oil and gas development, surface coal mining activities, visual or audible impacts due to construction activities, vandalism resulting from changes in access to the cultural resources, increased erosion from surface disturbance, and even damage to rock art from gas emissions.

In addition to energy development on BLM-administered lands, energy development activities within the cumulative impacts study area would include exploration, construction, operation, and maintenance of CBNG wells. Within the CBNG area, more than 73,000 cultural resource sites were identified above the known coal resources. Surface and

subsurface-disturbing activities such as road construction, well drilling, pad construction, pipeline and utility placement would affect cultural resources.

Contribution of the Build Alternatives to Cumulative Impacts on Cultural Resources

Any build alternative would be constructed and would operate in landscapes affected by oil and gas development, whether on federal or nonfederal lands. Most of the region around the northern build alternatives has a low potential for oil and gas development. There is moderate potential for development along the Decker Alternatives.

The Tongue River Alternatives and the Decker Alternatives would contribute to impacts already identified by BLM. The addition of impacts from the build alternatives to impacts from energy development would result in cumulative impacts on cultural resources.

U.4.9.5 Construction Projects

Construction Project Impacts on Cultural Resources

Tongue River Road Paving

The 32.7-mile paving project proposed for Tongue River Road would necessitate the excavation of previously undisturbed ground, which would affect cultural resources, most likely archaeological resources. There are 97 known cultural resources in the study area; however, only 7 percent of the study area has been surveyed previously (Montana Department of Transportation 2012). The study area is primarily native range and has not been subjected to plowing. As a result, there may be more than 1,000 additional cultural resources within the study area, primarily pre-contact archaeological sites.

Bull Pasture Subdivision Leasing

Leasing the 38.55-acre bull pasture subdivision would lead to ground disturbance activities that would affect cultural resources, specifically archaeological resources. While the area is already disturbed by agricultural practices, activities such as grazing often do not disturb archaeological resources. Construction of buildings, roads, parking lots or other infrastructure, however, would remove cultural resources if they were present.

Contribution of the Build Alternatives to Cumulative Impacts on Cultural Resources

Tongue River Road Paving

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be crossed by the paving project. Although the number and type of cultural resources that would be affected by the proposed rail line are not known, the

addition of impacts from the build alternatives to impacts from the road paving project would result in cumulative impacts on cultural resources.

Bull Pasture Subdivision Leasing

The Tongue River Alternatives and Tongue River Road Alternatives would be closest to the Bull Pasture Subdivision Leasing project. The addition of impacts from the build alternatives to the impacts from leasing the bull pasture subdivision and potential development would result in cumulative impacts on cultural resources.

U.4.9.6 Cumulative Impact Summary: Cultural Resources

The proposed rail line would affect cultural resources and would combine with impacts from the other projects to result in cumulative impacts on cultural resources in the study area. The contribution of the proposed rail line to cumulative impacts is summarized as follows.

- **Existing coal mines and Colstrip Power Plant.** The Colstrip and Decker Alternatives would contribute to cumulative impacts on cultural resources such as removing or demolishing cultural resources, causing additional damage or alteration to the resources such that they would no longer convey their significance, or hindering accessibility of cultural resources.
- **Proposed and potentially induced coal mines.** Any build alternative would contribute to cumulative impacts on cultural resources as described above for existing coal mines, but to a substantially higher degree because of the additional acreage that would be affected by mining activity.
- **Land management.** The Tongue River Alternatives and Tongue River Alternatives would contribute to cumulative impacts related to Hogback Pasture and other ongoing surface disturbances at Fort Keogh. The Moon Creek Alternatives would not affect the Hogback Pasture but would contribute to the cumulative effects of ongoing surface disturbances at Fort Keogh. Any build alternative would contribute to cumulative impacts related to land management under the BLM Draft RMP/EIS by increasing surface and subsurface disturbances, potentially causing the removal, damage or demolition of cultural resources or hindering accessibility of cultural resources, which may affect that property's ability to convey its historic significance.
- **Energy development.** Any build alternative would contribute to cumulative impacts on cultural resources by increasing the area potentially disturbed by construction and operations activities related to the exploration for coal, oil and natural gas. Cumulative impacts would be the same as described for existing coal mines.
- **Construction projects.** The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative impacts on cultural resources. Impacts would be the same as described for coal mines. The Tongue River Alternatives, Colstrip Alternatives, and Tongue River Road

Alternatives would contribute to cumulative impacts related to leasing the bull pasture subdivision to the extent that cultural resources are present.

In summary, construction and operation of any build alternative would contribute to cumulative impacts on cultural resources when combined with impacts from proposed and potentially induced coal mines, land management, and energy development. Some build alternatives would result in cumulative impacts on cultural resources when combined with impacts from existing coal mines, Fort Keogh activities, and bull pasture subdivision leasing. These projects would have to comply with Montana DEQ and other state permits approvals as well as any BLM-required mitigation measures. OEA concludes that the direct impacts from the proposed rail line, when combined with impacts from past, present, and reasonably foreseeable projects and actions, would result in moderate to highly adverse cumulative impacts on cultural resources.

U.4.10 Land Resources

U.4.10.1 Land Use

Construction and operation of the proposed rail line would result in land use impacts primarily through the acquisition and conversion of land to railroad use and the displacement of capital improvements in the right-of-way, including residences and other structures (referred to as the *common land use impacts*). The right-of-way for any build alternative would cross through adjacent properties, rendering the properties or portions of them unsuitable for their current uses. Any build alternative would contribute to cumulative impacts on land use by adding to impacts from other projects. The following subsections describe the impacts of other projects and how impacts from the proposed rail line, when added to the impacts of these projects, would result in cumulative impacts on land use.

The other projects are described in Section U.3.3, *Projects Analyzed*. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and land use is described in Chapter 12, Section 12.2, *Land Use*. OEA defined the study area for impacts of the proposed rail line on land use as land in the rights-of-way of the build alternatives and any land for which access would be limited or lost because of construction of the proposed rail line (Chapter 12, Section 12.2.1, *Land Use, Study Area*). The cumulative impacts study area encompasses Custer, Rosebud, Powder River, and Big Horn Counties, Montana. The cumulative impacts study area differs from the footprint-specific study area defined in Chapter 12, Section 12.2.1, *Study Area*, because construction of a build alternative would preclude any other land use impacts in that footprint. The broader four-county planning area supports a cumulative impact analysis of total acres of land use designation and ownership impacts.

Existing Coal Mines and Colstrip Power Plant

Existing Coal Mines and Colstrip Power Plant Impacts on Land Use

The existing coal mines and Colstrip Power Plant are already operating in the land use cumulative impacts study area. Many of the land use impacts associated with the existing mines occurred in the past when the land was acquired or leased and converted from a prior use to mineral extraction. Operation of the existing mines inside their present boundaries would not result in a net change in land ownership, management, or use.

Continued development of the Rosebud and Spring Creek Mines would affect land use as mining progresses into the mines' RFD areas, which are within the cumulative impacts study area. Most of the land inside the RFD areas for these existing mines is used as grazing land and is under private ownership. Development of the RFD areas would result in land use impacts when the land is leased or sold and converted to mining use. If the existing owners of the land in the RFD areas enter into lease agreements with mining companies, no impacts on the underlying land ownership would result. However, if the existing owners of the land in the RFD areas choose to sell their property to the mining companies or to other land development companies, a change in land ownership would result and a change in land use could result, if the new landowner so chose.

Table U-56 identifies current land uses in the RFD areas of the Rosebud Mine and Spring Creek Mine.

Table U-56. Land Uses in Reasonably Foreseeable Development Areas of the Rosebud Mine and Spring Creek Mine (acres)

Mine RFD	Grazing Land	Forest Land ^a	Nonirrigated Hay Land	Summer Fallow Farmland	Total
Rosebud Mine	6,422.4	1,219.1	60.7	26.0	7,728.1
Spring Creek	5,605.7	40.6	17.2	0.0	5,663.5

Notes:

^a Includes both forested land and non-commercial forested land designations

RFD = reasonably foreseeable development

Source: Montana Department of Revenue 2013, Montana State Library Geographic Information Services 2014

All mines must comply with the reclamation requirements of MCA 82-4 Part 2. Reclamation includes planting and revegetating mined lands to return them to premining use. As mining activities progress gradually across the RFD area, reclamation would occur concurrently. Once a graded area is available for reclamation, soil placement and revegetation would begin. The timeframe for reclamation, included in the reclamation plan, would depend on the activities required to return any specific tract of mine land to its premining use. However, reclamation of each tract within a mine site would last several years. Following reclamation, the land would be capable of supporting its premining use, and would likely be used for grazing, consistent with the predominant land use in the surrounding area.

Contribution of the Build Alternatives to Cumulative Impacts on Land Use

The Colstrip Alternatives would be constructed and would operate near the Rosebud Mine and Colstrip Power Plant. Mine and power plant operations would continue during construction and operation of the build alternative. The Decker Alternatives would be constructed and would operate near the Spring Creek and Decker Mines. Mine operations would continue during construction and operation of the build alternatives; coal transport from the mines would coincide with operation of the build alternatives.

The build alternatives would result in the common land use impacts. The addition of impacts from the build alternatives to impacts from the existing mines and power plant would result in a cumulative impact.

Proposed and Potentially Induced Coal Mines

Proposed and Potentially Induced Coal Mine Impacts on Land Use

The proposed and potentially induced mines would be constructed and would operate in the land use cumulative impacts study area. OEA identified a footprint associated with the full development of Tract 2 of the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O'Dell Creek and Canyon Creek Mines that would consist of approximately 7,639, 17,951, and 11,672¹⁹ acres of land, respectively. If the existing landowners in the potentially induced mining areas enter into lease agreements with mining companies, no impacts on the underlying land ownership would result. However, if the existing owners of the land in the mine areas choose to sell their property to the mining companies or to other land development companies, a change in land ownership would result. While mining activities are underway, the land would not be suitable for uses other than mining.

Table U-57 presents the land use classifications that are located in the development footprint for the proposed and potentially induced coal mines. These land uses would be lost while mining operations occur.

¹⁹ To achieve the estimated volume of coal production, the potentially induced Canyon Creek Mine would require approximately 3,000 acres of mine area in addition to the estimated footprint defined here. The specific locations of the additional acreage have not yet been identified and were not included in the calculations of cumulative impacts on land uses.

Table U-57. Land Uses in the Proposed and Potentially Induced Mine Footprints (acres)

Proposed and Potentially Induced Mines	Grazing Land	Forest Land^a	Irrigated Land	Nonirrigated Hay Land	Summer Fallow Farmland	Total
Otter Creek (proposed)	6,844.9	124.9	0.0	630.7	23.0	7,623.4 ^b
Poker Jim Creek–O’Dell Creek (potentially induced)	15,773.0	1,884.5	283.7	< 0.1	9.5	17,950.7
Canyon Creek (potentially induced)	6,988.8	4,683.1	0.0	0.1	0.0	11,672.0

Notes:

^a Includes both forested land and noncommercial forested land designations

Source: Montana Department of Revenue 2013, Montana State Library Geographic Information Services 2014

^b Total may not match due to rounding

The required implementation of reclamation plans (MCA 82-4 Part 2) would ensure that lands are restored to a condition suitable for premining use. As described for the existing coal mines, mining would progress gradually across the mine area and would occur concurrently with reclamation. Following reclamation, the land would be capable of supporting its premining use.

Reclamation of some potentially induced mining areas would likely occur before the full potentially induced mine footprint is leased and mined. Construction of the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines is not expected to begin until 2021 and 2025, respectively.

Contribution of the Build Alternatives to Cumulative Impacts on Land Use

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would provide access to the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek Mine. The construction start and completion dates for the proposed Otter Creek Mine would depend on the construction schedule for the proposed rail line. The Decker Alternatives would provide access to the proposed Otter Creek Mine and to the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines. The Decker Alternatives would be the only build alternatives that would provide access to the Canyon Creek Mine.

Each of these build alternatives would require the acquisition and conversion of privately owned land for the railroad right-of-way, including properties operated for agriculture and ranching. Of these affected properties, nine would also be within the footprint for the potentially induced Poker Jim Creek–O’Dell Creek Mine and one would be within the development footprint for the proposed Otter Creek Mine. Table U-58 identifies the total private properties located within the overlap of a build alternative right-of-way and one or more of the proposed or potentially induced mine footprints.

Table U-58. Private Properties Located in a Build Alternative Right-of-Way that Overlaps the Development Footprint for Proposed or Potentially Induced Mines

Build Alternative	Otter Creek (proposed)^a	Poker Jim Creek–O'Dell Creek (potentially induced)^a
Tongue River	1	5
Tongue River East	1	4
Colstrip	1	5
Colstrip East	1	4
Tongue River Road	1	5
Tongue River Road East	1	4
Moon Creek	1	5
Moon Creek East	1	4
Decker	1	8
Decker East	1	7

Notes:
^a Totals reflect private agricultural and ranch properties and not properties already owned by mining interests

The addition of impacts from the build alternatives to impacts from the proposed and potentially induced mines would result in cumulative impacts on land ownership types and land use classifications during the mining and reclamation process. If the landowners of the properties in the overlapping mine area and build alternative right-of-way enter into lease agreements with mining companies, no cumulative impacts on the underlying land ownership of their properties would result. However, if the existing landowners choose to sell their property to the mining company or a land development company, the build alternatives would contribute to cumulative impacts on land ownership of these specific properties. Whether through lease or sale, landowner consent to mining activities would reduce the amount of land suitable for its present use during the lifetime of the mines, resulting in a cumulative impact on land use.

Land Management

Land Management Impacts on Land Use

Fort Keogh Livestock and Range Research Laboratory

Fort Keogh is an operating land management project that addresses cattle management and grazing. The present and anticipated future operation of Fort Keogh would not result in a change in ownership or a new use inconsistent with its existing predominant use of agricultural research activities. Therefore, no additional analysis of cumulative impacts on land use is warranted.

Tongue River Reservoir State Park

The proposed Tongue River Reservoir State Park project would renovate the Pee Wee Point North, Pee Wee Point South, and Sandpoint campgrounds. The renovation project would not

result in changes in land ownership or designated land use. Therefore, no additional analysis of cumulative impacts on land use is warranted.

BLM Resource Management Plan

The BLM Draft RMP/EIS would continue current management activities and identify new facilities or management strategies. The BLM Draft RMP/EIS addresses livestock grazing, wildlife habitat, special-designation areas, special recreation areas, national trails, and wilderness study areas. The primary uses of BLM-administered land in the cumulative impacts study area include livestock grazing, oil, gas, and coal development, and recreation. Each alternative in the BLM Draft RMP/EIS would result in different impacts on public use, livestock grazing, energy development, and disposal through sales or exchange in the cumulative impacts study area.

Beaver Creek Landscape Management Project

Implementation of the Beaver Creek LMP would promote a healthier and more resilient ponderosa pine ecosystem on 14,000 acres of forest by using large tree removal, fire applications, and selective vegetation thinning. These practices would promote fires that are of lower intensity and less severe than those caused by stand replacement fires. The Beaver Creek LMP would not result in a change in land use or ownership in the cumulative impacts study area. Therefore, no additional analysis of cumulative impacts on land use is warranted.

Contribution of the Build Alternatives to Cumulative Impacts on Land Use

BLM Resource Management Plan

Any build alternative would be constructed and operate in landscapes affected by future land management practices under the BLM Draft RMP/EIS. The addition of impacts from the build alternatives to impacts from the BLM management activities would result in cumulative impacts on land use. The types and extent of land uses affected would depend on which BLM Draft RMP/EIS alternative is implemented and whether the affected lands are located in the land use cumulative impacts study area.

Energy Development

Energy Development Impacts on Land Use

The BLM Draft RMP/EIS would promote oil and natural gas projects on 5.4 million acres of leased land in Rosebud, Custer, Powder River, and Big Horn Counties (the four-county area). OEA estimated that 1,158 CBNG wells would be developed between 2011 and 2030, and considers this estimate much higher than the number of wells that will be permitted and completed. It should be noted that none of the currently approved wells would be in the project area or near the build alternatives (Section U.3.3.4, *Energy Development*). In addition to well development on BLM-administered lands, oil and gas exploration and

development continues throughout southeastern Montana on federal, state, tribal, and private lands.

Oil and gas development would affect land uses on federal and nonfederal land. All projects that cause disturbances from gas and oil well development must implement proper reclamation procedures when the wells are abandoned (MCA 82-10-400 et seq.), returning those lands to their former utility.

Contribution of the Build Alternatives to Cumulative Impacts on Land Use

Any build alternative would be constructed and would operate in landscapes affected by future oil and gas development. Most of the region around the northern build alternatives has a low potential for oil and gas development. There is moderate potential for development along the Decker Alternatives.

Any build alternative would convert some land uses in the cumulative impacts study area. The addition of impacts from the build alternatives to impacts from energy development would result in cumulative impacts on land use. The location, type, and amount of cumulative land use impacts would depend on the number and location of future oil and gas wells and ancillary facilities. BLM energy development activities would not be permanent and required reclamation would return these lands to predevelopment use. This would reduce permanent cumulative impacts.

Construction Projects

Construction Project Impacts on Land Use

Tongue River Road Paving

The 32.7-mile paving project proposed for Tongue River Road would affect land uses, depending on design standards. The Tongue River Road Corridor Final Study (Montana Department of Transportation 2012) identifies a number of improvement concepts to address safety and design needs for the Tongue River Road corridor. The study concludes that, "... if a project is developed, it may be necessary to acquire additional right-of-way to meet current standards." Funding-contingent improvement concepts range from small-scale spot improvements to larger, complex improvements such as paving the gravel portion of Tongue River Road (S-332). The right-of-way of a secondary road is 130 feet wide. Up to 220 acres of additional right-of-way would be required for some of the design concepts (Montana Department of Transportation 2012). Acquisition of this land would affect land ownership (private owners, BLM-administered lands, and Montana State Trust lands) and land uses.

Bull Pasture Subdivision Leasing

Leasing the 38.55-acre bull pasture subdivision would not result in a change in land ownership or in designated land uses. The DNRC would only issue new leases for

development that are consistent with the existing zoned land use of Light Industrial. Therefore, no additional analysis of cumulative impacts on land use is warranted.

Contribution of the Build Alternatives to Cumulative Impacts on Land Use

Tongue River Road Paving

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be crossed by the paving project. The acquisition of land for a build alternative plus the acquisition of up to of 220 acres of land to expand the Tongue River Road right-of-way would affect land use. Furthermore, the Tongue River Road Alternatives and Tongue River Road East Alternative would run parallel to approximately 38 miles of the Tongue River Road at distances ranging from 100 feet to 3,300 feet. In certain locations, the build alternatives and the Tongue River Road upgrade may require the acquisition of land for their respective rights-of-way from the same properties and landowners, resulting in a cumulative loss of land within individual properties. However, these impacts cannot be quantified at this time. The addition of impacts from the build alternatives to impacts from the road paving project would result in cumulative impacts on land use.

Cumulative Impact Summary: Land Use

The proposed rail line would affect land use and would combine with impacts from the other projects to result in cumulative impacts on land use in the cumulative impacts study area. The contribution of the proposed rail line to cumulative impacts is summarized as follows.

- **Existing coal mines and Colstrip Power Plant.** None of the build alternatives would contribute to cumulative land use impacts when combined with impacts from operation of existing coal mines within their present boundaries. However, the Colstrip Alternatives and Decker Alternatives would contribute to cumulative land use impacts when combined with the impacts from the expansion of the Spring Creek Mine and the Rosebud Mine into the RFD areas.
- **Proposed and potentially induced coal mines.** Any build alternative would contribute to cumulative impacts on land use when combined with impacts from proposed and potentially induced coal mines through the conversion of land from its present use to a different use.
- **Land management.** Any build alternative would contribute to cumulative impacts related to land management under the BLM Draft RMP/EIS by adding to the amount of land in the cumulative impacts study area that would be converted from its present use.
- **Energy development.** Any build alternative would contribute to cumulative impacts on land use when combined with impacts from energy development by increasing the amount of land that would be converted from present uses.

- **Construction projects.** The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative impacts related to Tongue River Road improvement projects by adding to the amount of land that would change ownership and by changing the use of the land in the right-of-way.

In summary, construction and operation of any build alternative would contribute to cumulative impacts on land use when combined with impacts from proposed and potentially induced coal mines, land management, and energy development. Some build alternatives would result in cumulative impacts on land use when combined with impacts from existing coal mines and the Tongue River Road paving project. These projects would have to comply with Montana DEQ and other state permits approvals as well as any BLM-required mitigation measures. OEA concludes that the direct impacts from the proposed rail line, when combined with impacts from past, present, and reasonably foreseeable projects and actions, would result in moderate to highly adverse cumulative impacts on land use.

U.4.10.2 Recreation

Construction and operation of the proposed rail line would result in the following recreational resource impacts: diminished visual character, loss of land use for recreation purposes, and avoidance by big game species, which are popular for hunting and wildlife viewing (hereafter referred to as the *common recreation impacts*). Any build alternative would contribute to cumulative impacts on recreation by adding to impacts from other projects. The following subsections describe the impacts of other projects and how impacts of the proposed rail line, when added to the impacts of these other projects, would result in cumulative impacts on recreation. Although some of these projects include actions that would increase noise levels, OEA has determined there is no overlap of the areas of noise impact from these projects and actions with the areas of potential noise impact from the proposed rail line on recreational resources. Therefore, no additional analysis of cumulative noise impacts on recreation is warranted.

The other projects are described in Section U.3.3, *Projects Analyzed*. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and recreation is described in Chapter 12, Section 12.3, *Recreation*. OEA defined the study area for impacts of the proposed rail line on recreational resources the rights-of-way and any resources for which access would be limited or that would be affected by noise and visual disturbances resulting from construction and operation of the proposed rail line (Chapter 12, Section 12.3.1, *Recreation, Study Area*). The recreation cumulative impacts study area encompasses Custer, Rosebud, Powder River, and Big Horn Counties, Montana (the four-county area). The cumulative impacts study area differs from the footprint-specific study area defined in Chapter 12, Section 12.3.1 because construction of a build alternative would preclude any other recreation impacts in that footprint. The broader four-county planning area supports a cumulative impact analysis of the areas where build alternatives may affect acreage or recreational views also affected by the other projects.

Existing Coal Mines and Colstrip Power Plant

Existing Coal Mines and Colstrip Power Plant Impacts on Recreation

The existing coal mines and Colstrip Power Plant are already operating in the recreation cumulative impacts study area. Although none of these mines is on recreational lands, their ongoing activities result in visual disturbances such as large-scale excavation pits and associated mining infrastructure that would affect the recreation experience.

Contribution of the Build Alternatives to Cumulative Impacts on Recreation

The Colstrip Alternatives would be constructed and would operate near the Rosebud Mine and Colstrip Power Plant. Mine and power plant operations would continue during construction and operation of the build alternative. The Decker Alternatives would be constructed and would operate near the Spring Creek and Decker Mines. Mine operations would continue during construction and operation of the build alternatives; coal transport from the mines would coincide with operation of the build alternative.

Construction and operation of the Colstrip Alternatives would add industrial elements to a landscape that, while predominately rural and agricultural in nature, is already affected by industrial elements associated with mining. Montana FWP administers the block management area (BMA) program, which is a cooperative program between Montana FWP, private landowners, and public land-management agencies developed to provide hunting opportunities to the public. BMA 186 (Chapter 12, Section 12.3, *Recreation*, Figure 12.3-4) is flanked on its western border by the Big Sky Mine area, the Rosebud Mine area, and the Rosebud Mine pit and would be flanked on its northern border by the Colstrip Alternatives (Chapter 12, Section 12.3, *Recreation*, Figure 12.3-1). Viewers on the western edge of BMA 186 may see views associated with mining activity; viewers on the northern portion of the BMA would have the only views of the Colstrip Alternatives. A recreational user of the BMA would not see both the mining operations and the alignment from a single vantage point. However, user enjoyment of the BMA would be diminished by the increased industrial presence associated with the proposed rail line in this mostly rural and agricultural landscape.

Portions of the Spring Creek and Decker Mines are slightly visible from higher elevations at the southern end of the Tongue River Reservoir State Park. The Decker Alternatives would also be visible from certain vantage points in the Tongue River Reservoir State Park. A recreational park visitor would not see both the mining operations and the alignment from a single vantage point. However, user enjoyment of the park would be diminished by the increased industrial presence in this mostly rural and agricultural landscape. The addition of impacts from the build alternatives to impacts from the existing mines would result in cumulative recreation impacts.

Proposed and Potentially Induced Coal Mines

Proposed and Potentially Induced Coal Mine Impacts on Recreation

The proposed and potentially induced mines would be constructed and would operate in the recreation cumulative impacts study area. Mining activities would result in visual disturbances such as large-scale excavation pits and associated mining infrastructure. Construction of this infrastructure would cause big game to avoid these areas temporarily, affecting recreational hunting or wildlife viewing opportunities.

Contribution of the Build Alternatives to Cumulative Impacts on Recreation

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would provide access to the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek Mine. The construction start and completion dates for the proposed Otter Creek Mine would depend on the construction schedule for the proposed rail line. The Decker Alternatives would provide access to the proposed Otter Creek Mine and to the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines. The Decker Alternatives would be the only build alternatives that would provide access to the Canyon Creek Mine.

Any build alternative would result in the common recreation impacts. The addition of these impacts to the impacts from the proposed and potentially induced mines would result in cumulative impacts on recreation, described as follows.

- Visual disturbances would increase at Custer National Forest, Zook Creek Wilderness Study Area, and the Wolf Mountain Battlefield Historic Landmark while mining activities are being carried out at the induced mines. During construction, big game species may temporarily avoid Custer National Forest and Zook Creek Wilderness Study Area, where they provide opportunities for hunting or wildlife viewing.
- The proposed Otter Creek Mine would be located near the northeastern border of Custer National Forest. A forest visitor would not see the proposed rail line but would see the coal mine. Additionally, recreationalists using the Otter Creek Road as an access point for the Custer National Forest would come within a short distance of the proposed rail line and the proposed Otter Creek Mine. User enjoyment of the forest would be diminished by this proximity.
- The potentially induced Poker Jim Creek–O’Dell Creek Mine would be visible from some areas along the western boundary of Custer National Forest and would introduce new industrial elements to a mostly rural landscape.
- The footprint of the Canyon Creek Mine would come within 0.15 mile of the eastern boundary of Zook Creek Wilderness Study Area. Depending on the terrain, viewers from

this area may be able to see portions of the Canyon Creek Mine. Viewers in this area would not likely be able to see the Decker Alternatives from the same vantage point.

Land Management

Land Management Impacts on Recreation

Fort Keogh Livestock and Range Research Laboratory

Fort Keogh is an operating land management project that addresses cattle management and grazing. Fort Keogh participates in the BMA program and allows for hunting in select portions of the property. Current and anticipated management activities would not affect recreation. Therefore, no additional analysis of cumulative impacts on recreation is warranted.

Tongue River Reservoir State Park

The proposed Tongue River Reservoir State Park project would renovate the Pee Wee Point North, Pee Wee Point South, and Sandpoint campgrounds. These upgrades are designed to improve the recreational experience of the park. Therefore, no additional analysis of cumulative impacts on recreation is warranted.

BLM Resource Management Plan

The BLM Draft RMP/EIS would continue current management activities and identify new facilities or management strategies. The BLM Draft RMP/EIS addresses livestock grazing, wildlife habitat, special-designation areas, special recreation areas, national trails, and wilderness study areas. The preferred alternative in the BLM Draft RMP/EIS would improve recreational resources, including the creation of new special recreation management areas officially designated by statute or Secretarial order as containing special characteristics for outdoor recreation. Therefore, no additional analysis of cumulative impacts on recreation is warranted.

Beaver Creek Landscape Management Project

Implementation of the Beaver Creek LMP would promote a healthier and more resilient ponderosa pine ecosystem on 14,000 acres of forest by using large tree removal, fire applications, and selective vegetation thinning. These practices would promote fires that are of lower intensity and less severe than those caused by stand replacement fires. The Beaver Creek LMP would not affect recreational resources in the cumulative impact area. Therefore, no additional analysis of cumulative impacts on recreation is warranted.

Energy Development

Energy Development Impacts on Recreation

The BLM Draft RMP/EIS would promote oil and natural gas projects on 5.4 million acres of leased land in Rosebud, Custer, Powder River, and Big Horn Counties (the four-county area). OEA estimated that 1,158 CBNG wells would be developed between 2011 and 2030, and considers this estimate much higher than the number of wells that will be permitted and completed (Section 3.3.4, *Energy Development*). In addition to well development on BLM-administered lands, oil and gas exploration and development continues throughout southeastern Montana on federal, state, tribal, and private lands.

Oil and gas development would affect recreation uses on federal and nonfederal land. Recreation impacts would include visual disturbances and temporary loss of big game hunting and wildlife viewing opportunities, depending on the proximity to recreational resources and potential loss of recreational areas converted to oil and gas developments. Montana FWP administers the BMA program to provide public access to hunting on private land through leasing rights made between private landowners and FWP. This program helps to reduce hunter concentration on federally owned land in the project area, which are often preferred by hunters because private landowner permission is not required (Bureau of Land Management 2013). If energy development such as oil and gas drilling were to occur on BLM-administered lands, more hunters would likely turn to the private lands under the BMA program for recreational hunting, which would increase demand on these properties. Alternatively, if the private lands currently participating in the BMA program were to convert lands currently used for recreation to oil and gas development, this would result in a loss of recreational land. The location, type, and amount of recreation impacts would depend on the number and location of future oil and gas wells and ancillary facilities.

Additionally, oil and natural gas development would affect the visual characteristics of recreational areas by introducing roadways, utility lines, operations buildings, and nighttime lighting. Oil and natural gas development would also likely require vegetation removal, excavation, and new structures that would detract from the predominately rural and agricultural landscape.

Although the preferred alternative in the BLM Draft RMP/EIS would improve recreation opportunities, it would also allow for increased energy development on lands currently available for recreation. All projects that cause disturbances from gas and oil well development must implement proper reclamation procedures when the wells are abandoned (MCA 82-10-400 *et seq.*), returning those lands to their former utility.

Contribution of the Build Alternatives to Cumulative Impacts on Recreation

Any build alternative would be constructed and operate in landscapes affected by future oil and gas development. Most of the region around the northern build alternatives has a low

potential for oil and gas development. There is moderate potential for development along the Decker Alternatives.

Any build alternative would affect the visual characteristics of the landscape, which would affect the experience of recreational users, whether on federal or nonfederal lands in the cumulative impacts study area. BLM predicts that most of Custer County and Rosebud County would have low chances of natural gas and oil drilling. The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would not contribute to cumulative recreation impacts associated with natural gas and oil wells, with the exception of the Custer National Forest.

However, oil and gas drilling is more likely in the southern part of the cumulative impacts study area (along the Decker Alternatives). The addition of impacts from the Decker Alternatives to impacts from energy development would result in cumulative impacts on recreation.

Construction Projects

Construction Project Impacts on Recreation

Tongue River Road Paving

The 32.7-mile paving project proposed for Tongue River Road would introduce an impermeable surface to the area that would be visually discordant when viewed from a recreational area. However, the paving would also decrease the amount of dust generated by vehicles traveling along Tongue River Road and would help users access recreational areas that are currently accessed via the unpaved roadway.

Bull Pasture Subdivision Leasing

Leasing the 38.55-acre bull pasture subdivision would not affect recreational resources in the cumulative impacts study area. Therefore, no additional analysis of cumulative impacts on recreation is warranted.

Contribution of the Build Alternatives to Cumulative Impacts on Recreation

Tongue River Road Paving

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be crossed by the paving project. The addition of impacts from the build alternatives to impacts from the road paving project would result in cumulative impacts on and benefits to recreation. Land in this area is mostly under private ownership. Recreational areas near the Tongue River Road include five BMAs (BMAs 305,

311, 314, 325, and 178), the Bice and Hirsch Ranch conservation easements,²⁰ and the Pumpkin Creek Ranch and Recreation Area. The exact amount of land required for the paving project would depend on the final design of the road. The Tongue River Road Alternative would not require the acquisition and conversion of any of the aforementioned recreational areas but it would have the greatest contribution to cumulative impacts on recreational resources based on length and proximity to BMAs and Tongue River Road. The paving project area would also overlap with the Colstrip Alternatives through BMA 178. This hardscape, combined with the presence of a railway, would introduce an additional impervious feature to the largely rural landscape. However, as noted above, paving an unpaved roadway would decrease the amount of dust dispersed by vehicle wheels, which may improve visibility near the roadway. Lastly, travel on the Tongue River Road can be difficult, especially in muddy conditions. By paving the road, some recreational areas would become more accessible to the public.

Cumulative Impact Summary: Recreation

The proposed rail line would affect recreation and would combine with impacts from the other projects to result in cumulative impacts on recreation in the study area. The contribution of the proposed rail line to cumulative impacts is summarized as follows.

- **Existing coal mines and Colstrip Power Plant.** The Colstrip Alternatives and Decker Alternatives would contribute to cumulative impacts by adding visual disturbances to the ongoing activities at these mine sites. BMA users would have views of the mines and the Colstrip Alternatives, but not simultaneously from the same vantage point. Tongue River Reservoir State Park users would have views of the mines and the Decker Alternatives but not simultaneously from the same vantage point. User enjoyment of either recreational resource would be diminished by the increased industrial presence associated with the proposed rail line in this mostly rural and agricultural landscape.
- **Proposed and potentially induced coal mines.** Any build alternative would contribute to cumulative impacts by adding industrial elements to the visual landscape and affecting recreational hunting or wildlife viewing opportunities in areas of the Custer National Forest at the southern end of the northern alternatives²¹ and along the northern portion of the Decker Alternatives.
- **Energy development.** Any build alternative would contribute to cumulative impacts by diminishing visual character and affecting recreational hunting or wildlife viewing

²⁰ The Bice Ranch and Hirsch Ranch participate in the BMA program as well as being conservation easements. BMA 325 and the Bice Ranch conservation easement overlap, as do BMAs 311 and 314 with the Hirsch Ranch conservation easement. Therefore, the total land affected would be the same for the two conservation easements as for BMAs.

²¹ The northern alternatives consist of the Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives.

opportunities, depending on the proximity of the build alternative to recreational resources.

- **Construction projects.** The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative impacts related to road paving by increasing visual disturbances.

In summary, construction and operation of any build alternative would result in cumulative impacts on recreational resources when combined with impacts from existing, proposed, and potentially induced coal mines, and other energy development. Some build alternatives would result in cumulative impacts on recreation when combined with impacts from existing coal mines and the Tongue River Road paving project. These projects would have to comply with Montana DEQ and other state permits approvals as well as any BLM-required mitigation measures. OEA concludes that the direct impacts from the proposed rail line, when combined with impacts from past, present, and reasonably foreseeable projects and actions, would result in minor to moderate adverse cumulative impacts on recreation.

U.4.10.3 Section 4(f) and Section 6(f) Resources

The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and their impacts on resources protected under Section 4(f) of the Department of Transportation Act are described in Chapter 12, Section 12.4, *Draft Section 4(f) and 6 (f) Summary*.

OEA determined that the proposed rail line would affect one property that would be considered a Section 4(f) property—the Spotted Eagle Recreation Area—in the Section 4(f) study area.²² Construction and operation of any of the Tongue River Alternatives and Tongue River Road Alternatives would result in *direct use*²³ of the Spotted Eagle Recreation Area by permanently incorporating into the railroad right-of-way approximately 11 acres from the western side of the property.

For reasons outlined in Chapter 12, Section 12.4.1 *Draft Section 4(f) Evaluation Summary* and described in detail in Appendix Q, *Draft Section 4(f) and Section 6(f) Evaluation*, OEA has made the preliminary determination that construction and operation of any of the Tongue River Alternatives or Tongue River Road Alternatives would not adversely affect the activities, features, and attributes of the Spotted Eagle Recreation Area qualifying it for protection under Section 4(f). As such, OEA intends to make a *de minimis* impact finding for these build alternatives as they pertain to the Spotted Eagle Recreation Area.

²² OEA also identified a number of historic resources that are potentially eligible for listing on the National Register of Historic Places (National Register). However, for the purpose of determining Section 4(f) eligibility, historic resources must be listed on or determined to be eligible for the National Register by officials with jurisdiction over the resources pursuant to the National Historic Preservation Act (16 United States Code [U.S.C.] § 470, as amended). To date, no historic resources listed on the National Register have been identified in the study area.

²³ Terms italicized at first use are defined in Chapter 25, *Glossary*. Many of the terms italicized in this section and Appendix Q have meanings specific to Section 4(f) regulations.

OEA has also identified cultural resources that may be eligible for protection under Section 4(f); however, the significance of these resources has not yet been determined by officials with jurisdiction. Because the impacts on all potentially eligible cultural resources cannot be fully determined prior to the construction phase of the proposed rail line, OEA engaged in a phased resource identification approach and has developed a Section 106 Programmatic Agreement (Appendix P, *Programmatic Agreement*). Significant cultural resources eligible for protection under Section 4(f) that would be encountered during construction would be addressed by the Programmatic Agreement. Additionally, the Programmatic Agreement establishes responsibilities for the treatment of historic properties, the implementation of mitigation measures, and ongoing consultation efforts, thereby ensuring that harm would be minimized to cultural resources.

The Spotted Eagle Recreation Area is the only potentially affected property that has received funding under Section 6(f) the Land and Water Conservation Fund Act. A portion of the Spotted Eagle Recreation Area, approximately 11 acres on the western side of the property, would be permanently converted from recreational to nonrecreational uses if any of the Tongue River Alternatives or Tongue River Road Alternatives is authorized by the Board. No properties protected by Section 6(f) would be affected by any other build alternative.

U.4.10.4 Hazardous Waste Sites

Construction and operation of the proposed rail line would not affect or be affected by any hazardous waste sites. OEA did not identify any impacts related to hazardous waste sites; therefore, no cumulative impacts analysis of waste sites is warranted and no cumulative impacts would result.

The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and hazardous waste sites are described in Chapter 12, Section 12.5, *Hazardous Waste Sites*.

U.4.11 Geology, Soils, and Paleontological Resources

U.4.11.1 Geology and Soils

Construction and operation of the proposed rail line would result in the following geology and soils impacts: alteration of the existing topography, excavation of the Fort Union Formation, slope failure, and soil erosion. Any build alternative would contribute to cumulative impacts on geology and soils by adding to impacts from other projects. Overlapping construction activities for the proposed rail line and other projects would increase the potential for cumulative impacts. Once operational, the proposed rail line would not contribute to cumulative geology and soils impacts. The following subsections describe the impacts of the other projects and how impacts from the proposed rail line, when added to the impacts of these projects, would result in cumulative impacts on geology and soils.

The other projects are described in Section U.3.3, *Projects Analyzed*. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and geology and soils are described in Chapter 13, *Geology, Soils, and Paleontological Resources*. OEA defined the study area for impacts of the proposed rail line based on the type of geologic feature and its potential to affect the proposed rail line (Chapter 13, *Geology, Soils, and Paleontological Resources*, Section 13.2, *Study Area*). The cumulative impacts study area is the same for geology and seismicity; it comprises the geologic features of southeastern Montana and for topography and soils, it is the rights-of-way of the build alternatives.

Existing Coal Mines and Colstrip Power Plant

Existing Coal Mines and Colstrip Power Plant Impacts on Geology and Soils

The existing coal mines and Colstrip Power Plant are already operating in the geology and soils cumulative impacts study area. The existing mines and Colstrip Power Plant have site-specific geology and soils impacts, usually limited to their project boundaries. Although these projects have already been constructed and are in operation, new mining tracts and power plant expansions would affect soil and geology resources in the RFD areas. Those impacts would also be limited to the RFD areas, which would not overlap with the rights-of-way of the build alternatives. Therefore, no additional analysis of cumulative impacts on geology and soils is warranted.

Proposed and Potentially Induced Coal Mines

Proposed and Potentially Induced Coal Mines Impacts on Geology and Soils

The proposed and potentially induced mines would be constructed and would operate in the geology and soils cumulative impacts study area. Construction of the potentially induced mines would cause soils and geology impacts; however, these impacts would be generally limited to the project boundaries. In addition, cumulative impacts on geology and soils would occur in the presence of other projects being simultaneously constructed near the proposed rail line. For the purposes of this analysis, OEA has assumed that construction of the proposed rail could overlap in time with construction of any of the potentially induced mines.

In the case of the Otter Creek Mine, there would be approximately 12 acres (or 840 linear feet of rail line) of overlap of between the right-of-way for the proposed rail line and the Otter Creek Mine permit boundary. However, excavation activities for the actual pit mine would be located more than a mile east of the proposed rail line. OEA assumed that the footprints of the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines would be located at a similar distance from the proposed rail line. The purpose of this overlap area would be to allow a connection between the induced mine rail loops and the proposed rail line for the transport of coal.

The suitability of soils for construction in the area where the Otter Creek Mine rail loop and the proposed rail line were designated as fair to moderately poor due to a poor rating for subgrade, moderate shrink-swell potential, and a low potential for erosion by water. The main geologic formation in this area of overlap is the Tongue River member of the Fort Union Formation where bedrock is known to occur at varying depths and locations. In addition, slopes in this area were identified as from 1 to 5 percent with some more than 5 percent

The suitability of soils for construction in the Poker Jim Creek–O’Dell Creek and Canyon Creek Mine areas would be similar to those described above for the Otter Creek Mine. The main geologic formation that occurs in the vicinity of these mines includes the Tongue River member of the Fort Union Formation where bedrock is known to occur at varying depths and locations with some overlap in Quaternary Alluvium where bedrock does not occur. In addition, slopes in the vicinity of these induced mines were identified mainly more than 5 percent with some from 1 to 5 percent.

Similar to the proposed rail line, all proposed and potentially induced mines would be required and responsible for mitigating their respective impacts related to geology and soils. Mitigation to minimize impacts related to associated rail spurs and loops could be similar to those proposed for the proposed rail line. Furthermore, construction of the potentially induced mines would be subject to compliance with the permit requirements of MCA 82-4 Part 2.²⁴ Proponents would be required to prepare appropriate engineering studies and implement a stormwater pollution prevention plan (SWPPP), an erosion control plan, and best management practices to preclude or reduce impacts. The SWPPP is the document submitted to Montana DEQ to obtain the Montana Pollutant Discharge Elimination System permit for storm water discharges associated with construction activities.

Therefore, no additional analysis of cumulative impact on geology and soils is warranted.

Land Management

Land Management Impacts on Geology and Soils

Fort Keogh Livestock and Range Research Laboratory

Fort Keogh is an operating land management project that addresses cattle management and grazing. Management activities, such as maintaining rangeland and pastures and producing livestock feed, would be within the boundaries of Fort Keogh and would not require removal and replacement of large quantities of soil. Fort Keogh would implement best management practices to reduce any soil erosion and runoff into nearby waterways. No impacts on

²⁴ Montana coal mining permit requirements include provisions for grading, backfilling, water control, topsoil, reclamation and coal conservation. They also prescribe measures to eliminate damages to land owners and members of the public, their real and personal property, public roads, streams, and all other public property from soil erosion, subsidence, landslides, water pollution, and hazards dangerous to life and property (Montana Department of Environmental Quality 2011).

geology and soils would result. Therefore, no additional analysis of cumulative impacts on geology and soils is warranted.

Tongue River Reservoir State Park

The proposed Tongue River Reservoir State Park project would renovate the Pee Wee Point North, Pee Wee Point South, and Sandpoint campgrounds. Park renovation activities such as water, sewer, and electricity hookups and construction of storage, docking, and parking areas would be centralized within the boundaries of the Tongue River Reservoir State Park and would not require removal and replacement of large quantities of soil. Best management practices would be implemented to reduce any soil erosion and runoff into nearby waters. No impacts on geology and soils would result. Therefore, no additional analysis of cumulative impacts on geology and soils is warranted.

BLM Resource Management Plans

The BLM Draft RMP/EIS would continue current management activities and identify new facilities or management strategies. The BLM Draft RMP/EIS addresses livestock grazing, wildlife habitat, special-designation areas, special recreation areas, national trails, and wilderness study areas. Proposed activities include soil mixing, compaction, and removal, and would result in exposure of soils to erosion and potentially failure. The BLM Draft RMP/EIS includes actions to limit and slow soil loss, minimize soil degradation, and control sedimentation. BLM would evaluate activities on a case-by-case basis and would implement best management practices to reduce erosion, control sediment, reduce compaction, revegetate and stabilize slopes, and relocate surface-disturbing activities.

Beaver Creek Landscape Management Project

Implementation of the Beaver Creek LMP would promote a healthier and more resilient ponderosa pine ecosystem on 14,000 acres of forest by using large tree removal, fire applications, and selective vegetation thinning. These practices would promote fires that are of lower intensity and less severe than those caused by stand replacement fires. Removal and replacement of large quantities of soil are not expected. For some soil disturbances, best management practices would reduce soil erosion and runoff into nearby waterways. Therefore, no additional analysis of cumulative impacts on geology and soils is warranted.

Contribution of the Build Alternatives to Cumulative Impacts on Geology and Soils

BLM Resource Management Plans

Any build alternative would be constructed and operate in landscapes affected by land management practices under the BLM Draft RMP/EIS. The addition of impacts from the build alternatives to the impacts from BLM management activities would result in cumulative impacts related to slope failure and soil erosion. The potential for BLM Draft

RMP/EIS activities to take place within the same counties as the proposed rail line is low for Custer and Rosebud Counties and medium for Powder River County. Any such activities are not likely to occur near the right-of-way of the proposed rail line. After implementation of best management practices and other measures, no cumulative impacts are expected.

Energy Development

Energy Development Impacts on Geology and Soils

The BLM Draft RMP/EIS would promote oil and natural gas projects on 5.4 million acres of leased land in Rosebud, Custer, Powder River, and Big Horn Counties (the four-county area). OEA estimated that 1,158 CBNG wells would be developed between 2011 and 2030, and considers this estimate much higher than the number of wells that will be permitted and completed. It should be noted that none of the currently approved wells would be in the project area or near the build alternatives (Section U.3.3.4, *Energy Development*). In addition to well development on BLM-administered lands, oil and gas exploration and development continues throughout southeastern Montana on federal, state, tribal, and private lands.

Oil and natural gas development would result in impacts on geology and soils. However, OEA assumed that no oil and gas development would occur in the cumulative impact area for geology and soils. Therefore, no additional analysis of cumulative impacts on geology and soils is warranted.

Construction Projects

Construction Project Impacts on Geology and Soils

Tongue River Road Paving

The 32.7-mile paving project proposed for Tongue River Road is not expected to require the removal and replacement of large quantities of soil. However, the project would increase the amount of impervious surfaces, increasing the potential for erosion and stormwater runoff. The road paving project would reduce impacts on geology and soils to the extent practicable by preparing project-specific geotechnical studies, a SWPPP, and an erosion control plan, and implementing best management practices to reduce impacts related to erosion.

Bull Pasture Subdivision Leasing

Leasing the 38.55-acre bull pasture subdivision for light industrial development would not require the removal and replacement of large quantities of soil. However, the project would increase the amount of impervious surfaces, increasing the potential for erosion and stormwater runoff. The Bull Pasture Subdivision Leasing project would reduce impacts on geology and soils to the extent practicable by preparing project-specific geotechnical studies,

a SWPPP, and an erosion control plan, and implementing best management practices to reduce impacts related to erosion.

Contribution of the Build Alternatives to Cumulative Impacts on Geology and Soils

Tongue River Road Paving

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be crossed by the paving project. The build alternatives would not result in impacts on geology and soils. No cumulative impacts are expected.

Bull Pasture Subdivision Leasing

The Tongue River Alternatives and Tongue River Road Alternatives would be closest to the Bull Pasture Subdivision Leasing project. The build alternatives would not result in impacts on geology and soils. No cumulative impacts are expected.

Cumulative Impact Summary: Geology and Soils

The proposed rail line would affect geology and soils and would combine with impacts from the other projects to result in cumulative impacts on geology and soils in the cumulative impacts study area. The contribution of the proposed rail line to cumulative impacts is summarized as follows.

- **Land management.** Any build alternative would contribute to cumulative impacts in association with management practices under the BLM Draft RMP/EIS. However, the potential for overlap is low in Custer and Rosebud Counties and medium in Powder River County. Activities are not likely to occur near the right-of-way. No cumulative impacts are expected.
- **Construction projects.** The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be crossed by the paving project. The build alternatives would not result in impacts on geology and soils and no cumulative impacts are expected. The Tongue River Alternatives and Tongue River Road Alternatives would be closest to the Bull Pasture Subdivision Leasing project. The build alternatives would not result in impacts on geology and soils and no cumulative impacts are expected.

In summary, construction and operation of any build alternative would contribute to cumulative impacts on geology and soils when combined with impacts from land management. Some build alternatives would result in cumulative impacts on geology and soils when combined with impacts from the Tongue River Road paving project. These projects would have to comply with Montana DEQ and other state permits approvals as well as any BLM-required mitigation measures. OEA concludes that the direct impacts from the proposed rail line, when combined with impacts from past, present, and reasonably

foreseeable projects and actions, would result in negligible to minor adverse cumulative impacts on geology and soils.

U.4.11.2 Paleontological Resources

Construction and operation of the proposed rail line would result in the following impacts on paleontological resources: blasting and excavation of rock and removal of sediments, improved access to bedrock outcrops where fossil collection could occur, and inadvertent damage to paleontological resources by miscellaneous construction and vehicular activity. Any build alternative would contribute to cumulative impacts on paleontological resources by adding to impacts from other projects. The following subsections describe the impacts of the other projects and how impacts from the proposed rail line, when added to the impacts of these projects, would result in cumulative impacts on paleontological resources.

The other projects are described in Section U.3.3, *Projects Analyzed*. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and *Paleontological Resources* are described in Chapter 13, *Geology, Soils, and Paleontological Resources*. OEA defined the study area for paleontological resources as the rights-of-way of the build alternatives. The rights-of-way encompass the areas where ground disturbance would occur and where fossils may be discovered. OEA defined the cumulative impacts study area as the geologic features of southeastern Montana, which is the same as the study area for geology and seismicity. The cumulative impacts study area was selected to encompass the impact areas of both the other projects and the build alternatives. Therefore, it differs from the study area defined in Chapter 13, Section 13.3, *Paleontological Resources*.

Existing Coal Mines and Colstrip Power Plant

Existing Coal Mines and Colstrip Power Plant Impacts on Paleontological Resources

The existing coal mines and Colstrip Power Plant are already operating in the cumulative impacts study area. Mine development involves blasting and excavation of rock and removal of sediments. Continued development of the Rosebud Mine at Colstrip and the Spring Creek and Decker Mines would affect paleontological resources as mining progresses into the mines' RFD areas. A total of 13,392 acres would be developed for these two operating mines: 7,728 acres for the Rosebud Mine and 5,663 acres for the Spring Creek and Decker Mines. Mine development removes fossil-bearing rock and sediments through blasting and excavation. The development of the existing mines would likely affect paleontological resources due to blasting and excavation of rock and removal of sediments.

To address impacts on paleontological resources, the two mine areas were assessed by tabulating acres of rock units that would be affected by earth moving combined with these rock units' potential fossil yield classification (PFYC) in order to determine sensitivity for paleontological resources. Because the exact volumetric configuration of the mines is

unknown at this time, OEA was unable to analyze the volume of cutting needed for each mine or the initial disturbance of sediment and rock units in various amounts and to various depths to extract coal.

Table U-59 presents the number of acres and PFYC class of the rock units exposed at the surface in each mine area. Although all the mines occur in areas with rock units rated at PFYC of 3 (sensitive) or 4 (highly sensitive), the great extent of the mines indicates that some paleontological resources would be present and disturbed by mine excavation. Impacts from these mines would contribute to cumulative impacts on paleontological resources because of excavation and rock removal.

Table U-59. Paleontological Sensitivity of Existing Mines

Mine Area	Total Acres	Qal (acres)	Qal (%) ^a	Qat (acres)	Tftr (acres)	Tftr (%)	Tw (acres)	Tw (%) ^a
PFYC Classification		3	--	3	4	--	3	--
Rosebud RFD	7,728	189	2	-	7540	98	-	-
Spring Creek/Decker RFD	5,663	86	2	-	1345	24	4233	75

Notes:
^a Rounding error may result in a total slightly different than 100%
RFD = reasonably foreseeable development
Qal = Quaternary Alluvium
Qat = Quaternary Alluvium Terrace Deposit (this rock unit is not present in the mine areas studied);
Tfle = Lebo Member of Fort Union Formation (this rock unit is not present in the mine areas studied);
Tft = Tullock Member of Fort Union Formation (this rock unit is not present in the mine areas studied);
Tftr = Tongue River Member of Fort Union Formation
Tw = Wasatch Formation (PFYC classification of 3, based on BLM 2006, Ligett, n.d)

Contribution of the Build Alternatives to Cumulative Impacts on Paleontological Resources

The Colstrip Alternatives would be constructed and would operate near the Rosebud Mine and Colstrip Power Plant. Mine and power plant operations would continue during construction and operation of either of the Colstrip alternatives. The Decker Alternatives would be constructed and would operate near the Spring Creek and Decker Mines. Mine operations would continue during construction and operation of the build alternative; coal transport from the mines would happen during operation of the build alternative.

The study area includes 2,040 acres for the Colstrip Alternative, 2,094 acres for the Colstrip East Alternative, 2,826 acres for the Decker Alternative, and 2,695 acres for the Decker East Alternative. OEA analyzed acres of surface rock units that would be affected by earth moving and their PFYC to determine sensitivity for paleontological resources on the alternatives. Based on the acreage disturbed and PFYC analysis, construction of any of the Colstrip Alternatives or the Decker Alternatives would take place entirely in rock units and sediment units with a PFYC of 3, which is defined as a moderate or an unknown potential.

Continued development of the Rosebud and Spring Creek Mines would affect paleontological resources as mining progresses into the mines' RFD areas. Potential impacts could include blasting and excavation of rock and removal of sediments, improved access to bedrock outcrops where fossil collection could occur and inadvertent damage to paleontological resources by miscellaneous construction and vehicular activity.

The combined impacts from the Colstrip Alternatives and the Rosebud Mine RFD would affect an area ranging from 9,768 to 9,822 acres, depending on the build alternative. All of these acres would be across rock units with a PFYC of 3. The combined impacts from the Decker Alternatives and the Spring Creek and Decker Mine RFD would affect an area ranging from 8,358 to 8,489 acres. All of these acres would be across rock units with a PFYC of 3. The addition of impacts from the build alternatives to the impacts of the existing mines would result in cumulative impacts on paleontological resources.

Proposed and Potentially Induced Coal Mines

Proposed and Potentially Induced Coal Mine Impacts on Paleontological Resources

The proposed and potentially induced mines would be constructed and would operate in the paleontological resources cumulative impacts study area. Development of these mines could affect paleontological resources. A total of 37,262 acres would be developed for the proposed and potentially induced mines: 4,723 acres for the proposed Otter Creek Mine, 17,951 acres for the potentially induced Poker Jim Creek–O'Dell Creek Mine, and 11,672 acres for the potentially induced Canyon Creek Mine. Mine development removes fossil-bearing rock and sediments through blasting and excavation. The development of the proposed and potentially induced mines would likely affect paleontological resources due to blasting and excavation of rock and removal of sediments.

To address possible impacts on paleontological resources, the three proposed and potentially induced mine areas were assessed by tabulating acres of rock units that would be affected by earth moving and their PFYC to determine sensitivity for paleontological resources. Because the volumetric configuration of the mines is unknown at this time, OEA was unable to analyze the volume of cutting needed for each mine; i.e. the initial disturbance of sediment and rock units in various amounts and to various depths to extract coal.

Table U-60 presents the number of acres and PFYC of the rock units exposed at the surface in each mine area. Although all the mines occur in areas with rock units rated at PFYC of 3, the great extent of the mines indicates that some paleontological resources would be present and disturbed by mine excavation. Impacts from these mines would result in cumulative impacts on paleontological resources because of excavation and rock removal.

Table U-60. Paleontological Sensitivity in Proposed and Potentially Induced Mines

Mine Area	Total Acres	Qal (acres)	Qal (%) ^a	Qat (acres)	Qat (%) ^a	Tfle (acres)	Tft (acres)	Tftr (acres)	Tftr (%) ^a
PFYC Classification		3	--	3	--	3	4	3	--
Canyon Creek	11,672	365	3	59	.5	-	-	11,249	96
Otter Creek	4,723	330	7	-	-	-	-	4,393	93
Poker Jim Creek–O’Dell Creek	17,951	2431	14	427	2	-	-	15093	84

Notes:

^a Rounding error may result in a total slightly different than 100%

Qal = Quaternary Alluvium

Qat = Quaternary Alluvium Terrace Deposit;

Tfle = Lebo Member of Fort Union Formation (this rock unit is not present in the mine areas studied);

Tft = Tullock Member of Fort Union Formation (this rock unit is not present in the mine areas studied);

Tftr = Tongue River Member of Fort Union Formation

Contribution of the Build Alternatives to Cumulative Impacts on Paleontological Resources

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would provide access to the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek Mine. The Decker Alternatives would provide access to the proposed Otter Creek Mine and to the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines.

Based on the analysis of acreage and PFYC (Chapter 13, Section 13.3, *Paleontological Resources*, Table 13-1), construction of the Tongue River Alternative would affect 1,283 acres where the potential for paleontological resources is classed as PFYC 4, or high, and 2,500 acres classed as PFYC 3, moderate or unknown. Construction of the Tongue River East Alternative would affect 1,283 acres classed as PFYC 4 and 2,520 acres classed as PFYC 3. Construction of the Colstrip Alternative (2,040 acres) and the Colstrip East Alternative (2,094 acres) would occur entirely in rock and sediment units classed as PFYC 3. Construction of the Tongue River Road Alternative would affect 1,153 acres classed as PFYC 4 and 3,081 acres classed as PFYC 3. Similarly, the Tongue River Road East Alternative would affect 1,153 acres classed as PFYC 4 and 3,065 acres classed as PFYC 3. Construction of the Moon Creek Alternative would affect 1,336 acres classed as PFYC 4 and 2,690 acres classed as PFYC 3. Construction of the Moon Creek East Alternative would affect 1,336 acres classed as PFYC 4 and 2,711 acres classed as PFYC 3. Construction of the Decker Alternative (2,826 acres) and the Decker East Alternative (2,695) would occur entirely in rock and sediment units classed as PFYC 3.

The addition of impacts from the build alternatives to the impacts from proposed and potentially induced mines would result in cumulative impacts on paleontological resources. Cumulative impacts of the build alternatives may increase the amount of paleontological

resources that would be removed or demolished because they would affect larger areas than the proposed and potentially induced mines.

Impacts of the proposed Otter Creek Mine, when combined with impacts from the build alternatives, would affect an area ranging from 6,763 to 8,957 acres, depending on the build alternative. As many as 1,336 acres of the combined area are classified as PFYC 4 and the remainder as PFYC 3. Impacts of the potentially induced Poker Jim Creek–O’Dell Creek Mine, when combined with impacts from the build alternatives, would affect from 19,991 to 22,185 acres. As many as 1,336 acres of the combined area are classified as PFYC 4 and the remainder as PFYC 3. Impacts of the potentially induced Canyon Creek Mine, when combined with the impacts of the Decker Alternatives would affect an area ranging from 14,367 to 14,498 acres. All of these acres would be across rock units classed as PFYC 3.

Land Management

Land Management Impacts on Paleontological Resources

Fort Keogh Livestock and Range Research Laboratory

Fort Keogh is an operating land management project that addresses cattle management and grazing. Fort Keogh has been the site of agricultural uses for nearly a century. Although its continued operation would cause surface disturbance, it has a small potential to affect paleontological resources.

Tongue River Reservoir State Park

The proposed Tongue River Reservoir State Park project would renovate the Pee Wee Point North, Pee Wee Point South, and Sandpoint campgrounds. This type of surface activity is unlikely to affect paleontological resources.

BLM Resource Management Plan

The BLM Draft RMP/EIS would continue current management activities and identify new facilities or management strategies. The Draft RMP/EIS addresses livestock grazing, wildlife habitat, special-designation areas, special recreation areas, national trails, and wilderness study areas. These activities would cause surface disturbance. However, this is unlikely to affect paleontological resources.

Beaver Creek Landscape Management Project

Implementation of the Beaver Creek LMP would promote a healthier and more resilient ponderosa pine ecosystem on 14,000 acres of forest by using large tree removal, fire applications, and selective vegetation thinning. These practices would be unlikely to affect paleontological resources.

Energy Development

Energy Development Impacts on Paleontological Resources

The BLM Draft RMP/EIS would promote oil and natural gas projects on 5.4 million acres of leased land in Rosebud, Custer, Powder River, and Big Horn Counties (the four-county area). OEA estimated that 1,158 CBNG wells would be developed between 2011 and 2030, and considers this estimate much higher than the number of wells that will be permitted and completed (Section U.3.3.4, *Energy Development*). However, none of the currently approved wells would be in the project area or near the build alternatives. In addition to well development on BLM-administered lands, oil and gas exploration and development continues throughout southeastern Montana on federal, state, tribal, and private lands.

Impacts common to all of the BLM Draft RMP/EIS alternatives would include excavation and construction, agricultural expansion, reservoir filling, and recreational vehicle traffic. Excavation and construction and improved recreational vehicle could cause surface and subsurface disturbance, and, potentially, vandalism resulting from increased access to paleontological resources.

In addition to energy development on BLM-administered lands, energy development activities in the cumulative impacts study area would include exploration, construction, operation, and maintenance of CBNG wells. Surface and subsurface-disturbing activities such as road construction, well drilling, pad construction, and pipeline and utility placement would affect paleontological resources.

Contribution of the Build Alternatives to Cumulative Impacts on Paleontological Resources

Any build alternative would be constructed and would operate in landscapes affected by oil and gas development, whether on federal or nonfederal lands. Most of the region around the northern build alternatives has a low potential for oil and gas development. There is moderate potential for development along the Decker Alternatives.

The Tongue River Alternatives and the Decker Alternatives would contribute to impacts already identified by BLM in their Draft RMP/EIS. The addition of impacts from the build alternatives to impacts from energy development would result in cumulative impacts on paleontological resources. These impacts include blasting and excavation of rock and removal of sediments, improved access to bedrock outcrops where fossil collection could occur, and inadvertent damage to paleontological resources by construction and vehicular activity.

Construction Projects

Construction Project Impacts on Cultural Resources

Tongue River Road Paving

The 32.7-mile paving project proposed for Tongue River Road would necessitate the excavation of previously undisturbed ground, which could affect paleontological resources, most likely during grading and excavation into bedrock.

Bull Pasture Subdivision Leasing

Leasing the 38.55-acre bull pasture subdivision and subsequent construction of buildings, roads, parking lots, or other infrastructure, could lead to ground disturbance activities that have the potential to affect paleontological resources if they are present.

Contribution of the Build Alternatives to Cumulative Impacts on Paleontological Resources

Tongue River Road Paving

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be crossed by the paving project. The addition of impacts from the build alternatives to impacts from the road paving project would result in cumulative impacts on paleontological resources. These impacts would be similar to those described under energy development.

Bull Pasture Subdivision Leasing

The Tongue River Alternatives and Tongue River Road Alternatives would be closest to the Bull Pasture Subdivision Leasing project. The addition of impacts from the build alternatives to the impacts from leasing the bull pasture subdivision and potential development would result in cumulative impacts on paleontological resources. These impacts would be similar to those described under energy development.

Cumulative Impact Summary: Paleontological Resources

The proposed rail line would affect paleontological resources and would combine with impacts from the other projects to result in cumulative impacts on paleontological resources in the study area. The contribution of the proposed rail line to cumulative impacts is summarized as follows.

- **Existing coal mines and Colstrip Power Plant.** The Colstrip Alternatives and Decker Alternatives would contribute to cumulative impacts on paleontological resources such as removing or demolishing resources due to blasting and excavation of rock and removal of sediments. When combined with impacts from the Colstrip Alternatives, development of the

Rosebud Mine RFD would affect from 9,768 to 9,822 acres, depending on the build alternative. All of these acres would be across rock classed as PFYC 3, moderate or unknown sensitivity. When combined with impacts from the Decker Alternatives, development of the Spring Creek and Decker Mine RFD would affect from 8,358 to 8,489 acres. All of these acres would be across rock units with a PFYC of 3.

- **Proposed and potentially induced coal mines.** Any build alternative would contribute to cumulative impacts on paleontological resources in combination with the proposed and potentially induced coal mines. When combined with impacts from any build alternative, the proposed Otter Creek Mine would affect from 6,763 to 8,957 acres, depending on the build alternative. As many as 1,336 acres would be classed as PFYC 4, high sensitivity, and the remainder as PFYC 3. When combined with impacts from any build alternative, the potentially induced Poker Jim Creek–O’Dell Creek Mine would affect from 19,991 to 22,185 acres. As many as 1,336 acres would be classed as PFYC 4, and the remainder as PFYC 3. When combined with impacts from the Decker Alternatives, the potentially induced Canyon Creek Mine would affect from on 14,367 to 14,498 acres. All of these acres would be classed as PFYC 3.
- **Land management.** The Tongue River Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative impacts related to ongoing surface disturbances at Fort Keogh. Any of these build alternatives would contribute to cumulative impacts related to land management under the BLM Draft RMP/EIS by increasing surface and subsurface disturbances, potentially causing the removal, damage or demolition of paleontological resources or increasing accessibility for collection of or inadvertent damage to paleontological resources.
- **Energy development.** Any build alternative would contribute to cumulative impacts on paleontological resources by increasing the area potentially disturbed by construction and operation related to the exploration for coal, oil, and natural gas. Cumulative impacts would be the same as the impacts described for existing coal mines.
- **Construction projects.** The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would contribute to cumulative impacts on paleontological resources when combined with impacts from the Tongue River Road paving project. Impacts would be the same as the impacts described for coal mines. The Tongue River Alternatives, Colstrip Alternatives, and Tongue River Road Alternatives would contribute to cumulative impacts related to leasing the bull pasture subdivision to the extent that paleontological resources are present.

In summary, construction and operation of any build alternative would result in cumulative impacts on paleontological resources when combined with impacts from proposed and potentially induced coal mines and energy development. Some build alternatives would result in cumulative impacts on paleontological resources when combined with impacts from existing coal mines and the Tongue River Road paving project. These projects would have to comply with Montana DEQ and other state permits and approvals as well as any BLM-

required mitigation measures. OEA concludes that the direct impacts from the proposed rail line, when combined with impacts from past, present, and reasonably foreseeable projects and actions, would result in minor adverse cumulative impacts on paleontological resources.

U.4.12 Energy Resources

Construction and operation of the proposed rail line would result energy resource consumption impacts. Additionally, the proposed rail line right-of-way would cross the rights-of-way for electric transmission lines and natural gas and petroleum liquids pipelines. Any build alternative would contribute to cumulative impacts on energy resources by adding to impacts from other projects. The following subsections describe the impacts of other projects and how potential impacts from the proposed rail line, when added to the impacts of these projects, would result in cumulative impacts on energy resources.

The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and energy is described in Chapter 14, *Energy Resources*. OEA defined the study area for impacts of the proposed rail line on the rights-of-way of existing energy distribution infrastructure (e.g., natural gas and petroleum liquids pipelines and production wells and electric transmission lines) as encompassing Custer, Rosebud, Big Horn, and Powder River Counties. OEA defined the study area for the analysis of energy resources as the energy production, energy distribution, and energy consumption infrastructure and energy supply within Custer, Rosebud, Big Horn, and Powder River Counties (Chapter 14, Section 14.2, *Energy Resources, Study Area*). OEA selected this study area because one or more of the build alternatives would cross each of these counties. Equipment for constructing the proposed rail line and locomotives operating on the proposed rail line would be fueled from distribution facilities in Forsyth or Miles City (for the northern alternatives) or Decker (for the southern alternatives). OEA did not identify a study area for the transport of recyclable commodities. OEA does not anticipate that any recyclable commodities would be transported on the proposed rail line. OEA defined the cumulative impacts study areas as identical to the study areas defined in Chapter 14, Section 14.2, *Study Area*.

Cumulative impacts of the build alternatives related to downline transportation of coal and national and international coal markets are not discussed in this appendix. Appendix C, *Coal Production and Markets*, provides an analysis of the impacts of the proposed rail line on national and international coal markets. Air emissions associated with build alternatives construction and operation are discussed in Chapter 4, *Air Quality*, and Appendix E, *Air Quality, Emissions, and Modeling Data*. Economic impacts of build alternative construction and operation, including purchase of diesel fuel and other goods and services, are discussed in Chapter 15, *Socioeconomics* and Appendix T, *Socioeconomic Methods and Tables*.

U.4.12.1 Existing Coal Mines and Colstrip Power Plant

Existing Coal Mines and Colstrip Power Plant Impacts on Energy Resources

The existing coal mines and Colstrip Power Plant are already operating in the energy resource cumulative impacts study area. The coal mines consume electricity and diesel fuel in proportion to the tonnage of coal mined. The Colstrip Power Plant consumes coal and generates electricity.

Spring Creek Mine and Decker Mine

Coal Production

Energy is consumed at Spring Creek and Decker Mines in order to mine and process mined coal into a finished coal product. Approximately 20 million tons of coal are produced each year.

Electricity Consumption

Approximately 12.97 kilowatt hours (kWh) of electricity are consumed for each ton of coal mined. Based on the production of 20.2 million tons of coal per year (2012), electricity consumption for the Spring Creek and Decker Mines would be 262.05 million kWh per year. Electricity consumption factors for coal production were calculated based on data from the National Renewable Energy Laboratory's study *Life Cycle Assessment of Coal-Fired Power Production* (Spath et al. 1999).

Diesel Fuel and Gasoline Consumption

Approximately 0.275 gallon of diesel fuel is consumed per ton of coal mined, based on the permitted diesel fuel consumption of Rosebud Mine Area C (Montana Department of Environmental Quality 2001a). Based on the production of 20.2 million tons of coal per year, diesel fuel consumption for the Spring Creek and Decker Mines would be 5.55 million gallons per year. Approximately 0.012 gallon of gasoline is consumed per ton of coal mined. Based on the production of 20.2 million tons of coal per year, gasoline consumption for the Spring Creek and Decker Mines would be 0.25 million gallons per year. Based on the maximum permitted coal production rate for the Spring Creek Mine of 24 million tons per year and the maximum permitted coal production capacity of the Decker Mine of 16 million tons per year, the mines would consume 11 million gallons per year of diesel fuel and 0.48 million gallons per year of gasoline.

OEA assumed that operation and production of the Spring Creek and Decker Mines would remain unchanged during the analysis period of 2018 to 2037. Energy consumption for the Spring Creek Mine and Decker Mine is summarized in Table U-61.

Table U-61. Energy Consumption for Spring Creek and Decker Mines ^a

Element	Value
Electricity consumption factors	12.97 kWh electricity per ton of coal mined
Diesel fuel consumption factors	0.275 gallon diesel fuel per ton of coal mined
Gasoline consumption factor	0.012 gallon gasoline per ton of coal mined
Spring Creek/Decker coal produced ^b	20.20 million tons of coal annually
Spring Creek/Decker electricity consumption	262.05 million kWh per year (12.97 kWh per ton coal produced)
Spring Creek/Decker diesel fuel consumption	5.55 million gallons per year (0.275 gallon per ton coal produced)
Spring Creek/Decker gasoline consumption	0.25 million gallons per year (0.012 gallon per ton coal produced)
Notes:	
^a 2012	
kWh = kilowatt hours	
Sources: Montana Department of Environmental Quality 2001b, Spath et al. 1999	

Rosebud Mine

Based on production of 13 million tons of coal per year and the same electricity consumption factors described for the Spring Creek and Decker Mines, electricity consumption for the Rosebud Mine would be 168.65 million kWh per year. Based on the diesel fuel consumption factor estimated from the Rosebud Mine Area C permit (Montana Department of Environmental Quality 2001a), diesel fuel consumption for the Rosebud Mine would be 2.41million gallons per year. Based on the same gasoline consumption factor, gasoline consumption for the Rosebud Mine would be 0.13 million gallons per year.

OEA assumed that operation and annual production of the Rosebud Mine would remain unchanged during the analysis period of 2018 to 2037. Energy resource consumption for the Rosebud Mine is summarized in Table U-62.

Table U-62. Energy Consumption for Rosebud Mine

Element	Value
Electricity consumption factors	12.97 kWh electricity per ton of coal mined
Diesel fuel consumption factors	0.275 gallon diesel fuel per ton of coal mined
Gasoline consumption factor	0.012 gallon gasoline per ton of coal mined
Rosebud Mine coal produced (2012)	13.00 million tons of coal annually
Rosebud Mine electricity consumption	168.65 million kWh per year (12.97 kWh per ton coal produced)
Rosebud Mine diesel fuel consumption	3.57 million gallons per year (0.275 gallon per ton coal produced)
Rosebud Mine gasoline consumption	0.16 million gallons per year (0.012 gallon per ton coal produced)
Notes:	
kWh = kilowatt hours	
Sources: Montana Department of Environmental Quality 2001b, Spath et al. 1999	

Colstrip Power Plant

The Colstrip Power Plant has a generation capacity of 2,094 megawatts, equivalent to 16.75 million megawatt hours (MWh) per year (based on 8,000 operating hours per year). The Colstrip Plant is collectively owned by Puget Sound Energy, PPL Montana LLC, Portland General Electric, Avista Corporation, PacifiCorp, and NorthWestern Energy LLC (Puget Sound Energy 2014). The electricity consumption of the existing mines, 0.431 million MWh per year, represents 2.6 percent of the generating capacity of the Colstrip Power Plant.

Summary of Resource Consumption by Existing Coal Mines

The total diesel fuel consumption for the Spring Creek, Decker, and Rosebud Mines is 9.12 million gallons per year. For operation of the existing mines from 2015 to 2037 (including the 2015 to 2017 construction period and the 2018 to 2037 operation period of the build alternatives), the total diesel fuel consumption would be 209.76 million gallons. The total electricity consumption for these mines is 430.7 million kWh per year. For 23 years of operation, the total electricity consumption would be 9,906 million kWh. The total gasoline consumption for these mines is 0.47 million gallons per year. For 23 years of operation, the total gasoline consumption would be 10.81 million gallons.

Contribution of the Build Alternatives to Cumulative Impacts on Energy Resources

The Colstrip Alternatives would be constructed and would operate near the Rosebud Mine and Colstrip Power Plant. Mine and power plant operations would continue during construction and operation of the build alternative. The Decker Alternatives would be constructed and would operate near the Spring Creek and Decker Mines. Mine operations would continue during construction and operation of the build alternative; coal transport from the mines would coincide with construction and operation of the build alternative.

U.4.12.2 Proposed and Potentially Induced Coal Mines

Proposed and Potentially Induced Coal Mine Impacts on Energy Resources

The proposed and potentially induced mines would be constructed and would operate in the energy resource cumulative impacts study area. Construction and operation of these mines would result in increased energy production (coal) and increased energy consumption (electricity, gasoline, and diesel fuel).

Energy Production

Table U-63 summarizes the production capacities for the low, medium, and high production scenarios for the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines.²⁵ Table U-64 summarizes the maximum production capacities for the low, medium, and high production scenarios assuming all proposed and potentially induced mines are in production. The potentially induced Canyon Creek Mine would be in production only if one of the Decker Alternatives is licensed; the other build alternatives would not provide access to the Canyon Creek deposit.

The construction schedule for the proposed Otter Creek Mine is dependent on the construction schedule for the proposed rail line and the mine permit application process. Under the normal construction scenario that assumes no construction activities occur during the winter months, the construction schedule for the build alternatives would range from 2.5 years for the Colstrip Alternative to 6.2 years for the Moon Creek East Alternative and 6 years for the Decker Alternatives. The proposed Otter Creek Mine is assumed to commence operations in the calendar year after the construction of the proposed rail line is completed (in 2018 for the Colstrip Alternative and in 2021 for the Moon Creek East and Decker Alternatives).

Under the winter construction scenario, construction of any build alternative would be completed within 3 years except for the Moon Creek East Alternative, for which the construction schedule would be 3.3 years. Under this scenario, the proposed Otter Creek Mine would commence operation in 2018 for any build alternative. Construction of the Moon Creek East Alternative would extend into 2018 if construction commenced in 2015. To maintain consistency with other build alternative calculations, OEA assumed that, if the Moon Creek East Alternative is selected, the proposed Otter Creek Mine would commence operation in 2018 and would produce 60 percent of its full capacity in 2018.

The construction and operation schedule of the potentially induced Poker Jim Creek–O’Dell Creek Mine and Canyon Creek Mine for the medium and high production scenarios would not be affected by the construction schedule of any build alternative.

²⁵ Three coal production scenarios (low, medium, high) scenarios depend on which build alternative is selected and constructed and which proposed and potentially induced mines are producing coal. Higher coal production scenarios are associated with more rail traffic. See Appendix C, *Coal Production and Markets*.

Table U-63. Mine Production Capacities

Mine	Build Alternatives	Production Scenario	Production Capacity (million tons per year)	Normal Construction Online Year ^a	Winter Construction Online Year
Proposed Mine					
Otter Creek	All	Low	20	2018 for the Colstrip and Tongue River Alternatives; 2019 to 2021 for the other build alternatives	2018
Otter Creek	All	Medium	20		2018
Otter Creek					
	All	High	34		2018
Potentially Induced Mines					
Poker Jim Creek–O'Dell Creek	All	Low	0	NA	NA
Poker Jim Creek–O'Dell Creek	All	Medium	12	2023	2023
Poker Jim Creek–O'Dell Creek	All	High	16	2023	2023
Canyon Creek	Decker	Low	0	NA	NA
Canyon Creek	Decker	Medium	0	NA	NA
Canyon Creek	Decker	High	22	2028	2028
Notes:					
^a Construction schedules for the build alternatives are discussed in Chapter 14, <i>Energy Resources</i>					

Table U-64. Maximum Production Capacities for All Mines, Assuming Winter Construction

Year	No-Action Alternative	Production Scenario: Northern Alternatives ^a (million tons per year)			Production Scenario: Southern Alternatives ^b (million tons per year)		
		Low	Medium	High	Low	Medium	High
2016	0	0	0	0	0	0	0
2018	0	20	20	34	20	20	34
2023	0	20	32	50	20	32	50
2030	0	20	32	50	20	32	72
2037	0	20	32	50	20	32	72
Notes:							
^a The northern alternatives consist of the Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives.							
^b The southern alternatives consist of the Decker Alternatives							

Energy Consumption from Construction

Construction of the proposed Otter Creek Mine would commence 2 years prior to the commencement of operation of any build alternative and once there is an acceptable mine permit with Montana DEQ. Therefore, the construction period for the proposed Otter Creek Mine would depend on the construction period for the build alternative. Construction of the

potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines would commence 2.5 years prior to commencement of operation of the mine.

OEA assumed that construction of the proposed and potentially induced mines would occur over 2.5 years and would require 30 percent of the annual electricity, diesel fuel, and gasoline that would be needed for mining operations at full production capacity. Under the normal construction scenario, construction of the proposed Otter Creek Mine would occur from 2016 to 2018 for the Colstrip Alternative and Tongue River Alternative and from 2016 to 2018 for the Colstrip East Alternative. Construction of the proposed Otter Creek Mine would occur from 2017 to 2019 for the Tongue River East Alternative, Tongue River Road Alternatives, and Moon Creek Alternative, and from 2018 to 2020 for the Moon Creek East and Decker Alternatives.

For both the normal construction and winter construction scenarios, construction of the potentially induced Poker Jim Creek–O’Dell Creek Mine would occur from 2020 to 2022. Construction of the potentially induced Canyon Creek Mine would occur from 2025 to 2027. OEA assumed that the construction dates for the potentially induced mines would be the same for any build alternative.

Total energy consumption for construction and operation of the proposed and potentially induced mines over the 2018 to 2037 analysis period would be lower under the normal construction scenario than under the winter construction scenario. The proposed Otter Creek Mine would operate for 20 years from 2018 to 2037 for the Colstrip Alternative and the Tongue River Alternative, but would operate only for 17 years (from 2021 to 2037) for the Moon Creek East Alternative and Decker Alternatives. Total energy consumption for the proposed Otter Creek Mine operation from 2018 to 2037 would be proportional to the number of mine operating years in that same period. OEA assumed that the energy consumption for construction of the proposed Otter Creek Mine and the number of years required to construct the proposed Otter Creek Mine would be the same regardless of the construction start date.

Electricity, gasoline, and diesel fuel consumption for construction of the proposed and potentially induced mines were calculated as described for the Spring Creek and Decker Mines. Table U-65 summarizes the electricity, gasoline, and diesel fuel consumption for construction of the proposed and potentially induced mines.

Table U-65. Energy Consumption for Construction of Proposed and Potentially Induced Mines (Low, Medium, and High Production Scenarios) Assuming Winter Construction of Tongue River Railroad

Proposed and Potentially Induced Mines	Total Coal Production Capacity (million tons per year)	Construction Start Date	Construction End Date	Electricity (MWh per year)	Diesel Fuel (million gallons per year)	Gasoline (million gallons per year)
Low Production Scenario						
Otter Creek	20	2015	2017	77,836	1.65	0.07
Poker Jim Creek / O'Dell Creek	0	NA	NA	0	0	0
Canyon Creek	0	NA	NA	0	0	0
Medium Production Scenario						
Otter Creek	20	2015	2017	77,836	1.65	0.07
Poker Jim Creek / O'Dell Creek	12	2020	2022	46,702	0.99	0.04
Canyon Creek	0	NA	NA	0	0	0
High Production Scenario						
Otter Creek	34	2015	2017	132,322	2.80	0.13
Poker Jim Creek / O'Dell Creek	16	2020	2022	63,369	1.32	0.06
Canyon Creek (Decker Alternatives only)	22	2025	2027	85,620	1.81	0.08
Notes:						
Winter construction assumed for Tongue River Railroad construction						
MWh = megawatt hours; NA = not applicable						
Sources: Montana Department of Environmental Quality 2001b, Spath et al. 1999						

Based on the electricity, diesel, and gasoline resources required per ton of mine production described for the Spring Creek and Decker Mines, the total energy consumption for proposed and potentially induced mine construction would be as follows.

- Low production scenario: 0.195 million MWh of electricity, 4.12 million gallons of diesel fuel, and 0.19 million gallons of gasoline.
- Medium production scenario: 0.311 million MWh of electricity, 6.60 million gallons of diesel fuel, and 0.30 million gallons of gasoline.
- High production scenario: 0.703 million MWh of electricity, 14.85 million gallons of diesel fuel, and 0.67 million gallons of gasoline (southern alternatives)²⁶ and 0.486 million MWh of electricity, 10.31 million gallons of diesel fuel, and 0.46 million gallons of gasoline (northern alternatives).²⁷

²⁶ The southern alternatives consist of the Decker Alternatives.

²⁷ The northern alternatives consist of the Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives.

Energy Consumption from Operations

During the first and second years of mine operations, the proposed Otter Creek Mine would produce at 60 percent capacity and 80 percent capacity and would consume energy at 60 percent and 80 percent of the total energy consumption of the mine operating at full capacity. During the first 2 years of operations, the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines would produce at 60 percent and 80 percent capacity and would consume energy at 60 percent and 80 percent of the total energy consumption of the mine operating at full capacity. Based on the electricity, diesel, and gasoline resources required per ton of coal production described for the Spring Creek and Decker Mines, the total energy consumption for proposed and potentially induced mine operations for the low, medium, and high production scenarios over the 20 year period from 2018 through 2037, assuming winter construction, would be as follows.

- Low production scenario: 5.03 million MWh of electricity, 106.67 million gallons of diesel fuel, and 4.80 million gallons of gasoline.
- Medium production scenario: 7.27 million MWh of electricity, 154.17 million gallons of diesel fuel, and 6.94 million gallons of gasoline.
- High production scenario: 11.55 million MWh of electricity, 244.68 million gallons of diesel fuel, and 11.01 million gallons of gasoline (northern alternatives) and 14.23 million MWh of electricity, 301.53 million gallons of diesel fuel, and 13.57 million gallons of gasoline (southern alternatives).

Energy resource consumption for construction and operation of the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines is summarized in Tables U-66 through U-68 for the low, medium, and high coal production scenarios. Total energy resource consumption for construction and operation of the proposed and potentially induced mines for the low, medium, and high production scenarios is summarized in Table U-69. Energy consumption is based on the winter construction schedule for the proposed rail line and commencement of operation of the proposed Otter Creek Mine in 2018. Total energy resource consumption would be lower for build alternatives with longer construction schedules under the normal construction scenario, as the proposed Otter Creek Mine would commence operation later and would therefore operate for fewer years from 2018 to 2037.

Table U-66. Energy Consumption for Construction and Operation of Proposed and Potentially Induced Mines (Low Production Scenario) Assuming Winter Construction

Proposed and Potentially Induced Mines	Coal Production (million tons/year)	Electricity Consumption (MWh/year)	Diesel Fuel Consumption (million gallons/year)	Gasoline Consumption (million gallons/year)
Otter Creek				
Construction (2015–2017)	0	77,836	1.65	0.07
Operation; year 1 (2018)	12	155,673	3.30	0.15
Operation; year 2 (2019)	16	207,564	4.40	0.20
Operation; remaining years (2020–2037)	20	259,455	5.50	0.25
Poker Jim Creek–O’Dell Creek	0	0	0	0
Canyon Creek	0	0	0	0

Notes:

MWh = megawatt hours

Sources: Montana Department of Environmental Quality 2001b, Spath et al. 1999

Table U-67. Energy Consumption for Construction and Operation of Proposed and Potentially Induced Mines (Medium Production Scenario) Assuming Winter Construction

Proposed and Potentially Induced Mines	Coal Production (million tons/year)	Electricity Consumption (MWh/year)	Diesel Fuel Consumption (million gallons/year)	Gasoline Consumption (million gallons/year)
Otter Creek				
Construction (2015–2017)	0	77,836	1.65	0.07
Operation; year 1 (2018)	12	155,673	3.30	0.15
Operation; year 2 (2019)	16	207,564	4.40	0.20
Operation; remaining years (2020–2037)	20	259,455	5.50	0.25
Poker Jim Creek–O’Dell Creek				
Construction (2020–2022)	0	46,702	0.99	0.04
Operation; year 1 (2023)	7.2	93,404	1.98	0.09
Operation; year 2 (2024)	9.6	124,538	2.64	0.12
Operation; remaining years (2025–2037)	12	155,673	3.30	0.15
Canyon Creek	0	0	0	0

Notes:

MWh = megawatt hours

Sources: Montana Department of Environmental Quality 2001b, Spath et al. 1999

Table U-68. Energy Consumption for Construction and Operation of Proposed and Potentially Induced Mines (High Production Scenario) Assuming Winter Construction

Proposed and Potentially Induced Mines	Coal Production (Million tons/year)	Electricity Consumption (MWh/year)	Diesel Fuel Consumption (Million gallons/year)	Gasoline Consumption (Million gallons/year)
Otter Creek				
Construction (2015–2017)	0	132,322	2.80	0.13
Operation; year 1 (2018)	20.4	264,644	5.61	0.25
Operation; year 2 (2019)	27.2	352,859	7.48	0.34
Operation; remaining years (2020–2037)	34	411,073	9.35	0.42
Poker Jim Creek–O’Dell Creek				
Construction (2021–2022)	0	62,269	1.32	0.06
Operation; year 1 (2023)	9.6	124,538	2.64	0.12
Operation; year 2 (2024)	12.8	166,051	3.52	0.16
Operation; remaining years (2025–2037)	16	207,564	4.40	0.20
Canyon Creek (Southern Alternatives only)				
Construction (2025–2027)	0	85,620	1.81	0.08
Operation; year 1 (2028)	13.2	171,240	3.63	0.16
Operation; year 2 (2029)	17.6	228,320	4.84	0.22
Operation; remaining years (2030–2037)	22	285,400	6.05	0.27
Notes:				
MWh = megawatt hours				
Sources: Montana Department of Environmental Quality 2001b, Spath et al. 1999				

Table U-69. Energy Consumption for Construction and Operation of Proposed and Potentially Induced Mines

Proposed and Potentially Induced Mines	Coal Production (Million tons)	Electricity Consumption (MWh)	Diesel Fuel Consumption (Million gallons)	Gasoline Consumption (Million gallons)
Low Production Scenario				
Construction	0	194,591	4.12	0.19
Operation	388	5,033,424	106.67	4.80
Total		5,228,015	110.79	4.99
Medium Production Scenario				
Construction	0	311,345	6.60	0.30
Operation	561	7,275,114	154.17	6.94
Total		7,586,459	160.77	7.24
High Production Scenario – Northern Alternatives				
Construction	0	486,478	10.31	0.46
Operation	890	11,545,740	244.68	11.01
Total		12,032,218	254.99	11.48
High Production Scenario – Southern Alternatives				
Construction	0	700,528	14.85	0.67
Operation	1,097	14,228,503	301.53	13.57
Total		14,929,031	316.37	14.24
Notes:				
MWh = megawatt hours				
Sources: Montana Department of Environmental Quality 2001b, Spath et al. 1999				

Contribution of the Build Alternatives to Cumulative Impacts on Energy Resources

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would provide access to the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek Mine. The construction start and completion dates for the proposed Otter Creek Mine would depend on the construction schedule for the proposed rail line. The Decker Alternatives would provide access to the proposed Otter Creek Mine and to the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines. The Decker Alternatives would be the only build alternatives that would provide access to the potentially induced Canyon Creek Mine.

Impacts from the build alternatives would include consumption of diesel fuel, gasoline, and electricity for construction and operation of the proposed rail line. Construction of the Moon Creek East Alternative would result in the most diesel fuel consumption for all construction activities (24.11 million gallons) and construction of the Colstrip Alternative would result in the least diesel fuel consumption for all construction activities (9.71 million gallons). OEA has not separately estimated diesel fuel and gasoline consumption for construction of the

build alternatives; all fuel consumption is reported as diesel fuel. Fuel consumption for workforce vehicles would include both diesel fuel and gasoline. Fuel consumption for earthworks, supply train locomotives, bridge construction, and road relocation would be primarily diesel fuel.

For the high production scenario, operation of the Tongue River East Alternative would result in the most diesel fuel consumption (130.19 million gallons) and operation of the Decker East Alternative would result in the lowest diesel fuel consumption (87.05 million gallons). OEA did not separately estimate diesel fuel and gasoline consumption for operation of the build alternatives; all fuel consumption is reported as diesel fuel. Fuel consumption for maintenance vehicles would include both diesel fuel and gasoline. Fuel consumption for locomotive and maintenance equipment would be diesel fuel.

Electricity consumption for the proposed office building in Ashland for the build alternatives would be approximately the same for any build alternative (29,000 kWh per year). Additional electricity consumption for operation of communications towers would vary by alternative.

The addition of impacts from the build alternatives to impacts from the proposed and potentially induced mines would result in cumulative impacts on diesel fuel and electricity demand. Under the high production scenario, the total diesel fuel consumption for construction (2015 to 2017) and operation (2018 to 2037) of the Moon Creek East Alternative (the build alternative with the highest diesel consumption) would be 24.11 million gallons for construction and 127.54 million gallons for operation (151.65 million gallons total). This amount would be approximately 58 percent of the diesel fuel consumption for construction and operation of the proposed and potentially induced mines (254.99 million gallons) and approximately 27 percent of the combined diesel fuel consumption of the existing and proposed and potentially induced mines (including 209.76 million gallons of diesel fuel consumption for the existing mines operating between 2015 and 2037).

Under the high production scenario, the total diesel fuel consumption for construction (2015 to 2017) and operation (2018 to 2037) of the Decker Alternative would be 21.38 million gallons for construction and 89.11 million gallons for operation (110.49 million gallons total). This amount would be approximately 42 percent of the diesel fuel consumption for construction and operation of the proposed and potentially induced mines and approximately 20 percent of the combined diesel fuel consumption of the existing and proposed and potentially induced mines.

The total electricity, gasoline, and diesel fuel consumption for constructing the proposed and potentially induced mines would range from 0.195 million MWh, 4.12 million gallons of diesel fuel, and 0.19 million gallons of gasoline for the low production scenario; to 0.703 million MWh, 14.85 million gallons of diesel fuel and 0.67 million gallons of gasoline for the

high production scenario (assuming one of the southern alternatives²⁸ is constructed); or to 0.486 million MWh, 10.31 million gallons of diesel fuel, and 0.46 million gallons of gasoline for the high production scenario (assuming one of the northern alternatives is constructed).

The total electricity, gasoline, and diesel fuel consumption for operating the proposed and potentially induced mines over the analysis period would range from 5.03 million MWh, 4.80 million gallons of gasoline, and 106.67 million gallons of diesel fuel for the low production scenario to 11.55 million MWh, 11.01 million gallons of gasoline, and 244.68 million gallons of diesel fuel for the high production scenario (assuming one of the northern alternatives is constructed) or 14.23 million MWh, 301.53 million gallons of diesel fuel, and 13.57 million gallons of gasoline (assuming one of the southern alternatives is constructed).

U.4.12.3 Land Management

Land Management Impacts on Energy Resources

The land management projects or plans are primarily landscape management plans related to grazing, recreation, or forest resource management. They would not result in energy production or energy demand impacts. Therefore, no additional analysis of cumulative impacts on energy is warranted.

U.4.12.4 Energy Development

Energy Development Impacts on Energy Resources

The BLM Draft RMP/EIS would promote oil and natural gas projects on 5.4 million acres of leased land in Rosebud, Custer, Powder River, and Big Horn Counties (the four-county area). OEA estimated that 1,158 CBNG wells would be developed between 2011 and 2030, and considers this estimate much higher than the number of wells that will be permitted and completed. It should be noted that none of the currently approved wells would be in the project area or near the build alternatives (Section U.3.3.4, *Energy Development*). In addition to well development on BLM-administered lands, oil and gas exploration and development continues throughout southeastern Montana on federal, state, tribal, and private lands.

Energy is consumed in oil well development and operations in the four-county area. Crude oil production in Rosebud, Big Horn, Powder River, and Custer Counties was 619,695 barrels in 2013 (Montana Board of Oil and Gas Conservation 2014a, 2014b, 2014c, 2014d). Based on a factor of 6.81 percent of total crude oil production, energy consumption for production of crude oil in the four counties was estimated to be 42,201 barrels of crude oil in

²⁸ The southern alternatives consist of the Decker Alternatives.

2013, equivalent on a heat content basis to 1.77 million gallons of diesel fuel.²⁹ Assuming that production remains unchanged from 2018 through 2037, the total energy consumption on a diesel fuel-equivalent basis would be 35.4 million gallons, equivalent to 4,916,000 million British thermal units (Btu) (245,820 million Btu per year) at a conversion factor of 5.825 million Btu per barrel of diesel fuel.

Contribution of the Build Alternatives to Cumulative Impacts on Energy Resources

Any build alternative would be constructed and would operate in landscapes affected by future oil and gas development. Most of the region around the northern build alternatives has a low potential for oil and gas development. There is moderate potential for development along the Decker Alternatives.

None of the build alternatives would affect the energy production or consumption associated with future oil and gas development and exploration in southeastern Montana. However, the addition of energy demands from the build alternatives to the energy demands from future oil and gas development and exploration would result in a cumulative demand for energy resources in the study area.

U.4.12.5 Construction Projects

Construction Project Impacts on Energy Resources

Tongue River Road Paving

The 32.7-mile paving project proposed for Tongue River Road would result in consumption of diesel fuel for road-paving activities. Life-cycle energy consumption for road construction is typically about 3 to 7 terajoules per lane mile (Muench 2010). Life-cycle energy consumption studies cited in the Muench 2010 compilation typically considered only the roadway's pavement structure. For asphalt pavement of 32.7 miles of Tongue River Road (RP 17.7 to RP 50.4), the total life-cycle energy consumption would be approximately 310,000 million Btu, equivalent to 2.23 million gallons of diesel fuel at a conversion factor of 5.825 million Btu per barrel of diesel fuel. Of this amount, 425,500 gallons would be related to construction activities and construction-related transportation. This amount of diesel fuel is approximately equivalent to the amount of diesel fuel that would be consumed in 1 month of proposed rail line operation for the high production scenario and approximately equivalent to 10 percent of the amount of diesel fuel that would be consumed in 1 year of the proposed Otter Creek Mine operation at the low production scenario.

²⁹ The standard energy conversion factor for crude oil = 5.8 million British thermal units (Btu) per barrel; for diesel fuel = 5.825 million Btu per barrel, or a difference of 0.004 (U.S. Energy Information Administration 2014). These are not Montana-specific values.

Bull Pasture Subdivision Leasing

Leasing the 38.55-acre bull pasture subdivision would not result in impacts on energy demand or energy production. Although some amount of energy would be consumed in constructing buildings associated with the lease, the project would not affect energy demand or production. Therefore, no additional analysis of cumulative impacts on energy is warranted.

Contribution of the Build Alternatives to Cumulative Impacts on Energy Resources

Tongue River Road Paving

OEA assumed that the Tongue River Road paving project and the build alternative construction would be conducted simultaneously. The addition of impacts from the build alternatives to the impacts from the paving project would result in cumulative impacts on diesel fuel resources during the construction period.

Total life-cycle energy consumption for road paving would be approximately 310,000 million Btu, equivalent to 2.23 million gallons of diesel fuel. Based on data from Muench (2010), approximately 2.5 percent of the total life-cycle energy consumption for road paving is associated with road construction activities, 16 percent is associated with construction-related transportation activities, and 18.5 percent is associated with road maintenance activities. The remainder of the life-cycle energy consumption includes energy consumed in production of the raw materials (e.g., asphalt), activities that would occur outside of the study area. The life-cycle energy consumption for road paving includes the equivalent of 57,500 gallons of diesel fuel for road paving and 368,000 gallons of diesel fuel for construction-related transportation. An additional 425,500 gallons of diesel fuel would be consumed for road maintenance over the life cycle of the paved road. According to Muench (2010), life-cycle analysis studies of road paving are conducted over a 40- to 50-year period. Therefore, approximately 50 percent of the maintenance-related energy consumption (212,750 gallons) would be consumed during the 20-year analysis period (2018 to 2037).

U.4.12.6 Cumulative Impact Summary: Energy Resources

The proposed rail line would affect energy resources and would combine with impacts from the other projects to result in cumulative impacts on energy resources in the study area. The contribution of the proposed rail line to cumulative impacts is summarized as follows.

- **Existing coal mines and Colstrip Power Plant.** Any build alternative would contribute to cumulative impacts by increasing demand for diesel fuel in the study area. The total diesel fuel consumption for operation of the existing mines is 9.12 million gallons per year and the total electricity consumption for the existing mines is 430.7 million kWh per year. Under the high production scenario, diesel fuel consumption from construction and operation of the Moon Creek East Alternative (the build alternative having the highest

overall diesel fuel consumption at 151.65 million gallons) would be 58 percent of the diesel fuel consumption of the existing coal mines. Electricity consumption from construction and operation of the build alternatives would be less than 0.1 percent of the electricity consumption of the existing coal mines. Cumulative impacts would be associated with increased demand for diesel fuel and electricity in the study area.

- **Proposed and potentially induced coal mines.** Any build alternative would contribute to cumulative impacts by increasing demand for diesel fuel and electricity in the study area. The total diesel fuel energy consumption for constructing the proposed and potentially induced mines would range from 4.12 million gallons of diesel fuel for the low production scenario to 10.31 million gallons for the high production scenario for the northern alternatives and 14.85 million gallons for the high production scenario for the southern alternatives. The total diesel fuel consumption for operating the proposed and potentially induced mines would range from 106.67 million gallons for the low production scenario to 244.68 million gallons for the high production scenario for the northern alternatives and 301.53 million gallons for the high production scenario for the southern alternatives. Diesel fuel consumption from construction and operation of the Moon Creek East Alternative would be 58 percent of the diesel fuel consumption of the proposed and potentially induced coal mines for the high production scenario. Electricity consumption from construction and operation of the build alternatives would be less than 0.1 percent of the electricity consumption of the proposed and potentially induced coal mines. Cumulative impacts would be associated with increased demand for diesel fuel and electricity in the study area.
- **Energy development.** Any build alternative would contribute to cumulative impacts by increasing demand for diesel fuel in the study area. The total energy consumption on a diesel fuel-equivalent basis for future oil and gas production over the 20-year period (based on the 2013 annual rates of oil and gas production) would be 35.4 million gallons, equivalent to 4,916,000 million Btu (245,820 million Btu per year) at a conversion factor of 5.825 million Btu per barrel of diesel fuel. Any build alternative would increase demand for diesel fuel in the study area. Cumulative impacts on energy resources would result from the addition of impacts from the build alternatives to impacts from future oil and gas production in conjunction with energy development.
- **Construction projects.** Any build alternative would contribute to cumulative impacts on energy by increasing demand for diesel fuel in the study area. The total energy consumption for road paving would be 425,500 million gallons. An additional 425,500 gallons of diesel fuel would be consumed for road maintenance over the life cycle of the paved road.

The proposed rail line would contribute to increased demand for diesel fuel in the study area. In 2012, 10.0 million barrels (421 million gallons) of diesel fuel was consumed in Montana (U.S. Energy Information Administration 2014). In 2011 total sales of electricity in Montana were 13.788 million MWh (Montana Department of Environmental Quality 2014) corresponding to approximately 275 million MWh over 20 years. Diesel fuel consumption

for construction and operation of the build alternatives for the high production scenario (151.65 million gallons for the Moon Creek East Alternative), when added to impacts from the other projects (209.76 million gallons for operation of the existing mines; 254.99 million gallons for construction and operation of the proposed and potentially induced mines; 35.4 million gallons for future oil and gas production; and 0.4 million gallons for road paving), would represent approximately 7 percent of annual state-wide diesel fuel consumption. Electricity consumption for the build alternatives and other projects would represent approximately 8.5 percent of the annual state-wide electricity consumption. These impacts, in conjunction with impacts from the other projects, would not affect the availability of energy resources (diesel fuel, gasoline, electricity) or result in the need to construct and operate additional infrastructure for the production and distribution of energy in the study area.

In summary, construction and operation of any build alternative would contribute to cumulative impacts on energy resources when combined with impacts from proposed and potentially induced coal mines and energy development. Some build alternatives would result in cumulative impacts on energy when combined with impacts from the Tongue River Road paving project. These projects would have to comply with Montana DEQ and other state permits approvals as well as any BLM-required mitigation measures. OEA concludes that the direct impacts from the proposed rail line, when combined with impacts from past, present, and reasonably foreseeable projects and actions, would result in negligible adverse cumulative impacts on energy resources.

U.4.13 Socioeconomics

Construction and operation of the proposed rail line would result in the socioeconomic impacts related to more workers moving into the area and the resulting increased demand for local housing and public services; impacts on rural communities related to nonmarket values and quality of life; and the displacement of business activity (primarily farm production) and residences within the right-of-way (hereafter referred to as the *common socioeconomic impacts*). The proposed rail line would also result in increased construction-related employment and earnings, and increased state and local tax revenues. Any build alternative would contribute to cumulative socioeconomic impacts by adding to impacts from other projects. The following subsections describe the impacts of these other projects and how potential impacts from the proposed rail line, when added to the impacts of these projects, would result in cumulative socioeconomic impacts.

The other projects are described in Section U.3.3, *Projects Analyzed*. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives* and socioeconomics is described in Chapter 15, *Socioeconomics*. OEA defined the study area for impacts of the proposed rail line on socioeconomics as the four counties where any build alternative would be located (Custer, Rosebud, Powder River and Big Horn Counties) and five counties that are linked to these by trade and commuter patterns (Yellowstone, Treasure, Carter, and Fallon

Counties, Montana; and Sheridan County, Wyoming) (Chapter 15, Section 15.2, *Study Area*). The cumulative impacts study area is consistent with this study area.

U.4.13.1 Existing Coal Mines and Colstrip Power Plant

Existing Coal Mines and Colstrip Power Plant Impacts on Socioeconomics

The existing coal mines and Colstrip Power Plant are already operating in the socioeconomic cumulative impact study area and their impact on the socioeconomic characteristics of the study area is captured in the baseline analysis presented in Chapter 15, *Socioeconomics*. The existing mines support direct, indirect, and induced employment and earnings in the study area; and fiscal contributions and impacts on livelihoods of communities providing employment, inputs, or services to those mines. Mining in general (including coal) directly employed an estimated 2.6 percent of total employment in the nine-county area in 2011 (3,838 jobs) and 6.3 percent of total employment in the four-county area in that same year (1,362 jobs) (Chapter 15, *Socioeconomics*, Table 15-4). The Rosebud Mine and Colstrip Power Plant are located around the city of Colstrip, Rosebud County, and the Spring Creek and Decker Mines are located next to the community of Decker, Big Horn County.

Contribution of the Build Alternatives to Cumulative Impacts on Socioeconomics

The Colstrip Alternatives would be constructed and would operate near the Rosebud Mine and Colstrip Power Plant. Mine and power plant operations would continue during construction and operation of the build alternative. The Decker Alternatives would be constructed and would operate near the Spring Creek and Decker Mines. Mine operations would continue during construction and operation of the build alternative; coal transport from the mines would coincide with operation of the build alternative.

Construction of any build alternative would support new employment and earnings during construction and operations. Because the existing mines are included in the affected area baseline discussed in Chapter 15, *Socioeconomics*, any cumulative impacts resulting from the addition of impacts of the build alternatives to impacts from the existing mines are already captured in that analysis.

U.4.13.2 Proposed and Potentially Induced Coal Mines

Proposed and Potentially Induced Coal Mine Impacts on Socioeconomics

The proposed and potentially induced mines would be constructed and would operate in the socioeconomic cumulative impact study area. Construction of these mines would permanently displace other economic activity currently making use of lands that would be

occupied by the mining activities. This loss would further affect local economic activity by reducing demand from suppliers and reducing purchases from those earning income from the affected activities. Table U-70 shows the estimated loss of farm income from production in lands that would be displaced by construction and operation of the mines. The methods for calculating and accruing these losses are the same as those used for calculating the losses due to the proposed rail line and are described in Appendix T, *Socioeconomic Methods and Tables*.

Table U-70. Estimated Loss of Farm Output in Four-County Area^a

Proposed and Potentially Induced Mines	Estimated Loss of Farm Output to Mine, 2012				Estimated Annual Output (Cattle, Winter Wheat and Alfalfa Hay)	Share of Annual Output Lost
	Livestock Production	Winter Wheat	Alfalfa Hay	Total		
	\$	\$	\$	\$	\$	%
Otter Creek	212,715	0	202,581	415,296	234,364,260	0.1772
Poker Jim Creek– O'Dell Creek	489,062	173,208	0	662,270	234,364,260	0.2826
Canyon Creek	287,164	0	32	287,197	234,364,260	0.1225

Notes:

^a Custer, Rosebud, Powder River and Big Horn Counties

Source: Calculations based on USDA NASS 2013 and USDA 2007 as explained in Appendix T, *Socioeconomic Methods and Tables*

Construction of new coal mines would temporarily support additional local employment and earnings and contribute to the local economy. Employment generated by mine construction would cause workers to move to both the four-county area and the nine-county area. Mine employees would likely live in the four-county area, while construction and other indirect service providers, as well as businesses catering to the new demand from coal mine employees, would likely be located throughout the nine-county area. The incoming workers would add demand for housing and public services. OEA estimated the potential job creation, migration, and increased demand for housing and public services using the regional economic impact model IMPLAN (Impact analysis for PLANning). OEA applied the following assumptions in developing estimates of socioeconomic impacts from the proposed and potentially induced mines for the cumulative analysis.

- OEA used the same customized IMPLAN model used to analyze the impacts of railroad construction, as described in Appendix T, *Socioeconomic Methods and Tables*.
- OEA used the nine-county cumulative impacts study area in the IMPLAN analysis.
- OEA obtained construction expenditures for the proposed Otter Creek Mine from the coal market analysis (Appendix C, *Coal Production and Markets*, Chapter 6). OEA assumed that the nine-county share of expenditures would be 35 percent. This share assumes that

dragline, rock shovel, ton-rock trucks, front-end coal loader, mobile equipment and other equipment and supplies would be purchased from outside the state of Montana. OEA assumed that local expenditures would include construction of mine facilities, coal handling plant, and reclamation equipment. Thirty-five percent represents the share of these tasks in the total costs of mine development. OEA assumed that all the local costs would occur in the last year of construction (Appendix C, *Coal Production and Markets*, Table 6.6).

- OEA assumed that construction expenditures for the two potentially induced mines would be proportional to the maximum volume of annual production expected.
- OEA modeled local expenditures as an increase in demand for local services, using values from IMPLAN industry 35, *Construction of New Nonresidential Manufacturing Structures*.
- OEA assumed that employment in the four-county area corresponds to the estimated direct employment in the construction sector. This approximation is likely an upper bound estimate for employment in the four-county area because direct employment in the construction sector partially reflects expenditures made in the broader nine-county area but outside the four-county area, in places such as Billings, Montana. On the other hand, some of the indirect and potentially induced impacts would also occur within the four-county area.
- OEA estimated migration to the four-county area as the difference between estimated employment in the last year of construction (year 3) and estimated available construction workers that same year in the four-county area. OEA estimated migration to the nine-county area as the difference between estimated employment in the last year of construction (year 3) and estimated available construction workers that same year in the nine-county area. Estimated migration to the four-county area would be higher than that to the nine-county area, indicating that some of the workers moving to the four-county area came from other counties of the nine-county area.
- OEA projected the baseline population, labor force, unemployment, and housing estimates using the projected population growth rate for the nine-county area and four-county area (Chapter 15, *Socioeconomics*, Table 15-1). Estimated impacts were compared with this baseline.

Tables U-71 and U-72 show the estimated impacts from construction of the proposed and potentially induced mines for the nine-county and four-county areas, respectively. Unemployed construction workers are assumed to fill a portion of the jobs created by development of the proposed Otter Creek Mine.

Table U-71. Estimated Jobs, Migration, and Increased Demand for Housing from Proposed and Potentially Induced Mines (Construction, Nine-County Area)

Proposed and Potentially Induced Mines	Last Year of Construction	Total Annual Jobs in Last Year of Construction	Estimated Incoming Population	Incoming Population as Percent of Local Population %	New Demand for Housing as Percent of Available Housing for Rent or Sale %
Otter Creek Mine	2017	1,373	959	0.4	39.4
Poker Jim Creek–O'Dell Creek	2023	646	199	0.1	7.5
Canyon Creek	2027	888	417	0.2	15.0

Source: Calculation based on Appendix C, *Coal Production and Markets*, using IMPLAN

Table U-72. Estimated Jobs, Migration and Increased Demand for Housing from Proposed and Potentially Induced Mines (Construction, Four-County Area)

Proposed and Potentially Induced Mines	Last Year of Construction	Total Annual Jobs in Last Year of Construction	Estimated Incoming Population	Incoming Population as Percent of Local Population %	New Demand for Housing as Percent of Available Housing for Rent or Sale %
Otter Creek Mine	2017	802	745	2.0	149.8
Poker Jim Creek–O'Dell Creek	2023	377	318	0.8	61.1
Canyon Creek	2027	519	457	1.1	85.4

Source: Calculation based on Appendix C, *Coal Production and Markets*, using IMPLAN

The socioeconomic impacts shown in Tables U-71 and U-72 increase with size of the mine and decrease with year of construction. This is because the baseline labor force is assumed to grow over time, reducing the relative impact of the mine-related demand for labor. Demand for housing from construction of the proposed Otter Creek Mine would be expected to exceed availability in the four-county area during construction. Information on whether Otter Creek Coal would provide temporary housing during construction is currently not available. This information is also not available for the potentially induced mines, which do not have developers. In the absence of added temporary or permanent housing, mine construction workers would need to find alternative housing arrangements, such as sharing available accommodations above the average occupancy levels, or commuting from beyond the four-county area. The consequences for local communities include increased demand for public services (e.g., health services and police and fire protection).

Coal mine operations would support local employment and earnings and contribute to the local economy over an extended period. As in the case of construction, employment generated by operations would cause workers to move to both the four-county area and the nine-county area. Operations workers directly employed by the mines would be expected to live in the four-county area. The incoming of workers would add demand for housing and public services. OEA estimated the potential job creation, migration, and increase demand for housing and public services using the regional economic impact model IMPLAN (IMPact analysis for PLANning). OEA applied the following assumptions.

- OEA used the same customized IMPLAN model used for the analysis of the impacts of railroad construction, as described in Appendix T, *Socioeconomic Methods and Tables*.
- OEA used the nine-county study area in the IMPLAN analysis.
- OEA obtained operations output for the proposed Otter Creek Mine from the coal market analysis (Appendix C, *Coal Production and Markets*, Chapter 6). The nine-county share of output would be 100 percent. Full production was assumed by year 3 of operations.
- OEA modeled coal mining output impacts as an increase in demand for local services, using values from IMPLAN industry 21, *Mining Coal*.
- OEA assumed that employment in the four-county area corresponds to direct employment, which, in this case, reflects all the employment in the coal mining operations. Additional indirect and induced employment would also occur in the four-county area and are captured in the nine-county area employment estimates that reflect all direct, indirect, and induced employment.
- Migration to the four-county area is indicated by the difference between estimated employment in year 3 of operations (assumed first year of full operations) and estimated available mine workers that same year in the four-county area. OEA estimated migration to the nine-county area as the difference between estimated employment in year 3 of operations and estimated available mine workers that same year in the nine-county area. Estimated migration to the four-county area would be higher than that to the nine-county area, indicating that some of the workers moving to the four-county area came from other counties of the nine-county area.
- OEA projected the baseline population, labor force, unemployment and housing estimates using the projected population growth rate for the nine-county and four-county areas (Chapter 15, *Socioeconomics*, Table 15-2). Estimated impacts were compared with this projected baseline.

Tables U-73 and U-74 show the estimated impacts for the nine-county and four-county areas, respectively. Ranges of estimates reflect ranges in the expected production volume of the mines.

Table U-73. Estimated Jobs, Migration and Increased Demand for Housing from Proposed and Potentially Induced Mines (Operations, Nine-County Area)

Proposed and Potentially Induced Mines	Year 3 of Operations	Total Annual Jobs in Year 3 of Operations	Estimated Incoming Population	Incoming Population as Percent of Local Population %	New Demand for Housing as Percent of Available Housing for Rent or Sale %
Otter Creek	2020	1,399–2,378	3,570–6,420	1.4–2.6	48.4–87.1
Poker Jim Creek–O'Dell Creek	2026	839–1,119	2,443–3,257	0.9–1.2	30.7–40.9
Canyon Creek	2030	1,539	4,478	1.6	53.4

Source: Calculation based on Appendix C, *Coal Production and Markets*, using IMPLAN

Table U-74. Estimated Jobs, Migration and Increased Demand for Housing from Proposed and Potentially Induced Mines (Operations, Four-County Area)

Proposed and Potentially Induced Mines	Year 3 of Operations	Total Annual Jobs in Year 3 of Operations	Estimated Incoming Population	Incoming Population as Percent of Local Population %	New Demand for Housing as Percent of Available Housing for Rent or Sale %
Otter Creek	2020	685–1,165	1,750–3,145	4.6–8.2	118.2–212.5
Poker Jim Creek–O'Dell Creek	2026	411–548	1,196–1,595	3.0–4.0	77.3–103.0
Canyon Creek	2030	754	2,193	5.3	137.5

Source: Calculation based Appendix C, *Coal Production and Markets*, using IMPLAN

Tables U-730 and U-74 show that migration and demand for housing associated with operations of the proposed and potentially induced mines would affect socioeconomic conditions, particularly in the four-county area. If available housing does not grow above projected levels, demand for housing would exceed local availability, particularly in the four-county area. Mine workers may need to commute from beyond the four-county area and local communities may face an increase in demand for public services above recent trends.

The proposed and potentially induced mines would generate fiscal revenues for local governments. OEA estimated coal mining-related tax collections for the proposed Otter Creek Mine to reach approximately \$32 million per year in state taxes (including severance and gross receipts taxes and the state Resource Indemnity Trust tax), \$2.9 million per year in local property taxes, and \$18 million per year in federal taxes (black lung tax and reclamation fees) (Appendix C, *Coal Markets and Production*, Chapter 6, Table 6-6). In addition, royalties would amount to approximately \$27 million per year. For the proposed Otter Creek Mine, these would be due to the state and to private mineral rights holders. The potentially induced mines can be assumed to contribute similar taxes, roughly in proportion to production: \$19 million to \$26 million per year in state taxes, \$1.7 million to \$2.3 million per

year in local property taxes, and \$16 million to \$22 million per year in federal taxes for the potentially induced Poker Jim Creek–O’Dell Creek Mine. The potentially induced Canyon Creek Mine would contribute an estimated \$35 million per year in state taxes, \$3.2 million per year in local property taxes and almost \$30 million per year in royalties.

Contribution of the Build Alternatives to Cumulative Impacts on Socioeconomics

Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives , and Moon Creek Alternatives would provide access to the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek Mine.

The Decker Alternatives would provide access to the proposed Otter Creek Mine and to the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines. The Decker Alternatives would be the only build alternatives that would provide access to the Canyon Creek Mine.

The addition of the build alternatives to the proposed and potentially induced mining projects would result in cumulative socioeconomic impacts during construction and operation of the proposed rail line and the proposed and potentially induced mines. Employment opportunities and associated income and stresses generated by the build alternatives would add to those of the mines for populations residing in or moving to the study area. Because the proposed rail line would generate the most job opportunities during construction, the largest cumulative impacts would occur when construction of the proposed rail line overlaps with construction of the proposed Otter Creek Mine. The construction period for the potentially induced Poker Jim Creek–O’Dell Creek and Canyon Creek Mines would not coincide with that of the proposed rail line.

The contribution of the build alternatives to the cumulative impacts relating to migration and increased demand for housing is reflected in Tables U-75 through U-78. The percentages indicated in the tables reflect the share of proposed rail line impacts on the projected baseline. For example, Table U-75 shows that construction of the Tongue River Road East Alternative would attract in-migration to the nine-county area that would correspond to up to 0.4 percent of the population in the nine-county area. Similarly, Table U-76 shows that operations of the proposed Otter Creek Mine would generate an estimated increase in demand for housing that is between 118.2 and 212.5 percent (depending on level of production) of the projected available housing in the four-county area. The analysis uses year 3 of construction and year 3 of operations as references for these calculations, and assumes these would be the maximum levels reached during the periods of rail or mine construction and operations, respectively. The numbers in the table reflect maximum levels during ranges of years (construction or operation) rather than estimates for one specific year. The totals shown reflect the sum of the values in the rows above. The tables show the cumulative impacts for the Tongue River Road East Alternative and for the Decker Alternative. Because of the year when construction of the build alternatives and that of the

proposed Otter Creek Mine are expected to overlap (year 3 of construction), the Tongue River Road East Alternative would have the greatest socioeconomic cumulative impacts among those build alternatives providing access only to the proposed Otter Creek Mine and the potentially induced Poker Jim Creek–O’Dell Creek Mine. Of the build alternatives providing access to all three mines (Decker Alternatives), the Decker Alternative would have the greatest socioeconomic cumulative impacts.

Table U-75. Cumulative Impacts on Migration and Housing, Nine-County Area, Northern Alternatives

Build Alternative, Mines	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Incoming Population as Share of Projected Population																
Tongue River Road East Alternative		0.4%								<0.1%						
Proposed Otter Creek Mine		0.4%								1.4–2.6%						
Potentially Induced Poker Jim Creek–O’Dell Creek Mine								0.1%					0.9–1.2%			
Total		0.8%			1.5-2.7%			1.6-2.8%					2.4-3.9%			
New Demand for Housing as a Share of Projected Vacant Housing for Rent or for Sale																
Tongue River Road East Alternative		34.9%								<0.1%						
Proposed Otter Creek Mine		39.4%								48.4–87.1%						
Potentially Induced Poker Jim Creek–O’Dell Creek Mine								7.5%					30.7–40.9%			
Total		74.3%			48.5-87.2%			56.0-94.7%					79.2-128.1%			

Source: Calculation based Appendix C, *Coal Production and Markets*, using IMPLAN

Table U-76. Cumulative Impacts on Migration and Housing, Four-County Area, Northern Alternatives

Build Alternatives, Mines	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Incoming Population as Share of Projected Population																
Tongue River Road East Alternative		0.6%								<0.1%						
Proposed Otter Creek Mine		2.0%								4.6–8.2%						
Potentially Induced Poker Jim Creek–O’Dell Creek Mine								0.8%					3.0–4.0%			
Total		2.6%			4.7-8.3%			5.5-9.1%					7.7-12.3%			
New Demand for Housing as a Share of Projected Vacant Housing for Rent or for Sale																
Tongue River Road East Alternative		48.7%								<0.1%						
Proposed Otter Creek Mine		149.8%								118.2%–212.5%						
Potentially Induced Poker Jim Creek–O’Dell Creek Mine								61.1%					77.3–103.0%			
Total		198.5%			118.3-212.6%			179.4-273.7%					195.6-315.6%			

Source: Calculation based Appendix C, *Coal Production and Markets*, using IMPLAN

Table U-77. Cumulative Impacts on Migration and Housing, Nine-County Area, Southern Alternatives

Build Alternative, Mines	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Incoming Population as Share of Projected Population																
Decker Alternative		0.3%								<0.1%						
Proposed Otter Creek Mine		0.4%								1.4–2.6%						
Potentially Induced Poker Jim Creek–O’Dell Creek Mine								0.1%					0.9–1.2%			
Potentially Induced Canyon Creek Mine												0.2%			1.6%	
Total		0.7%			1.5-2.7%			1.6-2.8%		2.4-3.9%		2.6-4.1%			4.0-5.5%	
New Demand for Housing as a Share of Projected Vacant Housing for Rent or for Sale																
Decker Alternative		27.9%								<0.1%						
Proposed Otter Creek Mine		39.4%								48.4–87.1%						
Potentially Induced Poker Jim Creek–O’Dell Creek Mine								7.5%					30.7–40.9%			
Potentially Induced Canyon Creek Mine												15.0%			53.4%	
Total		67.3%			48.5-87.2%			56.0-94.7%		79.2-128.1%		95.2-143.1%			181.5%	
Source: Calculation based Appendix C, <i>Coal Production and Markets</i> , using IMPLAN																

Table U-78. Cumulative Impacts on Migration and Housing, Four-County Area, Southern Alternatives

Build Alternative, Mines	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Incoming Population as Share of Projected Population																
Decker Alternative		0.5%								<0.1%						
Proposed Otter Creek Mine		2.0%								4.6–8.2%						
Potentially Induced Poker Jim Creek– O’Dell Creek Mine								0.8%					3.0–4.0%			
Potentially Induced Canyon Creek Mine												1.1%			5.3%	
Total		2.5%			4.7-8.3%			5.5-9.1%		7.7- 12.3%		8.8-13.4%			13.0-17.6%	
New Demand for Housing as a Share of Projected Vacant Housing for Rent or for Sale																
Decker Alternative		38.8%								<0.1%						
Proposed Otter Creek Mine		149.8%								118.2–212.5%						
Potentially Induced Poker Jim Creek – O’Dell Creek Mine								61.1%					77.3-103.0%			
Potentially Induced Canyon Creek Mine												85.4%			137.5%	
Total		188.6%			118.3-212.6%			179.5-273.7%		195.6- 315.6%		281.0-401.0%			333.1-453.1%	
Source: Calculation based Appendix C, <i>Coal Production and Markets</i> , using IMPLAN													i.	ii.	iii.	iv.

Tables U-75 through U-78 show that the overlap of construction of the proposed rail and of the proposed Otter Creek Mine would attract workers to both the four-county and nine-county areas and would generate demand for housing within commuting distance of the work sites. Projected housing availability, based on long-term population growth trends, would not be sufficient to accommodate the new demand for housing, particularly in the four-county area. Although excess demand for housing would also be expected during operations of one or more of the proposed or potentially induced mines, the contribution of the proposed rail line to that excess demand would be considerably less than during the construction period.

Because the incoming of workers generated by the overlap of construction of the proposed rail line and construction of one or more of the proposed and potentially induced mines would be temporary, OEA does not expect workers to move with their families. The excess demand would be expected to be addressed either by temporary housing, such as construction camps or use of existing hotels, motels and camp sites, or by long-distance commuting, or by a combination of both (such as workers that alternate weeks at work and time-off at home). The socioeconomic impacts depend on the balance between temporary housing and long-distance commuting.

The use of temporary housing increases the demand for public services in the communities where the temporary housing is located. This includes demand for trash collection, sewer and sanitation services, police and fire services, among others. The longer workers remain near the work sites, the greater is this increase in demand. Long-distance commuting increases traffic on roads and associated needs for maintenance and risk of accidents.

OEA expects communities affected during construction of the proposed rail line and proposed and potentially induced mines to include cities in the four county area with temporary housing (hotels, motels, camping sites), such as Miles City, Forsyth, Colstrip, and Hardin. Communities located along Highway 212 that connects Ashland to the Billings area, may also be impacted, either by incoming workers or by increased transient population: communities such as Ashland, Lame Deer, Muddy, Busby and Crow Agency. Communities beyond the four-county area where construction workers reside and from which they commute would benefit from increased job opportunities and income.

During operation of the proposed rail and proposed or potentially induced mines, because of the long-term nature of employment associated with rail and mine operations, OEA expects operation workers to have a greater preference for permanent housing and shorter commuting time than construction workers. Operation workers would also be more likely to move with their families and demand a broader range of public services, such as schooling, recreation and cultural opportunities. OEA expects the larger communities in the four county area to be more likely impacted by long-term increases in demands for housing and public services (such as Miles City, Forsyth, Colstrip and Hardin).

U.4.13.3 Land Management

Land Management Impacts on Socioeconomics

Fort Keogh Livestock and Range Research Laboratory

Fort Keogh is an operating land management project that addresses cattle management and grazing. The income and employment supported by Fort Keogh is already reflected in the current conditions of the socioeconomic study area described in Chapter 15, *Socioeconomics*, particularly for the area around Miles City adjacent to Fort Keogh.

Tongue River Reservoir State Park

The proposed Tongue River Reservoir State Park project would renovate the Pee Wee Point North, Pee Wee Point South, and Sandpoint campgrounds. The park renovations would potentially stimulate recreational activities and associated expenditures in the park and nearby locations.

BLM Resource Management Plan

The BLM Draft RMP/EIS would continue current management activities and identify new facilities or management strategies. The BLM Draft RMP/EIS addresses livestock grazing, wildlife habitat, special-designation areas, special recreation areas, national trails, and wilderness study areas. BLM's preferred alternative (Alternative E) would support increased oil and gas development and livestock grazing on BLM-administered lands. Increased use of public lands for these purposes would contribute to local employment and earnings.

Beaver Creek Landscape Management Project

Implementation of the Beaver Creek LMP would promote a healthier and more resilient ponderosa pine ecosystem on 14,000 acres of forest by using large tree removal, fire applications, and selective vegetation thinning. These practices would promote fires that are of lower intensity and less severe than those caused by stand replacement fires. Reduction of wildfires has the potential to reduce demand on local fire departments and emergency services.

Contribution of the Build Alternatives to Cumulative Impacts on Socioeconomics

Fort Keogh Livestock and Range Research Laboratory

The Tongue River Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be constructed and operate near where research activities occur in Fort Keogh. The addition of common socioeconomic impacts from these build alternatives to the impacts of the ongoing use of Fort Keogh would result in cumulative impacts on

socioeconomics to the extent that Fort Keogh operations attract additional workers to the area.

Tongue River Reservoir State Park

The Decker Alternatives would be constructed and would operate near the Tongue River Reservoir. The addition of impacts from the Decker Alternatives to the impacts of the renovations at Tongue River Reservoir State Park would result in cumulative impacts on socioeconomics.

BLM Resource Management Plan

Any build alternative would be constructed and operate in landscapes affected by land management practices under the BLM Draft RMP/EIS. The addition of impacts from any build alternative to the impacts from the BLM Draft RMP/EIS would result in cumulative impacts on socioeconomics. Any build alternative would increase the use of lands for employment and income generation and would reduce the availability of these lands for recreational and farming opportunities or for conservation. Cumulative impacts would include added employment and income generation with added demand for workers and potential attraction of labor force to the area. On the other hand, some of the impacts would tend to counterbalance some of the impacts of the build alternatives: greater availability of public lands for grazing, for example, would help compensate the loss of land for grazing to the right-of-way.

Beaver Creek Landscape Management Project

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be constructed and operate near the LMP. The addition of impacts from any build alternative to the impacts from the LMP would result in cumulative impacts on socioeconomics. Reduced demand for combating wildfires would attenuate the pressure on local public services from the incoming population associated with the build alternatives.

U.4.13.4 Energy Development

Energy Development Impacts on Socioeconomics

The BLM Draft RMP/EIS would promote oil and natural gas projects on 5.4 million acres of leased land in Rosebud, Custer, Powder River, and Big Horn Counties (the four-county area). OEA estimated that 1,158 coal bed natural gas (CBNG) wells would be developed between 2011 and 2030, and considers this estimate much higher than the number of wells that will be permitted and completed. It should be noted that none of the currently approved wells would be in the project area or near the build alternatives (Section U.3.3.4, *Energy Development*). In addition to well development on BLM-administered lands, oil and gas exploration and

development continues throughout southeastern Montana on federal, state, tribal, and private lands.

Development of oil and gas generates employment and income during well drilling and construction and during operations. The BLM Draft RMP/EIS assumes that 29 direct jobs are generated per 160 wells for exploration/development, 9 per 160 wells for production and 12 jobs per 160 wells for abandonment and that 925 wells would generate 634 direct jobs over a 20-year period. Using these same assumptions, 1,158 wells would support approximately 40 direct jobs a year. As noted in BLM's Draft RMP/EIS, to the extent that much of the development occurs near the border with Wyoming, many of the workers might commute from Wyoming, given the availability of specialized workers and services in nearby towns such as Sheridan. In addition, development of oil and gas generates fiscal resources for both the state and local governments through royalties and severance taxes (Montana's oil and gas production tax).

A 2013 study conducted for the Eastern Montana Impact Coalition estimated the impacts on population, housing, infrastructure, and public services of medium and high scenarios of oil and gas production in Eastern Montana. These impacts were estimated for 16 counties, including five counties in the socioeconomic study area (Custer, Rosebud, Powder River, Carter and Fallon Counties, Montana). Under these scenarios, oil and gas development would lead to increased housing costs and demand for retail, infrastructure, and public services. Increased demand for infrastructure and public services would occur before communities are able to benefit from increased revenues. The study suggests the need for increased resources and planning to avoid adverse impacts on local communities associated with reduced housing affordability, reduced capacity to provide infrastructure and public services, and overall reduced quality of life (Jones et al. 2013).

Contribution of the Build Alternatives to Cumulative Impacts on Socioeconomics

Any build alternative would be constructed and would operate in landscapes affected by oil and gas development, whether on federal or nonfederal lands. Most of the region around the northern build alternatives has a low potential for oil and gas development. There is moderate potential for development along the Decker Alternatives.

Any build alternative would result in additional long-term employment, earnings, and fiscal revenues. Rail operation is expected to support between 24 and 29 direct annual jobs and between 54 to 65 additional indirect and induced annual jobs. In combination with the development of oil and gas, the economic base of the study area would rely increasingly on energy sector workers and capital. This would tend to alter the livelihoods of communities in the study area.

U.4.13.5 Construction Projects

Construction Project Impacts on Socioeconomics

Tongue River Road Paving

The 32.7-mile paving project proposed for Tongue River Road would add temporary construction employment opportunities in the study area. When completed, the paved Tongue River Road would facilitate access to Ashland and the proposed Otter Creek Mine from Miles City. This would facilitate the establishment of residents and services in Miles City and connected areas, associated with the development of coal mining.

Bull Pasture Subdivision Leasing

Leasing of the 38.55-acre bull pasture would generate employment and earnings near Miles City, depending on the nature of the business that leases the area. The land is zoned light industrial, allowing a range of activities that would support a varying degree of employment.

Keystone XL Pipeline

The Keystone XL pipeline would traverse one county in the socioeconomics study area: Fallon County, Montana. During the 1- to 2-year construction, the project would support an estimated 3,700 annual jobs in Montana, including an estimated 1,500 direct jobs in construction and an additional 2,200 indirect and induced jobs. Jobs would be temporary, only lasting the construction period. Most construction workers for the direct job openings would be brought from outside the area and reside in four proposed construction camps in Montana, one of which would be in the Tongue River Railroad socioeconomic study area (Fallon County). A construction camp would typically house 900 to 1,300 workers. In Fallon County, the Keystone XL pipeline would contribute to property taxes during construction and operations (U.S. Department of State 2014).

Youngs Creek Mine and Brook Mine

The Youngs Creek Mine and the Brook Mine would not be expected to use any build alternative to transport coal to market. They are both undeveloped mines whose period of construction and operation could overlap with construction and operation of the build alternatives. During both construction and operation, the Youngs Creek Mine and Brook Mine would contribute to additional employment, earnings, and fiscal revenues in the socioeconomic study area and would be a source of demand for workers, housing and public services. During operation, they would also contribute to an increasing reliance of local communities in the study area on the energy sector as a source of income, contributing to alter their livelihoods.

Contribution of the Build Alternatives to Cumulative Impacts on Socioeconomics

Tongue River Road Paving

The Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives would be crossed by the paving project. The addition of impacts from the build alternatives to impacts from the road paving project would result in cumulative impacts on socioeconomics. To the extent that construction of the proposed rail line and pavement of the road occur simultaneously, both projects would demand labor from the available workforce. Any build alternatives would facilitate development of the proposed Otter Creek Mine and potentially increase the demand for pavement of connecting roads, such as the Tongue River Road to Miles City.

Bull Pasture Subdivision Leasing

The Tongue River Alternatives and Tongue River Road Alternatives would be closest to the bull pasture leasing project. The addition of impacts from the build alternatives to impacts from the bull pasture leasing project would result in cumulative impacts on socioeconomics. The cumulative impacts on earnings opportunities would primarily affect residents of Miles City.

Keystone XL Pipeline

Any build alternative would require labor from the construction workforce of the study area and attract construction workers from outside the area. To the extent that the construction period would coincide with that of the Keystone XL Pipeline, incoming workers for the proposed rail line would add to those working on the pipeline. The increase in demand for public services associated with the build alternatives would have a cumulative impact on socioeconomic resources, particularly in Fallon County, where part of the Keystone XL Pipeline construction workers are expected to reside temporarily.

Youngs Creek Mine and Brook Mine

The build alternatives would require labor from the construction workforce of the study area and attract construction workers from outside the area. To the extent that either the construction period of any build alternative or their operations overlaps with construction or operations of the Youngs Creek Mine and Brook Mine, incoming workers for the proposed rail line would add to those working on the mines. The increase in demand for public services associated with the build alternatives would have a cumulative impact on socioeconomic resources, most likely in Sheridan, Wyoming, and Big Horn Counties, Montana.

U.4.13.6 Cumulative Impact Summary

The proposed rail line would affect socioeconomics and would combine with impacts from the other projects to result in cumulative impacts on socioeconomics in the study area. The contribution of the proposed rail line to cumulative impacts is summarized as follows.

- **Existing coal mines and Colstrip Power Plant.** The Colstrip Alternatives and Decker Alternatives would contribute to cumulative impacts by generating additional employment opportunities, fiscal revenues and demand for housing and public services in the proximity of the existing coal mines. Because the existing mines are part of the baseline for analysis of impacts of the build alternatives, the cumulative effect of impacts from the build alternatives and impacts of these mines is captured in Chapter 15, *Socioeconomics*.
- **Proposed and potentially induced coal mines.** Any build alternative would contribute to cumulative impacts by displacing livestock operations and farming. The build alternatives would generate employment opportunities and contribute to migration to the study area, mostly during the 3-year construction period. These opportunities would add to employment opportunities of the mines. Projected housing availability would not be sufficient to accommodate the new demand for housing, particularly in the four-county area. The excess demand would be expected to be addressed by temporary housing, by long-distance commuting, or by a combination of both. The use of temporary housing increases the demand for public services in the communities where the temporary housing is located. Long distance commuting increases traffic on roads and associated needs for maintenance and risk of accidents. OEA expects the larger communities in the four-county area to be the most affected, including Miles City, Forsyth, Colstrip, and Hardin.
- **Land management.** Any build alternative would generate employment and income opportunities and would reduce the availability of lands for recreational and farming opportunities or for conservation. Some of the land management projects would counteract such effects with greater availability of lands for grazing and recreation or reduced demand on fire response.
- **Energy development.** Any build alternative would add to long-term employment, earnings and fiscal revenues generated by energy development in the four-county area. The economic base of the study area would be expected to rely increasingly on energy sector workers and capital, altering the makeup of the livelihoods of communities in the study area.
- **Construction projects.** Any build alternative would facilitate development of the proposed Otter Creek Mine and potentially increase the demand for pavement of connecting roads, such as the Tongue River Road. The simultaneous construction of these other projects and the proposed rail line would cause a cumulative and simultaneous increase in the demand for labor from the available workforce.

In summary, construction and operation of any build alternative would contribute to cumulative impacts on socioeconomics when combined with impacts from proposed and potentially induced coal mines, land management, and energy development. Some build alternatives would result in cumulative impacts on socioeconomics when combined with impacts from existing coal mines and construction projects. These projects would have to comply with Montana DEQ and other state permits approvals as well as any BLM-required mitigation measures. OEA concludes that the direct impacts from the proposed rail line, when combined with impacts from past, present, and reasonably foreseeable projects and actions, would range from positive cumulative impacts on socioeconomics by contributing to employment and the migration of workers into the cumulative impacts study area—mostly during the 3-year construction period—to moderate to highly adverse cumulative impacts on socioeconomics by displacing economic activities such as farming

U.4.14 Environmental Justice

Construction and operation of the proposed rail line would result in impacts on minority and low-income populations. Any build alternative would contribute to cumulative impacts on environmental justice populations by adding to impacts from other projects. The build alternatives are described in Chapter 2, *Proposed Action and Alternatives*, and the impacts on minority and low-income populations are described in Chapter 16, *Environmental Justice*.

OEA defined the study area for environmental justice impacts as the four-county area of Custer, Powder River, Rosebud, and Big Horn Counties, Montana (Chapter 16, Section 16.2, *Study Area*). The cumulative environmental justice impacts study area is consistent with this study area.

As outlined in Chapter 16, *Environmental Justice*, OEA determined that only noise impacts would result in high and adverse³⁰ impacts on minority and low-income populations. Except for the Decker East Alternative, operation of any of the other build alternatives would result in disproportionately high and adverse noise impacts on minority and low-income populations. OEA examined the other projects and the distances to these same minority and low-income populations that would be affected by any build alternative and determined that the other projects would not result in high and adverse noise impacts on these populations. Therefore, OEA concluded that no cumulative disproportionately high and adverse impacts on minority and low-income populations would occur.

Additionally, OEA examined the other projects to determine if the minority and low-income populations already disproportionately affected by noise impacts would also experience impacts of another nature (e.g., socioeconomic or visual impacts). OEA determined that none of the other projects would have high and adverse human health or environmental

³⁰ The terms *high and adverse* are derived from Executive Order 12898, which directs agencies to identify and consider “disproportionately high and adverse” human health or environmental effects of their actions on minority and low-income communities.

effects. Therefore, OEA concluded that no cumulative disproportionately high and adverse human health or environmental effects on minority and low-income populations would occur.

U.5 References

U.5.1 Introduction to Cumulative Impacts Analysis

- Ambre Energy. 2012. *Decker Mines*. Last Revised: 2012. Available:
<http://www.ambreenergy.com/decker-mine>. Accessed: January 19, 2014.
- Bureau of Land Management. 2013. *Miles City Field Office Draft Resource Management Plan and Environmental Impact Statement*. Available:
http://www.blm.gov/mt/st/en/fo/miles_city_field_office/rmp/draft_rmp.html. Accessed: March 14, 2013.
- Cloud Peak Energy. 2014. *Spring Creek Mine*. Last Revised: 2014. Available:
<http://cloudpeakenergy.com/operations/spring-creek-mine/>. Accessed: January 19, 2014.
- Council on Environmental Quality. 1997. *Considering Cumulative Effects under the National Environmental Policy Act*: Available:
<http://ceq.hss.doe.gov/nepa/ccnepa/ccenepa.htm>. Accessed: May 19, 2014.
- Matson, R. E. and J. W. Blumer. 1973. *Quality and Reserves of Strippable Coal, Selected Deposits, Southeastern Montana*. Montana Bureau of Mines and Geology. Available:
<https://dnrc.mt.gov/Trust/MMB/OtterCreek/3Evaluations/MBMGBulletin91.pdf>.
- Montana Board of Oil and Gas Conservation. 2014a. *Crude Oil Production Data by County*. Available:
<http://www.bogc.dnrc.mt.gov/webapps/dataminer/Production/ProdAnnualCounty.aspx>. Accessed: February 26, 2014.
- Montana Board of Oil and Gas Conservation. 2014b. *Permit Count*. Available:
<http://www.bogc.dnrc.mt.gov/WebApps/DataMiner/Statistics/StatPermitCount.aspx>. Accessed: June 16, 2014.
- Montana Board of Oil and Gas Conservation. 2014c. *5-Year Completion Count*. Available:
<http://www.bogc.dnrc.mt.gov/WebApps/DataMiner/Statistics/StatCompletionCount.aspx>. Accessed: June 16, 2014.
- Montana Board of Oil and Gas Conservation. 2014d. *Annual Production by County*. Available:
<http://www.bogc.dnrc.mt.gov/WebApps/DataMiner/Production/ProdAnnualCounty.aspx>. Accessed: June 16, 2014.

- Montana Department of Natural Resources and Conservation. 2013. *Montana Commercial Land for Lease*. Last Revised: December 2013. Available: <http://dnrc.mt.gov/Trust/Commercial/Default.asp>. Accessed: January 19, 2014.
- Montana Department of Transportation. 2012. *Tongue River Road Corridor Planning Study*. Available: <http://www.mdt.mt.gov/pubinvolve/tongueriver/>. Accessed: January 19, 2014.
- Montana Fish, Wildlife & Parks. 2012. *Tongue River Reservoir State Park Proposed Improvement Draft Environmental Assessment MEPA, NEPA, MCA 23-1-110 Checklist*.
- Montana State Parks and Montana Fish, Wildlife & Parks. 2012. *Tongue River Reservoir State Park Proposed Improvement Draft Environmental Assessment MEPA, NEPA, MCA 23-1-110 CHECKLIST*. Available: <http://fwp.mt.gov/news/publicNotices/environmentalAssessments/developmentImprovementsAndEnhancements/default.html>. Accessed: March 18, 2013.
- Otter Creek Coal, LLC. 2014. Otter Creek Coal. 2012. *Otter Creek Coal, LLC Otter Creek Mine Permit Application*. Updated. Available: http://deq.mt.gov/pubcom.mcp#Otter_Creek.
- U.S. Department of Agriculture. 2013. *Agricultural Research Service – Livestock and Range Research Laboratory*. Last Revised: August 22, 2013. Available: http://www.ars.usda.gov/main/site_main.htm?modecode=54-34-05-00. Accessed: January 19, 2014.
- U.S. Department of the Interior. 1984. *Proposed Montco Mine, Rosebud County, Montana: Draft Environmental Impact Statement*. February. Washington, DC: Office of Surface Mining Reclamation and Enforcement.
- U.S. Forest Service. 2011. *Beaver Creek Landscape Management Project Record of Decision*. Available: http://www.fs.fed.us/nepa/nepa_project_exp.php?project=31892. Accessed: March 11, 2013.
- Westmoreland Coal Company. 2014. *Rosebud Mine*. Last Revised: 2014. Available: <http://westmoreland.com/location/rosebud-mine-montana/>. Accessed: January 19, 2014.

U.5.2 Affected Environment

- Otter Creek Coal, LLC. 2014. Otter Creek Coal. 2012. *Otter Creek Coal, LLC l Otter Creek Mine Permit Application*. Updated. Available: http://deq.mt.gov/pubcom.mcp#Otter_Creek.

U.5.3 Rail Operations and Rail Safety

No references.

U.5.4 Grade-Crossing Delay

No references.

U.5.5 Grade-Crossing Safety

Bureau of Land Management. 2013. *Miles City Resource Management Plan and Environmental Impact Statement*. Page ARMP-16. Available: http://www.blm.gov/mt/st/en/fo/miles_city_field_office/rmp.html. Accessed: May 19, 2014.

U.5.6 Navigation

No references.

U.5.7 Air Quality

Birch, M. E. and J. D. Noll. 2004. Submicrometer Elemental Carbon as a Selective Measure of Diesel Particulate Matter in Coal Mines. *Journal of Environmental Monitoring* 6, 799–806. Available: <http://origin.glb.cdc.gov/niosh/nas/RDRP/appendices/chapter5/a5-38.pdf>. Accessed: May 16, 2014.

Bureau of Land Management. 2006a. *Environmental Assessment for Spring Creek Coal Lease By Application MTM94378 EA# MT-020-2007-34*. Miles City Field Office in Cooperation with Montana Department of Environmental Quality and Office of Surface Mining Reclamation and Enforcement. November. Available: http://www.blm.gov/pgdata/etc/medialib/blm/mt/field_offices/miles_city/coal.Par.88925.File.tmp/springcreekEA.pdf. Accessed: March 28, 2014.

Bureau of Land Management. 2006b. *Air Quality Technical Support Document: Quantitative Review of Ambient Air Quality Impacts, Supplement to Statewide Final Oil and Gas Environmental Impact Statement and Amendment of the Powder River and Billings Resource Management Plans*. December. Available: http://www.blm.gov/pgdata/etc/medialib/blm/mt/field_offices/miles_city/seis/airquality.Par.83608.File.dat/DSEIS_Air_Quality_TSD.pdf. Accessed: March 5, 2013.

Bureau of Land Management. 2006c. *Dispersion Modeling Protocol for Ambient Air Quality Impact Assessment, Supplement to Statewide Final Oil and Gas Environmental Impact Statement and Amendment of the Powder River and Billings Resource Management Plans*. April. Available: http://www.blm.gov/pgdata/etc/medialib/blm/mt/field_offices/miles_city/seis.Par.35500.File.dat/aqmodel.pdf. Accessed: March 5, 2013.

Bureau of Land Management. 2007a. *Miles City Field Office Resource Management Plan and Environmental Impact Statement*. Chapter 4: Environmental Consequences Air

Resources and Climate. Table 4-16 and Table 4-17, Page 4-26. Available:
http://www.blm.gov/pgdata/etc/medialib/blm/mt/field_offices/miles_city/rmp/draft_rmp.Par.94277.File.dat/Ch4_EnvironmentalConsequences.pdf. Accessed: April 10 2014.

Bureau of Land Management. 2007b. *Supplemental Air Quality Analysis to the Draft Supplement To the Montana Statewide Oil and Gas Environmental Impact Statement and Amendment of the Powder River and Billings Resource Management Plans*. Miles City Field Office Miles City, MT. November. Available:
http://www.blm.gov/pgdata/etc/medialib/blm/mt/field_offices/miles_city/seis/saqa.Par.63467.File.dat/FSEIS_FSAQA.pdf. Accessed: March 5, 2013.

Bureau of Land Management. 2007c. *Supplemental Air Quality Analysis to the Final Supplement To the Montana Statewide Oil and Gas Environmental Impact Statement and Amendment of the Powder River and Billings Resource Management Plans*. Appendix C: Model Output. Available:
http://www.blm.gov/pgdata/etc/medialib/blm/mt/field_offices/miles_city/seis/saqa.Par.51299.File.dat/FSEIS_SAQA_App_C.pdf. Accessed: March 5, 2013.

Bureau of Land Management. 2008. *Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Amendment of the Powder River and Billings Resource Management Plans*. October. Available:
http://www.blm.gov/mt/st/en/fo/miles_city_field_office/seis.html. Accessed: March 5, 2013.

Bureau of Land Management. 2009a. *Update of Task 3A Report for the Powder River Basin Coal Review: Cumulative Air Quality Effects for 2020*. December. Available:
http://www.blm.gov/wy/st/en/programs/energy/Coal_Resources/PRB_Coal/prbdocs/coalreview/task_3a-2020.html. Accessed: February 21, 2013.

Bureau of Land Management. 2009b. *Update of the Task 2 Report for the Powder River Basin Coal Review: Past and Present and Reasonably Foreseeable Development Activities*. High Plains District Office and Colorado Wyoming State Office. December. Available:
http://www.blm.gov/pgdata/etc/medialib/blm/wy/programs/energy/coal/prb/coalreview/task_2_update.Par.69616.File.dat/Task2_12-09.pdf. Accessed: June 26, 2014.

Bureau of Land Management. 2010. *Environmental Assessment for Spring Creek Coal Lease Modification, MTM-069782 and Amendment to Land Use Lease MTM-74913*. EA# MT-DOI-BLM-MT-020-2010-29. Miles City Field Office in Cooperation with Montana Department of Environmental Quality and DOI OSM, Western Regional Coordinating Center. April. Table 3-6, Page 3-12. Available:
http://www.blm.gov/pgdata/etc/medialib/blm/mt/field_offices/miles_city.Par.15531.File.dat/springcreekEA.pdf. Accessed: March 28, 2014.

Bureau of Land Management. 2011. *Task 2 Report for the Powder River Basin Coal Review – Past and Present and Reasonably Foreseeable Development*. High Plains District

- Office and Colorado Wyoming State Office. December. Available:
http://www.blm.gov/wy/st/en/programs/energy/Coal_Resources/PRB_Coal/prbdocs/coalreview/task_2_update__120.html. Accessed: June 26, 2014.
- Bureau of Land Management. 2012. *Powder River Basin Coal Review*. Available:
http://www.blm.gov/wy/st/en/programs/energy/Coal_Resources/PRB_Coal/prbdocs/coalreview/QAs.html. Accessed: February 21, 2013.
- Bureau of Land Management. 2013a. Miles City Field Office, June 12, 2013. News Release No. 130607A: *BLM Extends Comment Period on Decker Coal Lease Modification*. Available:
http://www.blm.gov/mt/st/en/info/newsroom/2013/june/blm_extends_comment.html. Accessed: March 28, 2014.
- Bureau of Land Management. 2013b. *Miles City Field Office Draft Resource Management Plan and Environmental Impact Statement. Air Resource Management Plan: Adaptive Management Strategy for Oil and Gas Resources*. Miles City Field Office. Available:
http://www.blm.gov/mt/st/en/fo/miles_city_field_office/rmp/draft_rmp.html. Accessed: April 10, 2014.
- Bureau of Land Management. 2014. *Task 3A Report for the Powder River Basin Coal Review: Cumulative Air Quality Effects*. High Plains District Office and Wyoming State Office. February. Available:
<http://www.blm.gov/pgdata/etc/medialib/blm/wy/programs/energy/coal/prb/coalreview/task3a.Par.8822.File.dat/Task3Afinal.pdf>. Accessed: May 28, 2014.
- Earth Tech. 2000. *A User's Guide for the CALPUFF Dispersion Model (Version 5)*. January. Available:
http://www.search.src.com/calpuff/download/CALPUFF_UsersGuide.pdf. Accessed: May 12, 2014.
- Kong, S., J. Yaqin, B. Lu, L. Chen, B. Han, Z. Li, and Z. Bai. 2011. Characterization of PM₁₀ Source Profiles for Fugitive Dust in Fushu – A City Famous For Coal. *Atmospheric Environment* 45 (2011): 5351-5365. Available:
www.elsevier.com/locate/atmosenv. Accessed: May 16, 2014.
- Montana Department of Environmental Quality. 2001a. *Air Quality Permit #1483-08*. Western Energy Company. Colstrip, MT. October 23. AFS #: 087-0004, Page 14. Available: <http://www.deq.mt.gov/airquality/ARMpermits/1483-08.pdf>. Accessed: July 14, 2014.
- Montana Department of Environmental Quality. 2001b. *Air Quality Permit #1570-06*. Western Energy Company. Colstrip, MT. October 23. AFS #: 087-0004. Available: <http://www.deq.mt.gov/airquality/ARMpermits/1570-06.pdf>. Accessed: March 10, 2015.

- Montana Department of Environmental Quality. 2009. Air Quality Permit #1120-10, Spring Creek Coal Company. Decker, MT. March 19. Available: www.deq.mt.gov/AirQuality/ARMpermits/1120-10.pdf. Accessed: March 28, 2014.
- Montana Department of Environmental Quality. 2012a. Air Quality Permit #1120-11, Spring Creek Coal Company. Decker, MT. October 2. Available: www.deq.mt.gov/AirQuality/ARMpermits/1120-11.pdf. Accessed: March 28, 2014.
- Montana Department of Environmental Quality. 2012b. Air Quality Permit #1435-07, Decker Coal Company. Decker, MT. July 27. Available: www.deq.mt.gov/AirQuality/ARMpermits/1435-07.pdf. Accessed: March 28, 2014.
- Montana Department of Environmental Quality. 2013a. Air Quality Permit #2035-06, Rosebud Power Plant, Colstrip Energy Limited Partnership. Boise, ID. October 13. Available: www.deq.mt.gov/AirQuality/ARMpermits/2035-06.pdf. Accessed: March 28, 2014.
- Montana Department of Environmental Quality. 2013b. *Air Quality Permit #1570-07*. Western Energy Company. Colstrip, MT. July 22. AFS #: 087-0004. Available: <http://www.deq.mt.gov/airquality/ARMpermits/1570-07.pdf>. Accessed: March 9, 2015.
- Montana Department of Environmental Quality. 2014. *Air Quality Permit #1570-08*. Western Energy Company. Colstrip, MT. October 31. AFS #: 087-0004. Available: <http://www.deq.mt.gov/airquality/ARMpermits/1570-08.pdf>. Accessed: March 9, 2015.
- National Park Service. 1999. *Introduction to Visibility*. Prepared by William C. Malm, Air Resources Division. May. Available: http://www.nature.nps.gov/air/vis/Intro_to_Visibility.pdf. Accessed: May 19, 2014.
- Noll, J. D. and M. E. Birch. 2004. Evaluation of SKC DPM Cassettes for Monitoring Diesel Particulate Matter in Coal Mines. *Journal of Environmental Monitoring* 6, 973–978. Available: <http://www.cdc.gov/niosh/nas/rdrp/appendices/chapter5/a5-35.pdf>. Accessed: May 16, 2014.
- Surface Transportation Board. 2000. *Draft Environmental Impact Statement, STB Finance Docket No. 33407, Dakota, Minnesota, and Eastern Railroad Corporation, Powder River Basin Expansion Project*. Appendix E, Air Quality. Attachment: Technical Support Document. Section 6. September. Available: <http://www.stb.dot.gov/stb/docs/DME/DEIS/volume7part01.pdf>, <http://www.stb.dot.gov/stb/docs/DME/DEIS/volume7part02.pdf>, <http://www.stb.dot.gov/stb/docs/DME/DEIS/volume7part03.pdf>, <http://www.stb.dot.gov/stb/docs/DME/DEIS/volume7part04.pdf>. Accessed: May 9, 2014.
- Surface Transportation Board. 2004a. *Draft Supplemental Environmental Impact Statement, STB Finance Docket No. 30186 (Sub–No. 3), Tongue River Railroad Company, Inc. – Construction and Operation – Western Alignment, Tongue River III - Rosebud and Big*

Horn Counties, Montana. Available:

<<http://www.stb.dot.gov/decisions/readingroom.nsf/51d7c65c6f78e79385256541007f0580/e0471b55d3fd433685256f2d0058c818?OpenDocument>>. Accessed: October 2, 2012.

Surface Transportation Board. 2004b. *Air Quality Impact Analysis Update*. TRR III, Tongue River Railroad Project. June. Available:

<http://www.stb.dot.gov/decisions/readingroom.nsf/WebDecisionID/37356?OpenDocument>. Accessed: September 24, 2012.

U.S. Environmental Protection Agency. 2010. *Guidance Concerning the Implementation of the 1-hour NO₂ NAAQS for the Prevention of Significant Deterioration Program*. Memo from Stephen D. Page to Regional Air Division Directors. June 29. Available: http://www.ct.gov/dep/lib/dep/air/permits/no2_guidance_with_attachment.pdf. Accessed: October 27, 2010.

Western Regional Air Partnership. 2013. *West-Wide Jump-start Air Quality Modeling Study (WestJumpAQMS)*. Final Report. September. Available: http://www.wrapair2.org/pdf/WestJumpAQMS_FinRpt_Finalv2.pdf. Accessed: March 12, 2014.

U.5.7.1 Personal Communications

Bassett, Susan. Bureau of Land Management. Montana State Office. June 5, 2013—Personal communication.

U.5.8 Greenhouse Gases and Climate Change

World Resources Institute. 2014. Climate Analysis Indicators Tool (CAIT) 2.0: WRI's climate data explorer. Accessed: September 2014.

U.5.9 Coal Dust

No references.

U.5.10 Noise and Vibration

No references.

U.5.11 Vegetation

Montana Natural Heritage Program. 2013. *Montana Land Cover/Land Use Theme*. Based on classifications originally developed by the University of Idaho, Sanborn and the MTNHP for the Pacific Northwest ReGAP project. Helena, Montana. Obtained via email from MTNHP staff on January 8, 2014.

U.5.12 Wildlife

- Bureau of Land Management. 2013. BLM Raptor Nest Data. Unpublished data. Miles City, MT.
- Cloud Peak Energy. 2013. *2012 Annual Mining Report—Spring Creek Mine*. Final. Decker, MT. Prepared for Montana Department of Environmental Quality. Helena, MT.
- Decker Coal Company. 2013a. *Unpublished Data from Wildlife Monitoring 2004–2013*. Draft. Helena, MT. Prepared for Montana Department of Environmental Quality. Helena, MT.
- Decker Coal Company. 2013b. *2012 Annual Mining Report—Decker Mine*. Final. Decker, MT. Prepared for Department of Environmental Quality. Helena, MT.
- Farmer, P. 2012. *Environmental Baseline Report 304 K: Fish and Wildlife Resources Baseline Inventory Otter Creek Mine, Powder River County, Montana*. Final. Helena, MT. Prepared for Otter Creek Coal, LLC, Billings, MT.
- ICF International. 2014. *Rosebud Mine 2013 Wildlife Monitoring*. Final. Gillette, WY. Prepared for Western Energy Company. Colstrip, MT.
- Montana Fish, Wildlife & Parks. 2011. *2011 Antelope Population Estimates*. Last revised: 2011. Available: <http://fwp.mt.gov/fishAndWildlife/management/antelope/>. Accessed: September 12, 2013.
- Montana Fish, Wildlife & Parks. 2012. *2012 Antelope Population Estimates*. Last revised: 2012. Available: <http://fwp.mt.gov/fishAndWildlife/management/antelope/>. Accessed: September 12, 2013.
- Montana Fish, Wildlife & Parks. 2013a. *2013 Antelope Population Estimates*. Last revised: 2013. Available: <http://fwp.mt.gov/fishAndWildlife/management/antelope/>. Accessed: September 12, 2013.
- Montana Fish, Wildlife & Parks. 2013b. *Distribution—Antelope (General and Winter)*. Last revised: 2013. Available: <http://fwp.mt.gov/doingBusiness/reference/gisData/dataDownload.html>. Accessed: September 13, 2013. Retrieved from: <http://fwp.mt.gov/doingBusiness/reference/gisData/dataDownload.html>.
- Montana Fish, Wildlife & Parks. 2013c. *Distribution—Mule Deer (General and Winter)*. Last revised: 2013. Available: <http://fwp.mt.gov/doingBusiness/reference/gisData/dataDownload.html>. Accessed: September 13, 2013. Retrieved from: <http://fwp.mt.gov/doingBusiness/reference/gisData/dataDownload.html>.
- Montana Fish, Wildlife & Parks. 2013d. *Distribution—White-Tailed Deer (General and Winter)*. Last revised: 2013. Available:

<http://fwp.mt.gov/doingBusiness/reference/gisData/dataDownload.html>. Accessed: September 13, 2013. Retrieved from:
<http://fwp.mt.gov/doingBusiness/reference/gisData/dataDownload.html>.

Montana Fish Wildlife and Parks. 2013e. *FWP sharp-tailed grouse lek data*. Unpublished data. Miles City, MT. Prepared by: Montana Department of Fish, Wildlife and Parks.

Montana Natural Heritage Program. 2015. Statewide Montana bat acoustic data summary; Excel Workbook with multiple pivot tables and pivot charts. 31 December, 2014.

Thunderbird Wildlife Consulting, Inc. 2013. *Spring Creek Mine 2012 Wildlife Monitoring*. Final. Gillette, WY. Prepared for: Cloud Peak Energy Resources LLC. Decker, MT.

Western Energy Company. 2013. *2012 Annual Mining Report—Rosebud Mine*. Final. Colstrip, MT. Prepared for Montana Department of Environmental Quality. Helena, MT.

U.5.13 Fish

AECOM. 2013a. *Task 1B Report for the Powder River Basin Coal Review, Current Water Resource Conditions*. Prepared by AECOM for the Bureau of Land Management High Plains District Office and Wyoming State Office. In progress.

AECOM. 2013b. *Task 3D Report for the Powder River Basin Coal Review, Cumulative Environmental Effects*. Prepared by AECOM for the Bureau of Land Management High Plains District Office and Wyoming State Office. March.

Bureau of Land Management. 2013. *Miles City Field Office Draft Resource Management Plan and Environmental Impact Statement*. Available:
http://www.blm.gov/mt/st/en/fo/miles_city_field_office/rmp/draft_rmp.html. Accessed: March 14, 2013.

Dauwalter, D. C. 2013. Fish Assemblage Associations and Thresholds with Existing and Projected Oil and Gas Development. *Fisheries Management and Ecology* 20(4):289–301.

Davis, W. N., R. G. Bramblett, A. V. Zale, and C. L. Endicot. 2009. A Review of the Potential Effects of Coal Bed Natural Gas Development Activities on Fish Assemblages of the Powder River Geologic Basin. *Reviews in Fisheries Science* 17(3):402–422.

Davis, W. N., R. G. Bramblett, and A. V. Zale. 2010. Effects of coalbed natural gas development on fish assemblages in tributary streams of the Powder and Tongue Rivers. *Freshwater Biology* 55(12):2612-2625.

EnviroVision Corporation, Herrera Environmental Consultants, Washington Department of Ecology. 2008. *Phase 2: Improved Estimates of Toxic Chemical Loadings to Puget Sound from Surface Runoff and Roadways*. Ecology Publication Number 08-10-084.

Olympia, Washington. Available:
<http://www.ecy.wa.gov/programs/wq/pstoxics/index.html>. Accessed: January 22, 2014.

Montana Board of Oil and Gas Conservation. No date. *GIS metadata*. Available:
<http://www.bogc.dnrc.mt.gov/webapps/dataminer/CBM/CBMWells.asp>. Accessed:
March 6, 2014.

Montana Department of Environmental Quality. 2013. *First Round Acceptability Deficiency; Otter Creek Permit*. Formal letter of response to Montana mining permit application C2012018. April 12.

U.S. Forest Service. 2011. *Beaver Creek Landscape Management Project Record of Decision*. Available: http://www.fs.fed.us/nepa/nepa_project_exp.php?project=31892. Accessed: March 11, 2013.

Washington State Department of Transportation. 2011. *Highway Runoff Manual M 31-16.03*. Environmental and Engineering Programs Design Office. Available:
<http://www.wsdot.wa.gov/publications/manuals/m31-16.htm>. Accessed: January 22, 2014.

U.5.14 Special-Status Species

Cloud Peak Energy. 2014. *Spring Creek Mine*. Last Revised: 2014. Available:
<http://cloudpeakenergy.com/operations/spring-creek-mine/>. Accessed: January 19, 2014.

Connelly, J. W., and C. E. Braun. 1997. Long-Term Changes in Sage Grouse *Centrocercus urophasianus* Populations in Western North America. *Wildlife Biology* 3(3):229–234.

Connelly, J. W., S. T. Knick, M. A. Schroeder, and S. J. Stiver. 2004. *Conservation Assessment of Greater Sage-Grouse and Sagebrush Habitats*. Unpublished manuscript, Cheyenne, WY: Western Association of Fish and Wildlife Agencies. Retrieved:
http://www.ndow.org/wild/conservation/sg/resources/greate_sg_cons_assessment.pdf.

Decker Coal Company. 2013a. *Unpublished Data from Wildlife Monitoring 2004–2013*. Draft. Helena, MT. Prepared for Montana Department of Environmental Quality. Helena, MT.

Decker Coal Company. 2013b. *2012 Annual Mining Report—Decker Mine*. Final. Decker, MT. Prepared for Department of Environmental Quality. Helena, MT.

Montana Board of Oil and Gas Conservation. No date. *GIS metadata*. Available:
<http://www.bogc.dnrc.mt.gov/webapps/dataminer/CBM/CBMWells.asp>. Accessed:
March 6, 2014.

Montana Fish, Wildlife & Parks. 2013a. *Distribution - Sage Grouse (Habitat)*. Last revised: 2013. Available:

<http://fwp.mt.gov/doingBusiness/reference/gisData/dataDownload.html>. Accessed: September 13, 2013.

Montana Fish, Wildlife & Parks. 2013b. *Greater Sage-Grouse Core Areas*. Last revised: 2013. Available: <http://fwp.mt.gov/doingBusiness/reference/gisData/dataDownload.html>. Accessed: September 13, 2013.

Montana Natural Heritage Program. 2009. *Predicted Suitable Habitat Models for Barr's Milkvetch, Woolly Twinpod, Nuttall Desert-Parsley, and Double Bladderpod*. GIS data. Available: <http://mtnhp.org/models/>.

Montana Natural Heritage Program. 2013. *Montana Land Cover/Land Use Theme*. Based on classifications originally developed by the University of Idaho, Sanborn and the MTNHP for the Pacific Northwest ReGAP project. Helena, MT. Obtained via email from MTNHP staff on January 8, 2014.

Montana Natural Heritage Program. 2015. Statewide Montana bat acoustic data summary; Excel Workbook with multiple pivot tables and pivot charts. 31 December, 2014.

Thunderbird Wildlife Consulting, Inc. 2013. *Spring Creek Mine 2012 Wildlife Monitoring*. Final. Gillette, WY. Prepared for Cloud Peak Energy Resources LLC. Decker, MT.

Western Energy Company. 2013. *2012 Annual Mining Report—Rosebud Mine*. Final. Colstrip, MT. Prepared for Montana Department of Environmental Quality. Helena, MT.

U.5.15 Surface Water

Bureau of Land Management. 2013. *Miles City Field Office Draft Resource Management Plan and Environmental Impact Statement*. Available: http://www.blm.gov/mt/st/en/fo/miles_city_field_office/rmp/draft_rmp.html. Accessed: March 14, 2013.

City of Colstrip. 2008. *Colstrip Comprehensive Growth Plan*. Available: <http://comdev.mt.gov/content/CTAP/docs/GrowthPolicies/Colstrip.pdf>. Accessed: June 3, 2014.

Davis, W. N., R. G. Bramblett, and A. V. Zale. 2010. Effects of coalbed natural gas development on fish assemblages in tributary streams of the Powder and Tongue Rivers. *Freshwater Biology* 55(12):2612-2625.

EnviroVision Corporation, Herrera Environmental Consultants, Washington Department of Ecology. 2008. *Phase 2: Improved Estimates of Toxic Chemical Loadings to Puget Sound from Surface Runoff and Roadways*. Ecology Publication Number 08-10-084. Olympia, Washington. Available: <http://www.ecy.wa.gov/programs/wq/pstoxics/index.html>. Accessed: January 22, 2014.

- Montana Board of Oil & Gas Conservation. No date. *GIS metadata*. Available: <http://www.bogc.dnrc.mt.gov/webapps/dataminer/CBM/CBMWells.asp>. Accessed: March 6, 2014.
- Montana Department of Environmental Quality. 2012. *Otter Creek Mine Permit Application*. Available: http://deq.mt.gov/pubcom.mcp#Otter_Creek. Accessed: March 18, 2013.
- U.S. Forest Service. 2011. *Beaver Creek Landscape Management Project Record of Decision*. Available: http://www.fs.fed.us/nepa/nepa_project_exp.php?project=31892. Accessed: March 11, 2013.
- Washington State Department of Transportation. 2011. *Highway Runoff Manual M 31-16.03*. Environmental and Engineering Programs Design Office. Available: <http://www.wsdot.wa.gov/publications/manuals/m31-16.htm>. Accessed: January 22, 2014.
- Wyoming Game and Fish Department. 2010. *Recommendations for Development of Oil and Gas Resources Within Important Wildlife Habitats*. Version 6.0, revised April 2010. Cheyenne, WY.

U.5.16 Groundwater

- Bureau of Land Management. 1984. Draft Environmental Impact Statement for Round II Coal Lease Sale in the Powder River Region. U.S. Department of Interior. January.
- Bureau of Land Management. 2013. *Miles City Field Office Draft Resource Management Plan and Environmental Impact Statement*. Available: http://www.blm.gov/mt/st/en/fo/miles_city_field_office/rmp/draft_rmp.html. Accessed: March 14, 2013.
- Interstate Commerce Commission. 1985. *Final Environmental Impact Statement for Construction and Operation of a Line of Railroad in Custer, Rosebud, and Powder River Counties, Montana*.
- Montana Bureau of Mines and Geology. 2013. *Groundwater Information Center Water Well Data*. October 23. Available: <ftp://geoinfo.msl.mt.gov/Data/Spatial/NonMSDI/Shapefiles/gwicwells.zip>. Accessed: January 16, 2014.
- Montana Department of Natural Resources and Conservation. 1999. *Final Order in the Matter of the Designation of the Powder River Basin Controlled Groundwater Area*. Available: http://www.dnrc.mt.gov/wrd/water_rts/cgwa/powder_riverbasin/powder_final_order.asp. Accessed: March 17, 2014.

- Montana Department of Natural Resources and Conservation. 2009. *Tongue River Hydrology Summary Report*. Tongue River Information Program. Prepared by Hydro Solutions Inc. September.
- Montana Department of Natural Resources and Conservation. 2014. *Settlement Proposal of Reserved Water Rights – Fort Keogh Livestock & Range Research Laboratory*. Summary. Reserved Water Rights Compact Commission. Available: <http://dnrc.mt.gov/rwrcc/Compacts/FortKeogh/Default.asp>. Accessed: June 23, 2014.
- Otter Creek Coal, LLC . 2014. *Otter Creek Coal, LLC Otter Creek Mine Permit Application*. Updated. Available: http://deq.mt.gov/pubcom.mcp#Otter_Creek.
- Wheaton, J., T. Donato, S. Reddish, and L. Hammer. 2006. *2005 Annual Coalbed Methane Regional Ground-water Monitoring Report: Northern Portion of the Powder River Basin*. Open-file Report 538. Montana Bureau of Mines and Geology.
- Williams Jr., R.S., and G.M. Clark. 1994. *Hydrology and Geochemistry of a Surface Coal Mine In Northwestern Colorado*. U.S. Geological Survey Water-Resources Investigations Report 92-4187. Prepared in cooperation with the Bureau of Land Management and the Colorado Department of Natural Resources. Denver, CO. Available: <http://pubs.usgs.gov/wri/1992/4187/report.pdf>. Accessed: March 19, 2014.

U.5.17 Floodplains

- Montana Board of Oil and Gas Conservation. No date. *GIS metadata*. Available: <http://www.bogc.dnrc.mt.gov/webapps/dataminer/CBM/CBMWells.asp>. Accessed: March 6, 2014.
- Montana Department of Natural Resources and Conservation. 2014. *Floodplain Hazard Management Regulations: 2014 Model Regulations*. Water Resources Division. Helena, MT. Available: http://dnrc.mt.gov/wrd/water_op/floodplain/permitting/model_regulations_2014_rev.pdf. Accessed: April 2, 2014.
- Natural Resources Conservation Service. No date. *Web Soil Survey for Custer, Rosebud, Big Horn, and Powder River Counties, Montana*. U.S. Department of Agriculture. Available: <http://websoilsurvey.nrcs.usda.gov/>. Accessed: February 2014.

U.5.18 Wetlands

- Bureau of Land Management. 2013. *Miles City Field Office Draft Resource Management Plan and Environmental Impact Statement*. Available: http://www.blm.gov/mt/st/en/fo/miles_city_field_office/rmp/draft_rmp.html. Accessed: March 14, 2013.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. Washington, DC: Office of Biological Services, U.S. Fish and Wildlife Service.

Montana Board of Oil and Gas Conservation. No date. *GIS metadata*. Available: <http://www.bogc.dnrc.mt.gov/webapps/dataminer/CBM/CBMWells.asp>. Accessed: March 6, 2014.

Natural Resources Conservation Service. 2014. *Watershed Boundary Data Set*. Available: <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/water/watersheds/dataset/>

U.S. Forest Service. 2011. *Beaver Creek Landscape Management Project Record of Decision*. Available: http://www.fs.fed.us/nepa/nepa_project_exp.php?project=31892. Accessed: March 11, 2013.

WESTECH Environmental Services, Inc. 2013. *Delineation Report: Baseline Wetland and Waterbody Inventory – Otter Creek Coal Project, Powder River County, Montana*. March. Helena, MT. Prepared for Otter Creek Coal, LLC, Billing, MT.

U.5.19 Visual Resources

No references.

U.5.20 Cultural and Historical Resources

Montana Department of Environmental Quality. 1999. *Environmental Assessment for the Proposed Revised Mining and Reclamation Plan for the East Decker Coal Mine*. April. Big Horn County, MT.

Montana Department of Environmental Quality. 2012. *Otter Creek Coal, LLC Otter Creek Mine Permit Application*. Available: http://deq.mt.gov/pubcom.mcp#Otter_Creek. Accessed: March 18, 2013.

Montana Department of Transportation. 2012. *Tongue River Road Corridor Planning Study*. Available: <http://www.mdt.mt.gov/pubinvolve/tongueriver/>. Accessed: January 19, 2014.

U.S. Department of the Interior. 1984. Proposed Montco Mine, Rosebud County, Montana: Draft Environmental Impact Statement. February. Washington, DC: Office of Surface Mining Reclamation and Enforcement.

U.5.21 Land Use

Montana Department of Revenue. 2013. *Revenue Final Land Unit (FLU) Classification*. Montana State Library. Last revised: December 13, 2013. Available: http://apps.msl.mt.gov/Geographic_Information/Data/DataList/datalist_MetadataDetail.aspx?did={4754A734-303D-4920-8CAA-F027D5F3EE58}>. Accessed: January 15, 2014.

Montana Department of Transportation. 2012. *Tongue River Road (S-332) Corridor Planning Study*. Final. December 7. Prepared for Montana Department of Transportation. Prepared by Robert Peccia and Associates. Available: <http://www.mdt.mt.gov/pubinvolve/tongueriver/>. Accessed: February 28, 2014.

Montana State Library. 2014. *Conservation Easements*. Available: <ftp://ftp.gis.mt.gov/CadastralFramework/ConservationEasements/>. Accessed: January 17, 2014.

U.5.22 Recreation

Bureau of Land Management. 2013. *Miles City Field Office Draft Resource Management Plan and Environmental Impact Statement*. Available: http://www.blm.gov/mt/st/en/fo/miles_city_field_office/rmp/draft_rmp.html. Accessed: February 27, 2014.

U.5.23 Section 4(f) and 6(f) Resources

No references.

U.5.24 Hazardous Waste Sites

No references.

U.5.25 Geology and Soils

Montana Department of Environmental Quality. 2011. *Coal and Uranium Mine Permitting*. Last Updated: June 23, 2011. Available: <http://deq.mt.gov/CoalUranium/Coalpermitting.mcp>. Accessed: March 13, 2014.

Otter Creek Coal, LLC. 2014. Otter Creek Coal. 2012. *Otter Creek Coal LLC Coal Otter Creek Mine Permit Application*. Updated. Available: http://deq.mt.gov/pubcom.mcp#Otter_Creek.

U.5.26 Paleontological Resources

No references

U.5.27 Energy Resources

Energy Information Administration. 2014. Profile and Energy Estimates. Table F-7. Available: http://www.eia.gov/state/seds/data.cfm?incfile=/state/seds/sep_fuel/html/fuel_use_df.html&sid=MT

- Montana Board of Oil and Gas Conservation. 2014a. *Crude Oil Production Data by County*. Available:
<http://www.bogc.dnrc.mt.gov/webapps/dataminer/Production/ProdAnnualCounty.aspx>.
Accessed: February 26, 2014.
- Montana Board of Oil and Gas Conservation. 2014b. *Permit Count*. Available:
<http://www.bogc.dnrc.mt.gov/WebApps/DataMiner/Statistics/StatPermitCount.aspx>.
Accessed: June 16, 2014.
- Montana Board of Oil and Gas Conservation. 2014c. *5-Year Completion Count*. Available:
<http://www.bogc.dnrc.mt.gov/WebApps/DataMiner/Statistics/StatCompletionCount.aspx>.
Accessed: June 16, 2014.
- Montana Board of Oil and Gas Conservation. 2014d. *Annual Production by County*. Available:
<http://www.bogc.dnrc.mt.gov/WebApps/DataMiner/Production/ProdAnnualCounty.aspx>.
Accessed: June 16, 2014.
- Montana Department of Environmental Quality. 2001a. *Air Quality Permit 1570-06*. Issued to Western Energy Company. July 19. Available: <http://www.deq.mt.gov/AirQuality/ARMpermits/1570-06.pdf>.
- Montana Department of Environmental Quality. 2001b. *Air Quality Permit 1483-08*. Issued to Western Energy Company. October 23. Available:
<http://www.deq.mt.gov/airquality/ARMpermits/1483-08.pdf>
- Montana Department of Environmental Quality. 2014. *Historical Energy Statistics*. Available: <http://www.deq.mt.gov/Energy/HistoricalEnergy/default.mcp>
- Muench, S. 2010. Roadway Construction Sustainability Impacts Review of Life-Cycle Assessments. Transportation Research Record. Washington, DC: Transportation Research Board of the National Academies. *Journal of the Transportation Research Board* 2151:36–45. Available: <http://courses.washington.edu/cee500e/Files/Muench--final%20article.pdf>. Accessed: February 25, 2014.
- Puget Sound Energy. 2014. *Colstrip Generating Station Fact Sheet*. Available: https://pse.com/aboutpse/PseNewsroom/MediaKit/064_Colstrip.pdf. Accessed: February 27, 2014.
- Spath, P. L., M. K. Mann, and D. R. Kerr. 1999. *Life Cycle Assessment of Coal-fired Power Production*. National Renewable Energy Laboratory, U.S. Department of Energy. June. Available: <http://www.nrel.gov/docs/fy99osti/25119.pdf>. Accessed: March 18, 2014.
- U.S. Energy Information Administration. 2014. Thermal Conversion Factor Source Documentation. May. *Monthly Energy Review*. Available:
http://www.eia.gov/totalenergy/data/monthly/pdf/sec13_a_doc.pdf. Accessed: June 11, 2014.

U.5.28 Socioeconomics

Jones, Lang, and LaSalle. 2013. *Regional Impact Analysis. A Study of Energy Related Impacts on the 16 County Region Represented by the Eastern Montana Impact Coalition*. Prepared for Eastern Montana Impact Coalition. Available: <http://semdc.org/wp-content/uploads/2013/11/Eastern-MT-Impact-Coalition-Final-Report-Oct.-2013.pdf>. Accessed: February 11, 2015.

U.S. Department of State. 2014. Keystone XL Project Final Environmental Impact Statement. Available: <http://keystonepipeline-xl.state.gov/finalseis/index.htm>. Accessed: February 11, 2015.

U.5.29 Environmental Justice

No references.