

**United States Department of the Interior
Bureau of Land Management**

**Environmental Assessment
for the
Peabody Twentymile Coal, LLC
COC54608 Lease Modification**

Little Snake Field Office
455 Emerson St.
Craig, Colorado 81625

DOI-BLM-CO-N010-2014-0044-EA

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CHAPTER 1 – INTRODUCTION

1.1 IDENTIFYING INFORMATION

CASEFILE/PROJECT NUMBER: COC54608

APPLICANT: Twentymile Coal, LLC

PROJECT NAME: Twentymile Coal, LLC COC54608 Lease Modification

1.2 PROJECT LOCATION AND LEGAL DESCRIPTION

LEGAL DESCRIPTION: Sixth PM, T5N, R86W;
SEC. 21: N $\frac{1}{2}$ NW $\frac{1}{4}$, N $\frac{1}{2}$ S $\frac{1}{2}$ NW $\frac{1}{4}$, N $\frac{1}{2}$ S $\frac{1}{2}$ SW $\frac{1}{4}$ NW $\frac{1}{4}$, N $\frac{1}{2}$ SW $\frac{1}{4}$ NE $\frac{1}{4}$;
SEC. 22: N $\frac{1}{2}$ NW $\frac{1}{4}$.

Proposed Project location contains approximately 310 acres in Routt County, Colorado.

1.3 BACKGROUND/INTRODUCTION:

This environmental assessment (EA) has been prepared by the BLM to analyze the environmental effects of a coal lease modification application. Peabody Energy's Twentymile Coal, LLC (TC) has submitted a lease modification to the Bureau of Land Management (BLM) seeking to modify an existing coal lease, COC54608. TC currently operates the Foidel Creek mine which is an underground longwall coal mine located about 20 miles southwest of Steamboat Springs in Routt County, Colorado (see Map 1). TC has been mining at the Foidel Creek Mine by underground methods since 1983. The Foidel Creek Mine is made up of 6 federal coal leases, private coal leases and state coal leases and produces approximately 7 million tons of coal per year.

The modification to lease COC54608 proposes to add 310 acres of un-leased federal coal under privately owned surface at the TC Foidel Creek Mine. Lease COC54608 was originally issued in February 1996 for 2,600 acres. Recovery of the Wadge coal seam within this 2,600 acre lease boundary occurred from June 1996 to September 2001. In August 2002, mining of the Wadge seam coal in COC54608 was completed; therefore TC relinquished 2,280 acres of lease COC54608. TC retained 320 acres of lease COC54608 for access to their continued mining operations. TC continues to mine the Wadge seam on other authorized federal, State and private leases within the permit boundary.

The lease modification application is for the Wolf Creek seam, a coal seam below the Wadge seam. It is estimated that the federal coal reserves included in this lease modification would total approximately 340,000 recoverable tons of high volatile, group B, bituminous coal. There would be no new or additional surface disturbance; unsuitability criteria apply only to surface coal mining, and therefore are not applicable for this proposed lease modification.

Coal is a federal asset, and the BLM is required by law to consider leasing federally-owned minerals for economic recovery. The Minerals Leasing Act (MLA) of 1920, as amended by the Federal Coal Leasing Amendments Act (FCLAA) of 1976; and the Code of Federal Regulations Title 43 Part 3400, et seq. provide the legal foundation for the leasing and development of federal coal resources. BLM is the federal agency delegated the authority to offer federal coal resources for leasing and to

issue leases. The Mining and Minerals Policy Act of 1920 (MMPA) declares that it is the continuing policy of the federal government to foster and encourage the orderly and economic development of domestic mineral resources. BLM complies with the Federal Land Policy and Management Act of 1976 (FLPMA) to plan for multiple uses of public lands and determine those lands suitable and available for coal leasing and development.

If the BLM decides to lease the federal coal described in the lease modification submitted by TC, the fair market value (FMV) of the coal would be determined and TC would submit payment for the 340,000 tons of coal. If the coal is mined, TC would pay 8% royalties on sales of the coal.

A decision to lease these lands is a necessary prerequisite for mining, but it does not authorize mining. The Surface Mining Control and Reclamation Act of 1977 (SMCRA) provides the legal framework for the federal government to regulate coal mining by balancing the need for continued domestic coal production with protection of the environment and ensuring the mined land is returned to beneficial use when mining is finished. The Office of Surface Mining Reclamation and Enforcement (OSMRE) was created in 1977 under SMCRA to carry out and oversee those federal responsibilities. OSMRE implements its MLA and SMCRA responsibilities under regulations at Code of Federal Regulations Title 30 - Mineral Resources, Chapter VII - Office of Surface Mining Reclamation and Enforcement, Department of the Interior, Subchapters A-T, Parts 700-955.

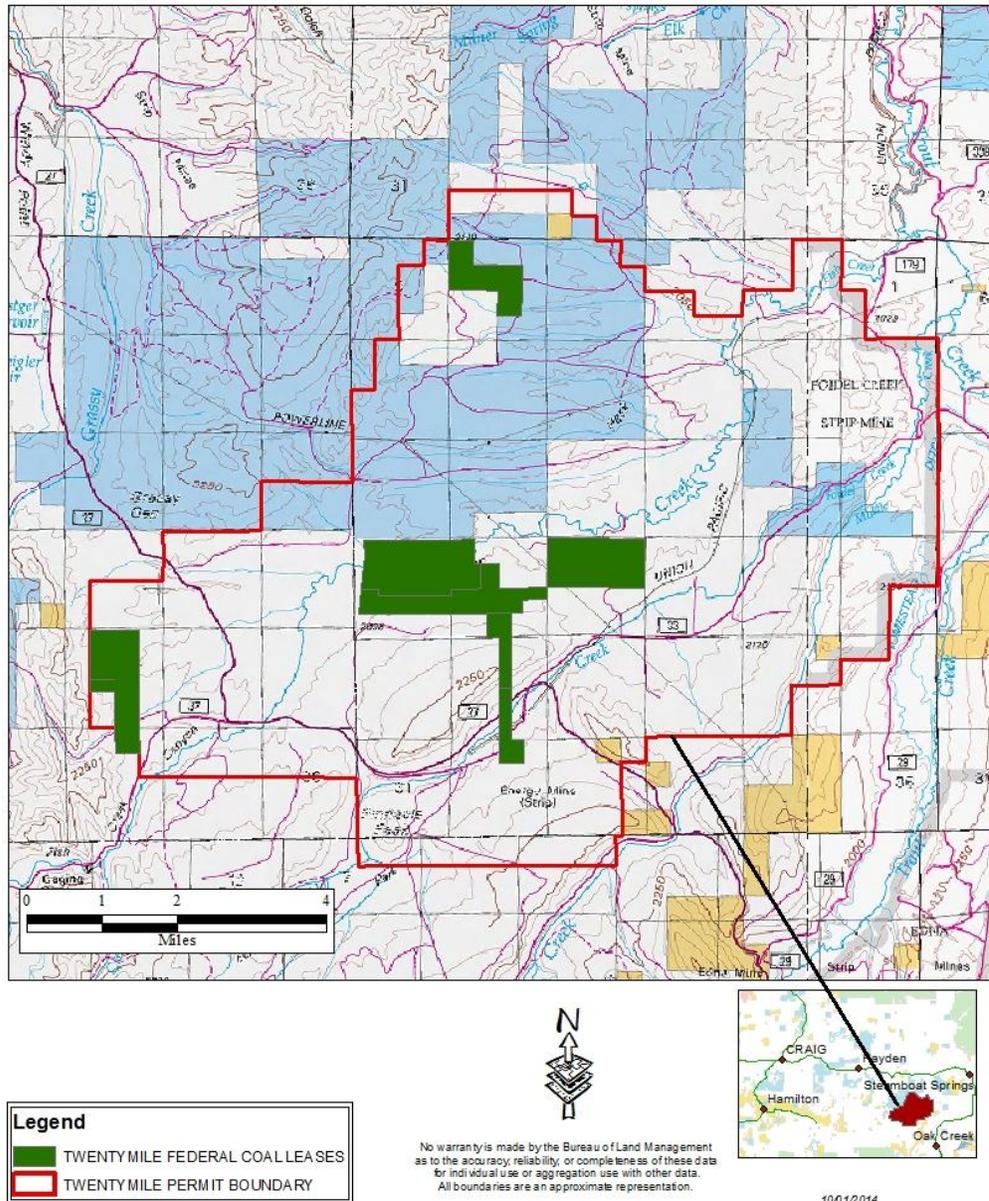
As provided for under SMCRA, OSMRE has worked with Colorado to develop its own regulatory program to permit coal mining with OSMRE in an oversight role. The Colorado Division of Reclamation, Mining, and Safety (DRMS) manages its own coal regulatory program under SMCRA and the Colorado Surface Coal Mining Control Act of 1976. DRMS has the authority and responsibility to make decisions to approve SMCRA mine permits and regulate coal mining under Regulations of the Colorado Mined Land Reclamation Board for Coal Mining (revised 09/14/2005).

TC holds a coal mining permit for the Foidel Creek Mine with DRMS. This permit was issued in 1982 (DRMS Permit C-1982-056) and encompasses 19,940 acres. The proposed 310 acre modification is within the TC Foidel Creek Mine boundary and is located between existing leases (federal, state and private). TC would need to modify their permit with DRMS to authorize mining of the proposed 310 acre lease modification, however the current permit boundary would not be changed.

The entirety of the lease modification tract is split estate. The lease modification involves leasing 310 acres of underground federal coal reserves beneath private lands. TC owns 290 acres of the surface while Ashley Investments owns the eastern 20 surface acres of the lease modification area. TC holds the adjacent leases and no other lease holders exist in the surrounding area. The only adjacent coal mine is the Sage Creek Mine which is also permitted by Peabody. The Sage Creek Mine is currently inactive.

The surface facilities for the Foidel Creek Mine are located on private land approximately 2 miles from the proposed lease modification. The coal which would be mined from the 310 acres covered by this lease modification would be processed at the existing Twentymile Coal Company Foidel Creek Mine surface facilities; there would be no new surface facilities.

TWENTYMILE FEDERAL COAL LEASES



MAP 1

Leasing of the 310 acres would enable TC to add longwall panels in the Wolf Creek seam and provide an extension of TC’s development of the Wadge seam. TC would be able to maximize recovery of federal coal – if the federal coal in question is not mined by TC, the potential economic recovery could be lost. Mining of the lease modification would occur over a 5 year period (approximately) and would allow TC to continue to employ the existing skilled workforce for the additional time required to extract the coal.

As a result of coal leasing and probable subsequent mining and sale of federal coal resources, the public receives lease bonus payments, lease royalty payments, and a reliable supply of low sulfur coal for power generation.

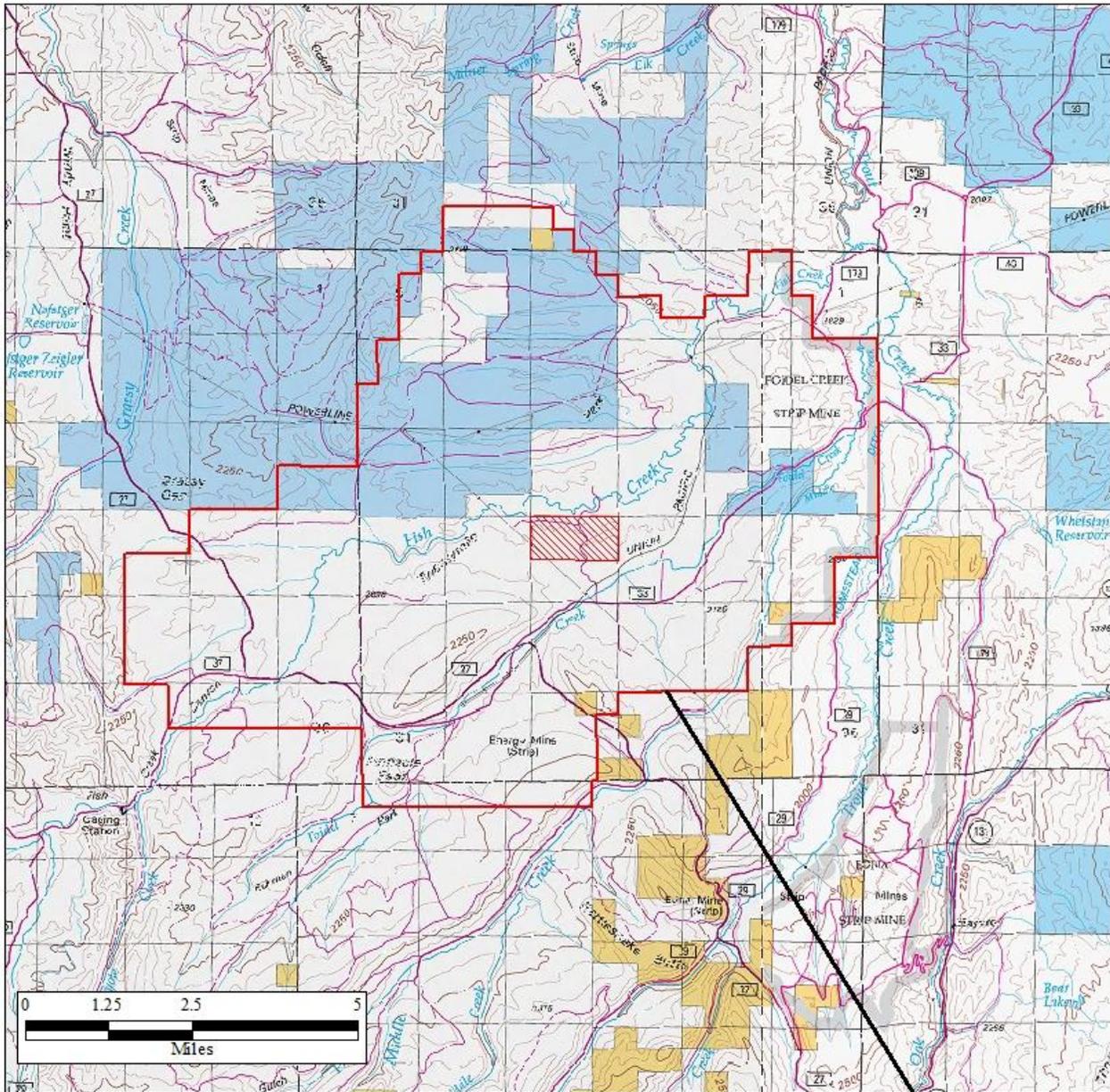
Pursuant to the 43 CFR 3432.2, the authorized officer may modify a lease to include all or part of the lands applied for if the said officer determines that:

- (1) the modification serves the interests of the United States;
- (2) there is no competitive interest in the lands or deposits; and
- (3) the additional lands or deposits cannot be developed as part of another potential or existing independent operation.

The application clearly meets the criteria for consideration as a federal coal lease modification, in that:

- (1) Achieving MER of federal coal resources is in the interest of the United States.
- (2) The applicant is the only active operation in the immediate area and no other operation would be able to economically recover these coal resources. Therefore, there is no competitive interest in the proposed lands.
- (3) The limited quantity of recoverable coal in the proposed tract, along with the physical boundaries to the tract, would preclude this tract from being developed as a part of any new or existing coal mining operation.
- (4) The 310 acres of the lease modification tract does not exceed the modified acreage limitation of 960 acres specified in the Energy Policy Act of 2005.

EXISTING COC54608 LEASE BOUNDARY



Legend

- COC54608 CURRENT BOUNDARY
- TWENTY MILE PERMIT BOUNDARY



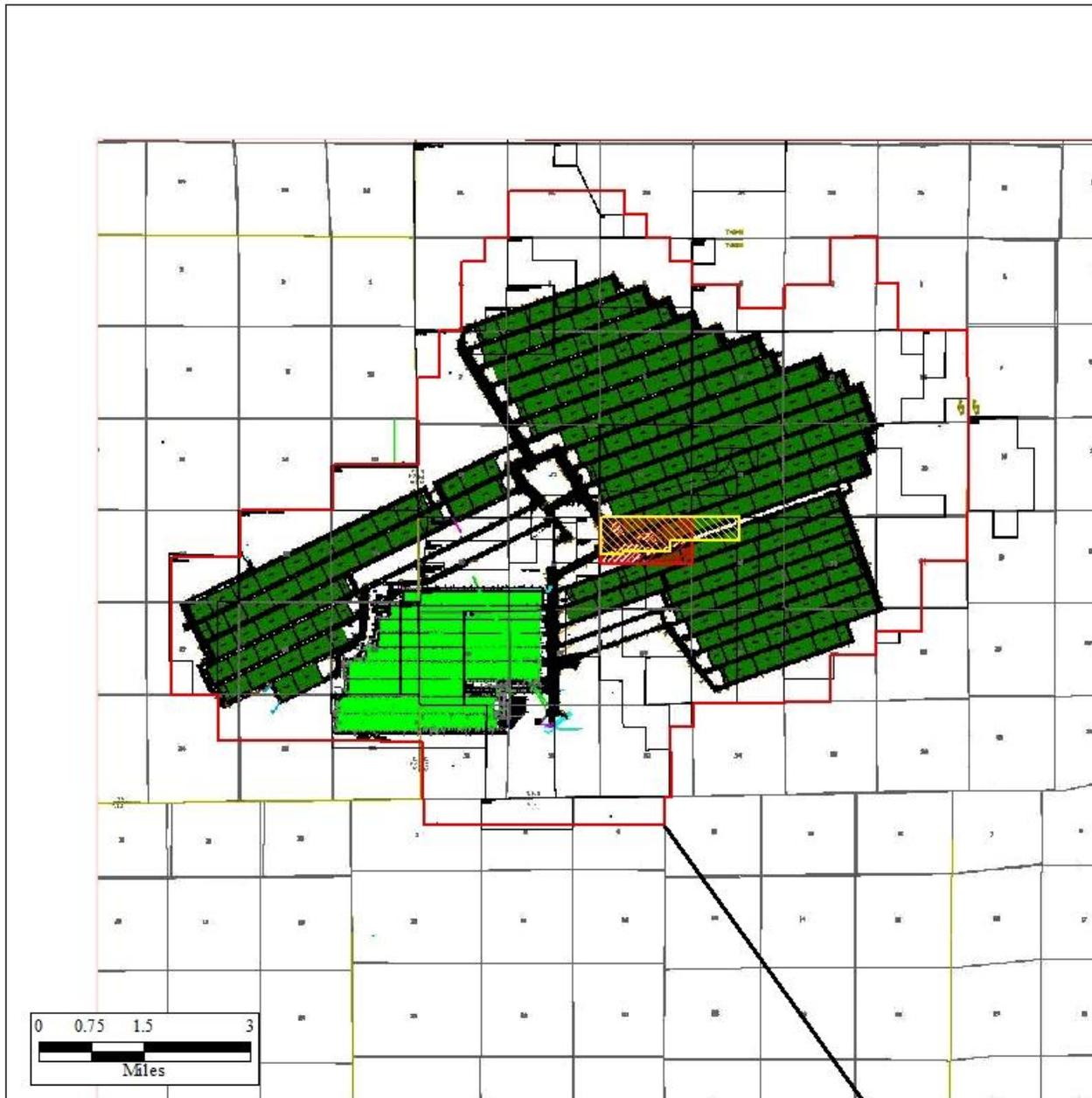
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MAP 2

**MINED OUT WEDGE SEAM LONGWALL PANELS
OVERLAYED BY THE PROPOSED LEASE MODIFICATION BOUNDARY**



Legend

- COC54608 EXISTING LEASE BOUNDARY
- COC54608 PROPOSED LEASE MODIFICATION BOUNDARY
- TWENTY MILE PERMIT BOUNDARY



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MAP 3

1.4 PURPOSE AND NEED

Twentymile Coal, LLC (TC) submitted an application seeking to modify existing federal coal lease COC54608 on May 15, 2014. A revised application was received January, 2015.

The purpose of the Proposed Action is to modify coal lease COC54608 to add a contiguous tract of unleased federal coal covering approximately 310 acres and containing an estimated 340,000 tons of recoverable full seam coal, thus preventing a potential bypass of the coal reserves.

This action, if approved, would allow the applicant access to federal coal from within the modified lease boundary. The applicant would not need to modify their mining permit boundary to remove the economic coal present within the lease modification area.

This action would allow for a logical progression of sequenced mining, ensure that these resources are not bypassed, and achieve maximum economic recovery of the federal coal resource.

This action is needed to fulfill the requirement, under the Mineral Leasing Act of 1920, as amended by the Federal Coal Leasing Amendments Act of 1976 (FCLAA) and the Federal Land Policy and Management Act (FLMPA) to respond to a request to modify federal coal lease COC54608. Part of the outlined responsibility of the BLM includes encouraging development of domestic coal reserves to meet future energy needs, reduced dependence on foreign sources of energy and provides for dependable and affordable domestic energy while giving due consideration to the protection of other resource values. For the applicant's proposal, a lease modification would ensure federal coal resources that cannot be mined by any other operation are not bypassed and that maximum economic recovery is achieved.

Decision to be Made:

The BLM will decide whether or not to modify the existing federal coal lease COC54608 to include the tract identified in the proposed action for the purpose of extracting the coal resources.

1.5 PLAN CONFORMANCE REVIEW

The Proposed Action is subject to and has been reviewed for conformance with the following plan (43 CFR 1610.5, BLM 1617.3):

Name of Plan: Little Snake Record of Decision and Resource Management Plan (RMP)

Date Approved: October 2011

Results: The Proposed Action is in conformance with the LUP because it is specifically provided for in the following LUP goals, objectives, and management decisions as follows:

Allow for the availability of the federal coal and oil shale estate for exploration and development.

Objectives for achieving these goals include:

- Identify and make available the federal coal and oil shale estate for exploration and development, consistent with appropriate suitability studies, to increase energy supplies.

- Facilitate reasonable, economical, and environmentally sound exploration and development of the federal coal and oil shale estate.
- Promote the use of BMP's, including implementation of sound reclamation standards.

Section/Page: RMP-36

1.6 SCOPING, PUBLIC INVOLVEMENT, AND ISSUES

Scoping: Scoping was the primary mechanism used by the BLM to initially identify issues. Internal scoping was initiated when the project was presented to the Little Snake Field Office (LSFO) interdisciplinary team on June 30, 2014. No issues were identified during internal scoping. External scoping was conducted by posting this project on the LSFO's on-line National Environmental Policy Act (NEPA) register beginning on June 30, 2014. A 30 day comment period on the preliminary EA was announced by press release. The press release was posted in the Craig Daily Press and the Steamboat Pilot and Today newspapers and was also posted on the LSFO website, https://www.blm.gov/epl-front-office/eplanning/nepa/nepa_register.do. The preliminary EA underwent a 30 day comment period from March 2 – April 1, 2015. _____ comments were received.

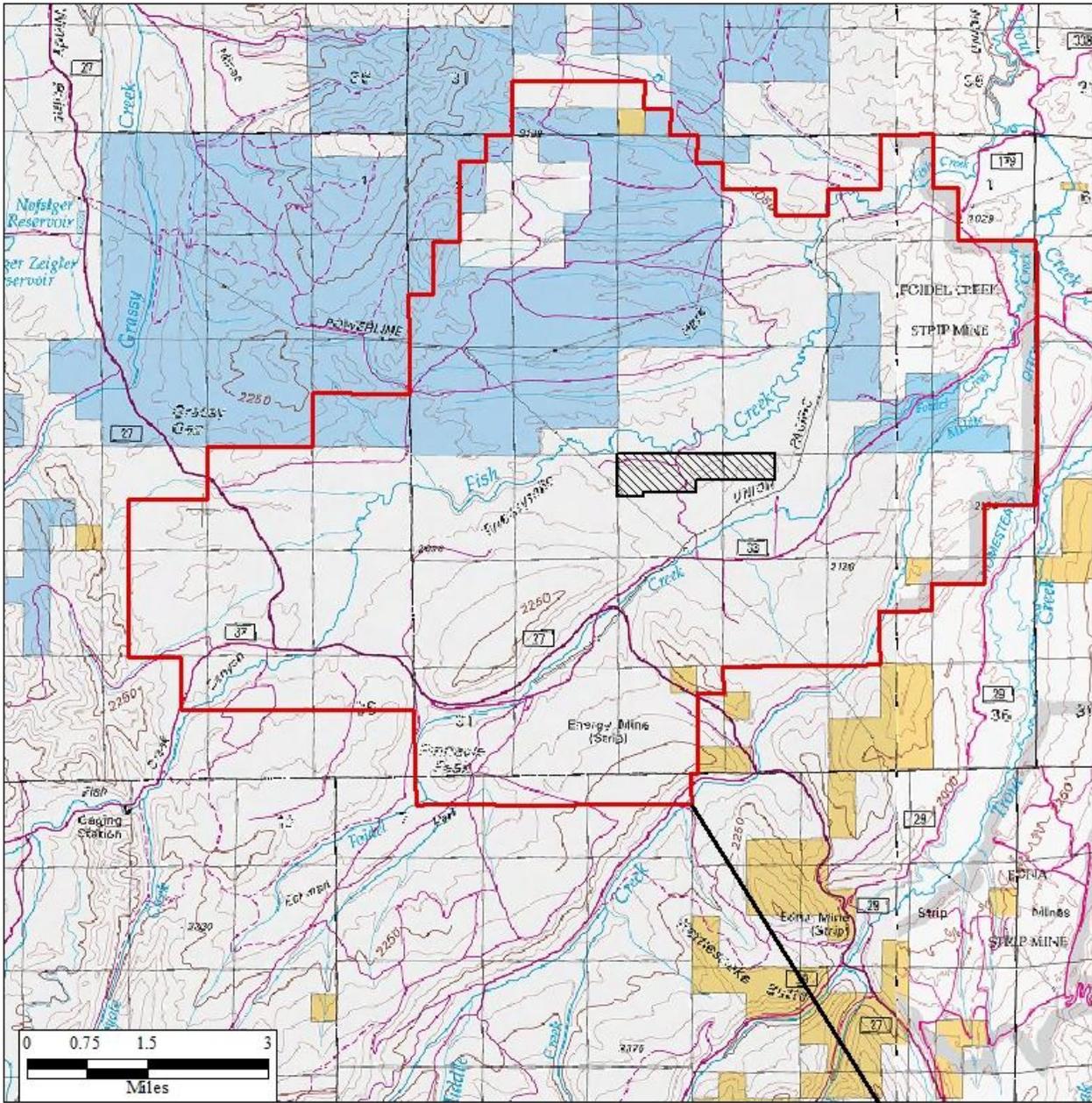
CHAPTER 2 – PROPOSED ACTION AND ALTERNATIVES

2.1 ALTERNATIVES ANALYZED IN DETAIL

2.1.1 Proposed Action

The Proposed Action is to issue a federal coal lease modification to existing federal lease COC54608. Lease COC54608 was issued in February 1996 for 2,600 acres. Mining in this lease boundary occurred from June 1996 to September 2001. In August 2002, TC relinquished 2,280 acres of lease COC54680. The current COC54608 lease contains 320 acres of the Wadge seam federal coal, which has been recovered. The proposed lease modification would add approximately 310 acres of the Wolf Creek seam to existing coal lease COC54608 for underground development and production of federal coal reserves, in accordance with applicable laws and regulations, including terms and conditions for protecting non-mineral resources. The lease modification would add 230 acres of unleased coal below the existing 320 acre boundary of COC54608, and 80 acres of unleased federal coal contiguous to lease COC54608 (see Maps 2, 3, 4, and 5) for a total of 310 acres of the Wolf Creek seam. Under the proposed action, the life of the current mine would be extended by approximately 1½-2 years.

PROPOSED LEASE MODIFICATION BOUNDARY



Legend

-  COC54608 PROPOSED LEASE MODIFICATION BOUNDARY
-  TWENTYMILE PERMIT BOUNDARY

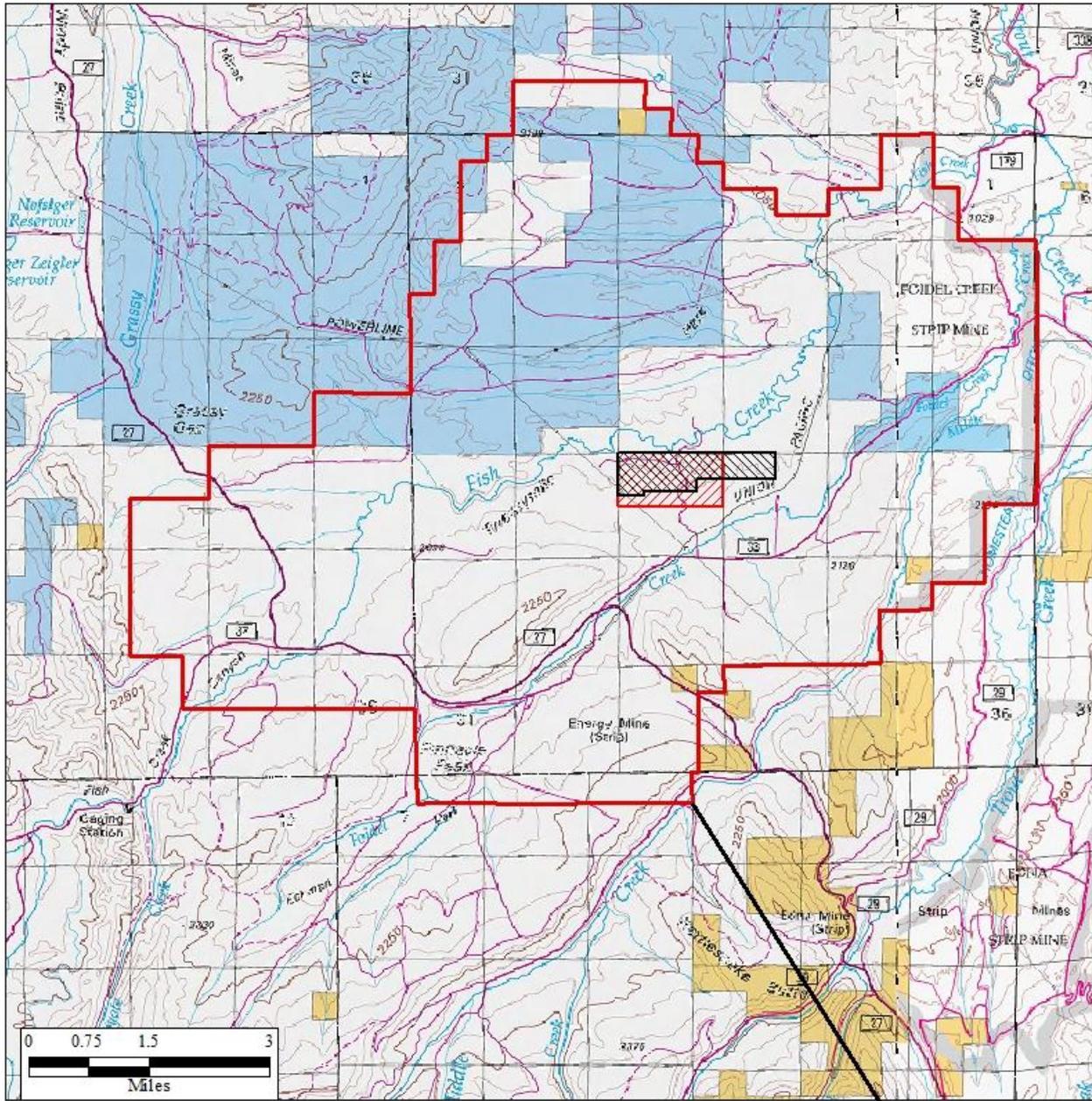


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MAP 4

OVERLAY OF EXISTING COC54608 LEASE WITH PROPOSED LEASE MODIFICATION BOUNDARY



Legend

-  COC54608 310 ACRE LEASE MODIFICATION BOUNDARY
-  COC54608 EXISTING LEASE BOUNDARY
-  TWENTY MILE PERMIT BOUNDARY



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MAP 5

Reasonably Foreseeable Mine Operations Plan

If the lease modification is approved, development of the coal resources of the Wolf Creek seam would occur in a similar manner as the current operations, using the existing surface facilities upon approval of a mine plan by DRMS. The Wolf Creek seam would be mined using a longwall. Mains and longwall panel gateroads would be developed using continuous miner units. A continuous miner unit would consist of a continuous miner, shuttle cars, roof bolter, belt feeder and conveyor belts. A longwall system would be used to mine the coal in the longwall panels (see Figure 1). A longwall system includes a shearer, face conveyor and shields. As the coal is sheared from the face, the face conveyor transports the coal to a crusher which dumps the crushed coal on to a conveyor belt. Additional conveyor belts transport the coal to the surface. Adding the lease modification would allow TC to maximize coal recovery by extending the length of the planned longwall panels.

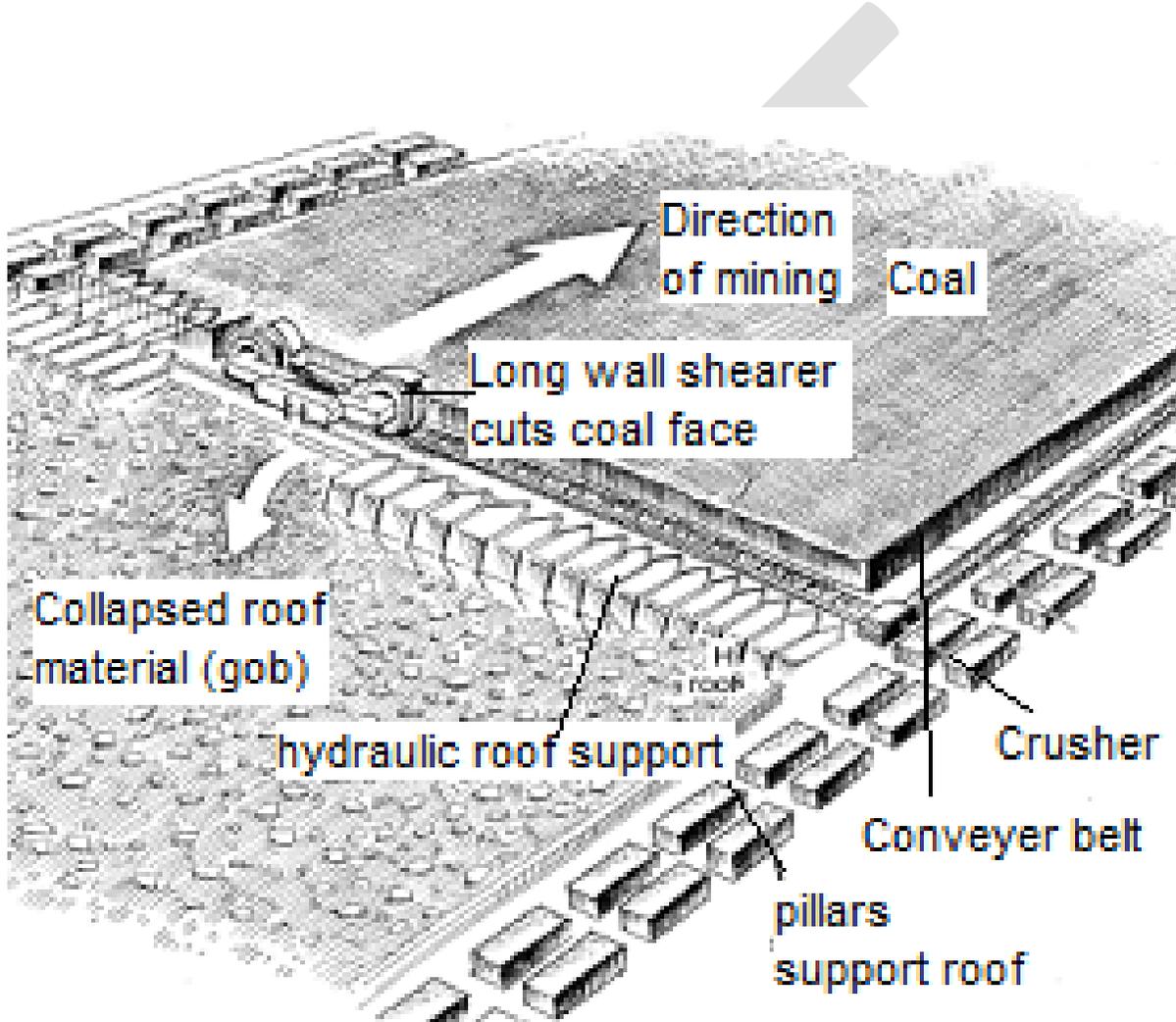


Figure 1
Schematic of Longwall Mining

There would be no new or additional surface facilities needed for the mining of the lease modification. There would be no surface mining; unsuitability criteria apply only to surface coal mining, not to underground mining.¹ All ventilation of the mine workings would be provided by existing fans. The existing belt conveyor would transport the coal to the existing Foidel Creek surface facilities. The lease modification would allow TC to continue operations by providing a logical extension to the mine's current Wadge and Wolf Creek seam operation. TC is using a 985 ft. long longwall to mine the Wadge seam and a similar longwall system would be used to mine the coal included in the lease modification. The panels would be mined in the same orientation as the Wadge seam (NE-SW). Portions of bleeder² entries and one panel would be in the proposed lease modification. Pillars would be left in place in the bleeders and full extraction of the coal would occur in the longwall block. Annual production from the mine (federal, private and state leases) would be approximately 5 million tons.

Controlled subsidence (i.e. the land surface lowered as a result of mining) would occur over the longwall panels. TC's maximum predicted subsidence above the longwall panels in the lease modification area would be 64 inches for overburden thickness of 1,000 feet. Subsidence monitoring above a previously mined longwall panel in the Wadge seam showed subsidence to be less than predicted. Mining of longwall panels has already occurred beneath Routt County Road 27, Union Pacific Railroad's Energy Spur, and the Archer-Hayden and Craig-Hayden-Steamboat Power Line. Subsidence from longwall mining has not interfered with the use of these structures.

2.1.2 No Action Alternative

The existing lease would not be modified. Approximately 340,000 tons of federal coal would be bypassed. The life of the mine would not be extended by 1½ - 2 years; production would end with depletion of the existing recoverable reserves. The mine workforce would be significantly reduced and the mine would be closed and reclaimed.

2.2 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

If an alternative is considered during the environmental analysis process, but the agency decides not to analyze the alternative in detail, the agency must identify those alternatives and briefly explain why they were eliminated from detailed analysis (40 CFR 1502.14). An alternative may be eliminated from detailed analysis if:

- It is ineffective (does not respond to the Purpose and Need for the Proposed Action);
- It is technically or economically infeasible (considering whether implementation of the alternative is likely, given past and current practice and technology);
- It is inconsistent with the basic policy objectives for the management of the area (such as, not in conformance with the Resource Management Plan [RMP]);
- Its implementation is remote or speculative;
- It would cause unreasonable environmental harm;
- It is substantially similar in design to an alternative that is analyzed; and/or
- It would result in substantially similar impacts to an alternative that is analyzed.

¹ CODE OF FEDERAL REGULATIONS 43 CFR § 3461.1

² Bleeders are entries surrounding an area being mined or which has been mined out. Bleeders are an MSHA requirement for ventilation in underground coal mines.

Alternatives specific to this EA that were considered, but that will not be analyzed in detail, are discussed below.

2.2.1 Alternatives Considered But Eliminated from Detailed Analysis

Methane Capture

Methane is released as a direct result of the physical process of coal extraction. Methane concentrations between 5-15% are explosive. Methane concentrations must be less than 1% to protect underground workers (30 CFR § 75.323). Underground coal mining techniques release methane previously trapped within the coal seam into the air supply of the mine as layers of the coal face are removed, thus creating a potential safety hazard. Methane emissions arise from the collapse of the surrounding rock strata after a section of the coal seam has been mined and the artificial roof and wall supports are removed as mining progresses to another section. The debris resulting from the collapse is known as gob and also releases methane or ‘gob gas’ into the mine.³

Coalbed methane or coal-mine methane (CMM) is a form of natural gas that can be extracted from coal beds. In recent decades it has become an important source of energy in many countries. An alternative that was considered but eliminated from detailed analysis is capturing the CMM from the mining of the additional 310 acres of the coal. This alternative was eliminated from analysis because it is technically infeasible and its implementation is remote or speculative. The obstacles include technical challenges, unresolved legal issues concerning ownership of the coalbed methane resource, power prices, and pipeline capacity, quantity of gas, and quality constraints.

Methane released from the worked coal face can be diluted and removed by large ventilation systems designed to move vast quantities of air through the mine. These systems dilute methane within the mine to concentrations below the explosive range of 5-15%, with a target for methane concentrations under 1%. The ventilation systems move the diluted methane out of the working areas of the mine into shafts leading to the surface. The methane removed from working mines via this technique is known as Ventilation Air Methane (VAM).³ The VAM is released through the ventilation shafts and released directly into the atmosphere. VAM has the lowest concentration levels of all forms of methane from coal seams because of its high exposure to air; often displaying levels of 0.05-0.8%.

To pre-empt the release of gob gas from post mining collapse, it is possible for vertical gob wells to be drilled directly into the coal seam’s surrounding strata before mining activities pass through that section. These pre-drilled wells can then remove the gob gas once the collapse takes place, thus avoiding the release of methane directly into the mine.

All of the methane from the 310 acre lease modification and from the mine can be vented through the mine ventilation system efficiently. TC does not use gob wells (gob vent boreholes) because the methane concentrations of the mine are low and can be vented through the existing mine ventilation system to keep concentrations within Mine Safety and Health Administration (MSHA) regulations. Additionally, a gob well would require surface disturbance, which would cause environmental impacts.

There is no surface disturbance associated with the proposed action. Currently, there are more than 1,000 underground coal mines in the U.S. There are presently only 15 coal mine methane recovery and utilization projects at active underground coal mines (Environmental Protection Agency (EPA)

³ <http://www.worldcoal.org/coal/coal-seam-methane/coal-mine-methane/>
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Coalbed Methane Outreach Program (CMOP), 2011). Twentymile Coal is not a gassy mine and was not identified as a candidate for methane recovery in the CMOP report. A 2012 study by Vessels Coal Gas Inc., in the Paonia to Somerset corridor evaluated the need for volumes on the order of 10,000,000 cubic feet per day of methane to justify the costs for gas treating and pipeline facilities that would be required to access commercial natural gas markets (DOI-BLM-CO-S050-2013-0010EA). The volume of methane from TC's main fan averaged 80,600 cubic feet of methane per 24 hour period for the first 8 months of 2014. TC's secondary fan averaged 3,500 cubic feet of methane per 24 hour period for the first 8 months of 2014.⁴

Practical constraints on commercial development of methane or natural gas in this area include the depth of the resource, the occurrence of the resource, resource quality and quantity, and limitations relative to effective resource development and production and the mine life. EPA's Identifying Opportunities for Methane Recovery at U.S. Coal Mines, Revised 2009 states:

“Life expectancy refers to the number of years left in the mine's plan for mining coal; it can be an important factor in determining whether a mine is a good candidate for a methane recovery and use project.” Prediction of mine life is difficult and speculative. Currently, Twentymile expects to mine for 5 more years. Mining of the Wolf Creek seam could extend the mine life an additional 5 years or more, but mine life is dependent on numerous factors, and can easily change. Mining of the 310 acre lease modification is estimated to occur over a 5 year period. With respect to resource quality and quantity, methane liberation and resulting concentrations from the Wolf Creek coal seam are low, and any methane released is further diluted by mine ventilation air, with the result that the concentration of any methane discharge from mining operations (as a component of ventilation exhaust air) is so low that it renders practical collection and concentration of the resource for sale and use infeasible. Even if collection and concentration were feasible, a network of collection pipelines, compressors and storage tanks would be necessary to collect, store, and transport the methane.

Since there is no gas transmission pipeline in the immediate area, the gas would have to be trucked from a central temporary storage point to either a pipeline transfer point or gas processing plant. A market for the gas would also have to exist. Only high quality gas (>95% methane) can be used for pipeline injection, if a pipeline existed. The economic viability of capturing the gas is limited due to the quantity and quality of the gas and the infrastructure required for distribution. Technologies for Ventilation Air Methane (VAM) Capture are still in the developmental stage and cost information is still limited (EPA CMOP, 2011).

Therefore, the implementation of methane capture is unlikely, given past and current practice and technology.

Methane Flaring

The alternative to flare the methane created by mining an additional 310 acres of the Wolf Creek coal seam was also considered and eliminated from detailed analysis. BLM determined it to be technically or economically infeasible and its implementation is remote and speculative.

The Environmental Protection Agency is currently sponsoring research and outreach efforts to coal mine operators to encourage coalbed and coal mine methane capture or flaring (refer to www.epa.gov/coalbed). The methodology for flaring methane emissions from underground coal mines is emerging, but remains technologically speculative at this time. In 2014, 20 methane flaring

⁴ Email from TC to BLM, 9/1/2014.
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projects were operating in 7 countries.⁵ The only methane flaring project in the U.S. is at a trona (soda ash) mine in Green River, Wyoming. The hazard that flaring could create relative to the potential for an underground ignition has not been clearly dismissed by current technology. MSHA does not have regulations that would govern this activity, but has expressed concerns relative to safety with respect to the potential for propagation of fire through methane drainage boreholes into underground mines. MSHA would not approve flaring without significant preliminary testing to assure the safety of the miners. There would also be an associated potential fire hazard where flammable brush, trees, or other vegetation exists in close proximity to the wellhead. The BLM does not have a policy governing flaring of gas from coal mining operations, so the issue of whether or not a gas lease would be required is unclear. These outstanding questions would have to be resolved if flaring is considered as an alternative to discharging methane into the atmosphere.

In addition, all of the methane from the 310 acre lease modification and from the mine can be vented through the mine ventilation system safely and efficiently. Twentymile does not use methane drainage wells because the methane concentrations are low and can be vented through the existing mine ventilation system to keep concentrations within Mine Safety and Health Administration (MSHA) regulations. Additionally, methane drainage wells would require surface disturbance, which would cause environmental impacts.

Flaring of methane would result in the release of other air pollutants, including nitrogen oxides, carbon dioxide, and carbon monoxide; these pollutants are regulated by the EPA for national ambient air quality standards. Methane is not a regulated gas. Therefore, the implementation of methane flaring is unlikely, given past and current practice and technology.

CHAPTER 3 – AFFECTED ENVIRONMENT AND EFFECTS

3.1 AFFECTED RESOURCES

The CEQ Regulations state that NEPA documents “must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail” (40 CFR 1500.1(b)). While many issues may arise during scoping, not all of the issues raised warrant analysis in an environmental assessment (EA). Issues will be analyzed if: 1) an analysis of the issue is necessary to make a reasoned choice between alternatives, or 2) if the issue is associated with a significant direct, indirect, or cumulative impact, or where analysis is necessary to determine the significance of the impacts. Table 1 lists the resources considered and the determination as to whether they require additional analysis.

Table 1. Resources and Determination of Need for Further Analysis

Determination ¹	Resource	Rationale for Determination
Physical Resources		
PI	Air Quality	See Chapter 3
NI	Floodplains	The proposed action does not alter the surface hydrology such that flood hazards are increased. If the stream channel grades are increased, the functionality of the floodplains could be altered.
PI	Hydrology, Ground	See Chapter 3

⁵ <http://www.epa.gov/cmop/docs/CMM-Flaring-Flyer-Sept-2014.pdf>
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Determination¹	Resource	Rationale for Determination
PI	Hydrology, Surface	See Chapter 3
NP	Minerals, Fluid	There are no fluid mineral authorizations within the proposed action.
PI	Minerals, Solid	See Chapter 3
NI	Soils	The proposed action would not affect soil resources.
PI	Water Quality, Ground	See Hydrology, Ground
PI	Water Quality, Surface	See Hydrology, Surface
Biological Resources		
NI	Invasive, Non-native Species	The proposed action would not result in any direct impact to invasive species on public land.
NI	Migratory Birds	Underground coal mining would not impact use of the surface by migratory birds. Any subsidence that occurs would not be enough modify habitat.
NI	Special Status Animal Species	There is no habitat for any ESA listed or proposed species in the lease modification boundary. The project area is within greater sage-grouse habitat; however, the project would not impact habitat or this species there would be no surface use or activity. Any subsidence that occurs would not be enough modify habitat.
NP	Special Status Plant Species	There are no federally listed threatened, endangered, or BLM sensitive plant species populations identified within the vicinity of the proposed project area.
NI	Upland Vegetation	No impacts are anticipated; there would be no new surface disturbance associated with the Proposed Action.
NI	Wetlands and Riparian Zones	There would be no mining and no subsidence below Foidel Creek or Fish Creek.
NI	Wildlife, Aquatic	Underground coal mining would not impact use of the surface by wildlife. Any subsidence that occurs would not be enough modify habitat.
NI	Wildlife, Terrestrial	Underground coal mining would not impact use of the surface by wildlife. Any subsidence that occurs would not be enough modify habitat.
NI	Wild Horses	The Sand Wash Herd Management Area is not near the project area.
Heritage Resources and the Human Environment		
PI	Cultural Resources	See Chapter 3
NI	Environmental Justice	According to Census 2013, the only minority population of note in the impact area is the Hispanic community of Routt County. Hispanic or Latino represented 7% of the population, considerably less the Colorado state figure for the same group, 21.0%. Blacks, American Indians, Asians and Pacific Islanders accounted for around 2% of the population, below the comparable state figure in all cases. The census counted 7.5% of the Routt County population as living in families with incomes below the poverty line, compared to 12.9% for the entire state. Both minority and low income populations are dispersed throughout the county therefore no minority or low income populations would suffer disproportionately high and adverse effects as a result of any of the alternatives.
PI	Hazardous or Solid Wastes	See Chapter 3

Determination¹	Resource	Rationale for Determination
NP	Lands with Wilderness Characteristics	Subject to WO-IM 2011-154 and in accordance with BLM policy, the proposed project area does not have any parcels that meet the minimum size requirements for inventory finding of the presence of lands with wilderness characteristics. Size requirements are based on whether parcels are within roadless areas greater than 5,000 acres or are directly adjacent to designated wilderness or WSAs.
NI	Native American Concerns	Based on available information, the proposed lease modification is not expected to affect areas or sites of concern to the Native American people who inhabited northwest Colorado in historic times (the Utes and the Shoshone). The lease modification is not within an area known to be of concern to the tribes, nor are sites known to be of concern to the tribes located on ground within the lease modification boundary. As discussed in the previous section on cultural resources, a prehistoric campsite was recorded within the bounds of the lease modification as 5RT177. No artifacts diagnostic of a particular prehistoric time period or cultural group were collected from the site. Based on the artifacts recovered, therefore, the site cannot be specifically and definitively attributed to the Utes or the Shoshone.
PI	Paleontological Resources	See Chapter 3
PI	Social and Economic Conditions	See Chapter 3
NI	Visual Resources	The majority of the proposed expansion occurs on private surface in areas that have already been modified including roads, oil and gas, and agricultural development. The area is managed as Class III. The proposed project area falls within the Williams Fork Unit. The Unit has a Scenic Quality rating of B. The Sensitivity Level Rating is Moderate Value because of some public interest, but limited public use. The project area is in the Foreground-Midleground zone.
Resource Uses		
NP	Access and Transportation	The proposed project would occur on private lands where there is no public access.
NP	Fire Management	No BLM surface is involved; therefore BLM fire management would not be impacted.
NP	Forest Management	This resource is not present in the project boundary.
NI	Livestock Operations	There would be no impact to surface livestock activities based on the nature of the Proposed Action and the limited amount of public lands being grazed within the lease area.
NP	Prime and Unique Farmlands	There are no Prime and Unique Farmlands in the project boundary.
NP	Realty Authorizations, Land Tenure	There are no ROW's in the proposed project area. There are no land tenure adjustments currently proposed in the area.
NP	Recreation	The proposed project area is located on private lands where there is no public access for recreational activities.
Special Designations		
NP	Areas of Critical Environmental Concern	The Irish Canyon ACEC is not in the vicinity of the proposed project area and, therefore, would not be affected by the proposed action(s).
NP	Wilderness Study Areas	There are no WSAs in the vicinity of the proposed project area and, therefore, would not be affected by the proposed action(s).
NP	Wild and Scenic Rivers	There are no eligible rivers in the vicinity of the proposed project area and, therefore, would not be affected by the proposed action(s).

¹ NP = Not present in the area impacted by the Proposed Action or Alternatives. NI = Present, but not affected to a degree that detailed analysis is required. PI = Present with potential for impact analyzed in detail in the EA.

3.1.1 Air Quality

Affected Environment

The Foidel Creek Mine is located in the central portion of Routt County, Colorado (Township 5 North, Range 86 West, and Township 5 North, Range 87 West), approximately 21 miles Southeast of Hayden, Colorado (population approx. 1,600), and south of State Highway 40 between the towns of Steamboat Springs to the east and Craig to the west. Topography in the project area and adjacent lands ranges in elevation from approximately 6,600 feet to 7,800 feet. The average elevation of the project area is approximately 7,040 feet. Terrain varies from rolling hills with agricultural fields and rangeland in the northwestern, central, and extreme southern extents of the project area to high ridges and steep slopes within the eastern and southwestern portions of the project area. The normal temperatures (min and max) for the area range from 4.8 to 29.1 °F in January to 46.9 to 83.7 °F in July. The regional average annual precipitation amounts to approximately 19.01 inches, which according to historical records shows the lower elevations receiving relatively higher precipitation amounts in summer, while the higher elevations receive relatively higher amounts of precipitation in winter. Average annual wind resultants are generally from the east south east at speeds of approximately 3.6 to 8.8 mph for a majority of the time.

The U.S. Environmental Protection Agency (EPA), as directed by the Clean Air Act (CAA), has established national ambient air quality standards (NAAQS) for criteria pollutants. Criteria pollutants are air contaminants that are commonly emitted from the majority of emissions sources and include carbon monoxide (CO), lead (Pb), sulfur dioxide (SO₂), particulate matter smaller than 10 and 2.5 microns (PM₁₀ and PM_{2.5}, respectively), ozone (O₃), and nitrogen dioxide (NO₂). Please note that ozone is generally not directly emitted from sources, but is chemically formed in the atmosphere via interactions of oxides of nitrogen (NO_x) and volatile organic compounds (VOCs) in the presence of sunlight and under certain meteorological conditions (NO_x and VOCs are ozone precursors). Exposure to air pollutant concentrations greater than the NAAQS has been shown to have a detrimental impact on human health and the environment. The EPA regularly reviews the NAAQS (every five years) to ensure that the latest science on health effects, risk assessment, and observable data such as hospital admissions are evaluated, and can revise any NAAQS if the data supports a revision. The current NAAQS levels are shown in Table 3.1 below. Ambient air quality standards must not be exceeded in areas where the general public has access.

The CAA established two types of NAAQS:

Primary standards: Primary standards set limits in order to protect public health, including the health of "sensitive" populations (such as asthmatics, children, and the elderly).

Secondary standards: Secondary standards set limits in order to protect public welfare, including protection against decreased visibility, and damage to animals, crops, vegetation, and buildings.

The EPA has delegated regulation of air quality to the State of Colorado (for approved State Implementation Plan (SIP) elements). The Colorado Department of Public Health and Environment (CDPHE), Air Pollution Control Division (APCD) administers Colorado's air quality control programs, and is responsible for enforcing the state's air pollution laws.

The CAA and the Federal Land Policy and Management Act of 1976 (FLPMA) require the BLM to ensure actions taken by the agency comply or provide for compliance with federal, state, tribal, and local air quality standards and regulations. FLPMA further directs the Secretary of the Interior to take any action necessary to prevent unnecessary or undue degradation of the lands [Section 302 (b)], and to manage the public lands "in a manner that will protect the quality of scientific, scenic,

historical, ecological, environmental, air and atmospheric, water resource, and archeological values” [Section 102 (a)(8)].

Table 2 Ambient Air Quality Standards

Pollutant [final rule citation]		Standard Type	Averaging Period	Level	Form
Carbon Monoxide [76 FR 54294, Aug 31, 2011]		Primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead [73 FR 66964, Nov 12, 2008]		Primary and secondary	Rolling 3-month average	0.15 µg/m ³	Not to be exceeded
Nitrogen Dioxide [75 FR 6474, Feb 9, 2010] [61 FR 52852, Oct 8, 1996]		Primary	1-hour	100 ppb	98th percentile, averaged over 3 years
		Primary and secondary	Annual	53 ppb	Annual mean
Ozone [73 FR 16436, Mar 27, 2008]		Primary and secondary	8-hour	0.075 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particulate Matter [73 FR 3086, Jan 15, 2013]	PM2.5	Primary	Annual	12 µg/m ³	Annual mean, averaged over 3 years
		Secondary	Annual	15 µg/m ³	Annual mean, averaged over 3 years
		Primary and secondary	24-hour	35 µg/m ³	98th percentile, averaged over 3 years
	PM10	Primary and secondary	24-hour	150 µg/m ³	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, Jun 22, 2010] Colorado (State Only) [38 FR 25678, Sept 14, 1973]		Primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Primary and Secondary	3-hour	267 ppb	Not to be exceeded in any 12 month period
		Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

Source: National – 40 CFR 50, Colorado – 5 CCR 1001-14.

µg/m³ = micrograms per cubic meter, ppb = parts per billion, ppm = parts per million.

Existing Regional Air Quality

Air quality for any area is generally influenced by the amount of pollutants that are released within the vicinity and up wind of that area, and can be highly dependent upon the contaminants’ chemical and physical properties. Additionally, an area’s topography or terrain (such as mountains and valleys) and weather (such as wind, temperature, air turbulence, air pressure, rainfall, and cloud cover) will have a direct bearing on how pollutants accumulate or disperse. Ambient air quality in the affected environment (i.e. compliance with the NAAQS) is demonstrated by monitoring for ground level atmospheric air pollutant concentrations. The APCD monitors ambient air quality at a number of locations throughout the state. The data is summarized by monitoring regions and CDPHE prepares an annual report ([Annual Air Quality Reports](#)) to inform the public about air quality trends within these regions. Similarly, several Federal Land Managers (FLMs) like the BLM, FS, and NPS, also monitor air quality for NAAQS and Air Quality Related Values (AQRVs) to meet organic act requirements. Table 3 below presents three years of monitoring data for criteria pollutants (with the exception of lead) for Routt (project location), Moffat, Rio Blanco, and Jackson Counties. The maximum monitoring value is presented where multiple monitors exist that monitor for the same pollutant within any single county. Concentrations are in units of the standard’s form (see the “Level” column in Table 2 above), with the exception of the ozone data, which is shown as the 4th highest 8-hour average. To compute the ozone design value (3 year average of the 4th highest 8-hour max), sum all three years of data (if available) and divide by three.

Table 3 Ambient Air Quality Monitoring Data

County	Pollutant	Standard	Monitored Values		
			2011	2012	2013
Jackson	CO	1-hour		0.2	0.2
Jackson	CO	8-hour		0.3	0.3
Jackson	NO2	1-hour	2	5	6
Jackson	O3	8-hour		0.059	0.064
Moffat	O3	8-hour	0.06	0.066	0.065
Rio Blanco	NO2	1-hour	23	19	24
Rio Blanco	O3	8-hour	0.073	0.069	0.091
Rio Blanco	PM2.5	24-hour	21.5	33.4	26.7
Rio Blanco	PM2.5	Annual	9.9	9.9	9.1
Routt	PM10	24-hour	79	93	77

Emissions Source Classifications & Regulatory Authority

Emissions sources are generally regulated according to their type and classification. Essentially all emissions sources fall into two broad categories, stationary and mobile. Stationary sources are generally non-moving, fixed-site producers of pollution such as power plants, chemical plants, oil refineries, manufacturing facilities, and other industrial facilities.

This source class can also cover certain types of portable sources (based on regulatory technicalities). Stationary facilities emit air pollutants via process vents or stacks (point sources) or by fugitive releases (emissions that do not pass through a process vent or stack). Stationary sources are also classified as major and minor. A major source is one that emits, or has the potential to emit, a regulated air pollutant in quantities above defined CAA thresholds.

Stationary sources that are not major are considered minor or area sources. Sources that take federally enforceable limits on production, consumption rates, or emissions to avoid major source status are called synthetic minors. The APCD has authority under their approved SIP to issue Air Permits for stationary sources of pollution in Colorado.

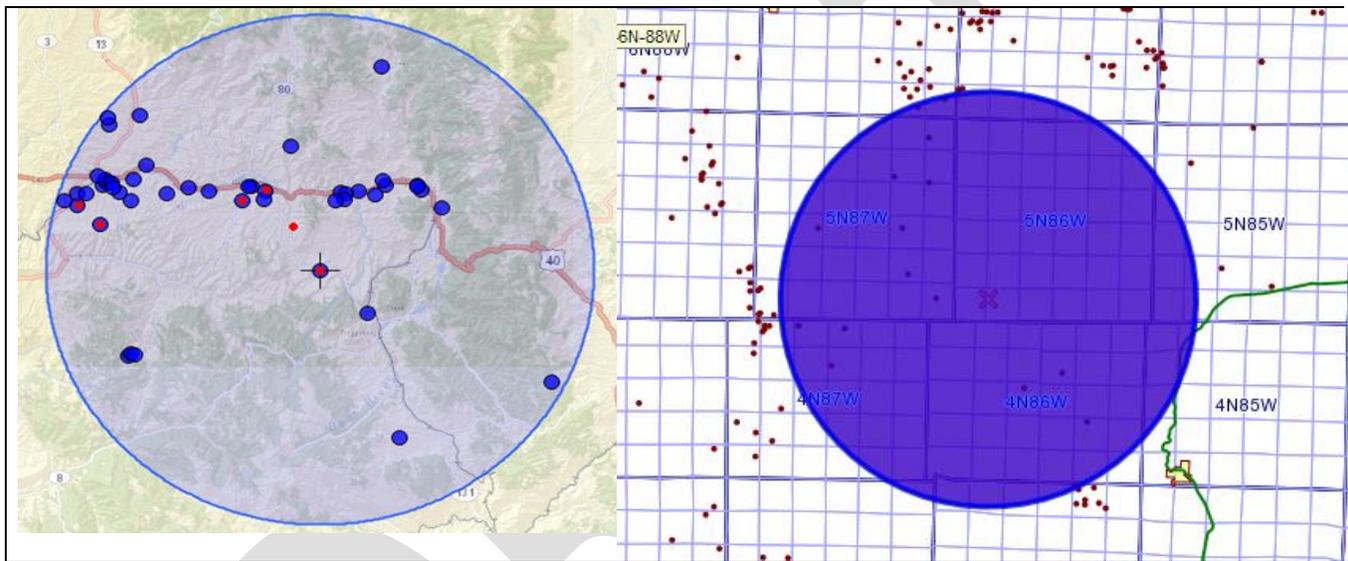
Mobile sources include any air pollution that is emitted by motor vehicles, engines, and equipment that can be moved from one location to another (typically under their own power). Due to the large number of sources, which includes cars, trucks, buses, locomotives, construction equipment, lawn and garden equipment, aircraft, watercraft, motorcycles, etc..., and their ability to move from one location to another, mobile sources are regulated differently than stationary sources. In general EPA and other federal entities retain authority to set emissions standards for these sources depending on their type (on-road or off-road) and class (light duty, heavy duty, horse power rating, weight, fuel types, etc...). Mobile sources are not regulated by the state (an exception being California) unless they are covered under an applicable SIP specific to a non-attainment or maintenance area requirement.

Table 4 below provides the most recent National Emissions Inventory (NEI) data for Routt County. As previously stated, air quality is generally a function of emissions loading within any particular region. With respect to the Foidel Creek Mine the following emissions inventories are provided to describe the affected environment in terms of current cumulative emissions intensities in Routt County.

Table 4, Routt County NEI Data (2011)

Routt	PM10	PM2.5	VOC	CO	NOX	SO2	CO2	CH4	N2O	NH3	HAPs
Agriculture	244.73	48.94	0	0	0	0	0	0	0	393.53	0
Biogenics	0	0	26,888.2	2,440.82	143.76	0	0	0	0	0	1,547.4
Commercial Cooking	21.74	20.16	2.8	8.09	0	0	0	0	0	0	1.09
Dust	5,766.67	817.51	0	0	0	0	0	0	0	0	0
Fires	1,061.99	899.32	2,500.61	10,657.19	118.3	71.6	110,221.91	514.06	0	173.81	218.89
Fuel Comb	131.63	127.89	119.54	1,095.08	6,453.77	2,163.19	0	0	0	31.28	22.94
Gas Stations	0	0	53.93	0	0	0	0	0	0	0	1.11
Industrial Processes	534.12	143.39	223.81	31.59	18.03	0.07	0	0	0	0	4.24
Miscellaneous	0	0	15.92	0	0	0	0	0	0	0	1.17
Mobile	70.93	61.82	604.48	5,046.19	1,030.94	7.89	185,391.59	16.1	6.32	10.27	153.83
Solvent	0	0	150.76	0	0	0	0	0	0	0	88.73
Waste Disposal	17.28	9.94	2.3	0.17	0.21	0.13	0	0	0	0.09	0.21
Sum Totals:	7,849.09	2,128.97	30,562.35	19,279.14	7,765.01	2,242.87	295,613.49	530.17	6.32	608.98	2,039.6

Figure 1, APCD PM₁₀ & PM_{2.5} Sources (50km buffer)¹ & COGCC Well locations (10km buffer)²



¹ 50km Buffer Map of PM₁₀ sources generated from the following APCD website: http://www.colorado.gov/airquality/ss_map_wm.aspx, Foidel Creek Mine located at crosshair in the center of the buffer area. **Note:** Blue dots indicate all permitted or APEN sources in APCD Database, red highlights are for sources emitting PM₁₀ > 85 percentile emissions for all APCD PM₁₀ (1,060 tpy) & PM_{2.5} (600 tpy) sources.

² 10km Buffer Map of Well Locations generated from the following COGCC website: <http://dnrwebcomapg.state.co.us/mg2010app/>, Foidel Creek Mine located at blue "X" in the center of the buffer area. **NOTE:** A well location does not necessarily mean an active well. Current O&G intensity within Routt Co. (2013) Oil = 61,510 bbl, Gas = 123,449 Mcf, Produced Water = 11,957 bbl

Criteria Pollutants

All the criteria pollutants shown in the NAAQS table above can be directly emitted by various stationary and mobile sources, with the exception of ground level ozone and secondary PM_{2.5} (also known as condensable particulate matter).

Ozone is chemically formed in the lower atmosphere via complex reactions of oxides of nitrogen (NO_x) and volatile organic compounds (VOCs) in the presence of sunlight and under certain meteorological conditions (NO_x and VOCs are Ozone precursors). In general, ozone concentrations in the lower atmosphere are highest during warmer months; however in some parts of the western U.S. high winter-time ozone concentrations have been monitored. These events have generally been linked to areas subject to temperature inversions and consistent snow cover. It is hypothesized that adequate snow cover (depth) effectively reflects UV radiation striking the ground, essentially

'doubling' the effective path length and potential reaction rates of any ozone forming region in the atmosphere relative to the total available UV reaching the surface. Ozone formation and prediction is complex, non-linear, and generally results from a combination of significant quantities of VOCs and NO_x emissions from various sources within a region. Once formed, ozone has the potential to be transported across long ranges. It is typically not appropriate to assess the potential ozone impacts that a single project (where increases in precursor emissions will occur) can have on regional ozone formation and transport.

According to the EPA fine particulate matter (PM_{2.5}) is chiefly comprised of five mass components: organic carbon, elemental carbon (also known as soot or black carbon), ammonium sulfates, ammonium nitrates, and crustal materials (i.e., soil). Primary fine particulate emissions result from combustion processes (including fossil fuel combustion and biomass combustion that occurs in wild fires) and include organic and black carbon. A minority component of primary PM_{2.5} is made up of crustal elements (i.e. fugitive dust, generally 5-15%). Condensable particulate matter, or secondary PM_{2.5} particles, are primarily ammonium sulfate and ammonium nitrate formed in the atmosphere from gaseous emissions of sulfur dioxide (SO₂) and oxides of nitrogen (NO_x), reacting with ammonia (NH₃). The largest constituents of fine particulate are usually organic mass, ammonium nitrates, and ammonium sulfates. Secondary particulates do not result from emissions of fugitive dust (which is the largest emissions category from the Foidel Creek Mine), and thus will not be discussed further in this document.

Hazardous Air Pollutants

Toxic air pollutants, also known as hazardous air pollutants (HAPs), are those pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. The majority of HAPs originate from stationary sources (factories, refineries, power plants) and mobile sources (e.g., cars, trucks, buses), as well as indoor sources (building materials and cleaning solvents). No ambient air quality standards exist for HAPs, instead emissions of these pollutants are regulated by a variety of laws that target the specific source category and industrial sectors for stationary, mobile, and product use/formulations. The majority of HAPs emitted from the Foidel Creek mine's operations are the result of the on-road and non-road vehicle use. The largest component of the HAPs emissions from these sources are typically various benzene compounds, and the majority of them are emitted from spark ignition (gasoline fueled) combustion sources. This is simply due to the fact that benzene is present in larger per cent volumes in the fuel (typically 1.0% vs. 0.05% for diesel fuel). The majority of the vehicle emissions (all the trucks for underground transportation, scoops, graders, etc.) and all the surface equipment (dozers, loader, graders) are from diesel powered engines, and thus HAP emissions from these sources are de minimis or insignificant.

Green House Gases

There is broad scientific consensus that humans are changing the chemical composition of Earth's atmosphere. Activities such as fossil fuel combustion, deforestation, and other changes in land use are resulting in the accumulation of trace greenhouse gases (GHGs) such as carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and several industrial gases in the Earth's atmosphere. An increase in GHG emissions is said to result in an increase in the earth's average surface temperature, primarily by trapping and thus decreasing the amount of heat energy radiated by the Earth back into space. The phenomenon is commonly referred to as global warming. Global warming is expected in turn, to affect weather patterns, average sea level, ocean acidification, chemical reaction rates, and precipitation rates, which is collectively referred to as climate change. The Intergovernmental Panel on Climate Change (IPCC) has predicted that the average global temperature rise between 1990 and 2100 could be as great as 5.8°C (10.4°F), which could have massive deleterious impacts on the

natural and human environments. However, according to the Intergovernmental Panel on Climate Change, the world's surface temperatures have risen at a slower rate over the past 15 years than at any time since 1951.⁶

Although GHG levels have varied for millennia (along with corresponding variations in climatic conditions), industrialization and the burning of fossil carbon fuel sources have caused GHG concentrations to increase measurably, from approximately 280 ppm in 1750 to 400 ppm in 2014 (as of April). The rate of change has also been increasing as more industrialization and population growth is occurring around the globe. This fact is demonstrated by data from the Mauna Loa CO₂ monitor in Hawaii that documents atmospheric concentrations of CO₂ going back to 1960, at which point the average annual CO₂ concentration was recorded at approximately 317 ppm. The record shows that approximately 70% of the increases in atmospheric CO₂ concentration since pre-industrial times occurred within the last 54 years.

Carbon dioxide is emitted from the combustion of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement). Methane is emitted during the production and transport of coal, natural gas, and oil. Methane also results from livestock and other agricultural practices and by the decay of organics in both the natural environment and from wastes in municipal landfills.

Nitrous oxide is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste. Fluorinated gases are powerful greenhouse gases that are emitted from a variety of industrial processes and are often used as substitutes for ozone-depleting substances (i.e., CFCs, HCFCs, and halons).

These gases all have various capacities to trap heat in the atmosphere, which are known as global warming potentials (GWPs). Carbon dioxide has a GWP of 1, and so for the purposes of analysis a GHG's GWP is generally standardized to a carbon dioxide equivalent (CO₂e), or the equivalent amount of CO₂ mass the GHG would represent.

As with the HAPs, ambient air quality standards do not exist for GHGs. In its Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act, the EPA determined that GHGs are air pollutants subject to regulation under the CAA. Under EPA's Mandatory Reporting Rule (74 FR 56260), Underground Coal Mines subject to the rule (i.e. emissions are above the reporting threshold) are required to report GHG emissions in accordance with the requirements of Subpart FF.

Air Quality and Prevention of Significant Deterioration (PSD)

Air quality for any given area (any geographical area that defines the class boundary) is designated as either attainment, or nonattainment. Attainment areas are those areas where criteria pollutant concentrations in ambient air do not exceed the NAAQS (or more stringent state standards) levels as outlined above. Areas or regions where criteria pollutant concentrations in ambient air exceed the NAAQS standards are designated as nonattainment. Additionally, two subset categories for attainment exist; for those areas where formal designations have not been made, i.e. Attainment/Unclassifiable (generally rural, or natural areas that lack sufficient air quality data), and for areas where previous violations of the NAAQS have been documented, but pollution concentrations no longer exceed NAAQS concentrations, i.e. Attainment/Maintenance areas. Routt County is designated as an attainment area for all NAAQS pollutants.

⁶ ClimateWire, October 7, 2014, *Research: Conflicting ocean studies renew a scientific argument over a warming 'pause'*
DOI-BLM-CO-N010-2014-0044-EA

Air sheds are also assigned a priority Class (I, II, or III) which describes how much degradation to the existing air quality is allowed to occur within the area under the Prevention of Significant Deterioration (PSD) regulations. Class I areas are areas of special national or regional natural, scenic, recreational, or historic value, and essentially allow very little degradation in air quality (i.e. National Parks, Wilderness Areas), while Class II areas allow for reasonable economic growth. There are currently no Class III areas defined in Colorado. The closest PSD Class I areas (which require the most stringent protection for air quality) are the Mount Zirkel and Flat Tops Wilderness Areas, located approximately 30 miles to the Northeast and 18 miles South of the proposed lease modification area, respectively.

Air Quality Related Values (AQRVs) are metrics for atmospheric phenomenon like visibility and deposition impacts that may adversely affect specific scenic, cultural, biological, physical, ecological, or recreational resources. Visibility changes can occur when excessive pollutant contaminants (mostly fine particles) scatter light such that the background scenery becomes hazy. Deposition can cause excess nutrient loading in native soils and acidification of the landscape, which can lead to declining buffering capacity changes in sensitive stream and lake water chemistries (commonly referred to as acid neutralization change (ANC)). Air pollutants are deposited by wet deposition (precipitation) and dry deposition (gravitational settling). The chemical components of wet deposition include sulfate (SO₄), nitrate (NO₃), and ammonium (NH₄); the chemical components of dry deposition include sulfate, sulfur dioxide (SO₂), nitrogen oxides (NO_x), nitrate, ammonium, and nitric acid (HNO₃). The NPS Technical Guidance on Assessing Impacts on Air Quality in NEPA and Planning Documents suggests that cumulative critical load values above 3 kg/ha-yr. (and lower in some sensitive areas) may result in moderate impacts to the landscape. AQRVs are important to FLMs because they have a mandate to ensure their Class I and sensitive Class II areas meet scientific (landscape nutrient loading) and congressionally mandated goals (i.e. regional haze). PSD sources (i.e. major sources under the CAA PSD definition) are required to provide an analysis to ensure their net emissions will not cause or contribute to a violation of any applicable NAAQS or PSD increment. In addition, the analysis required for permitting must include impacts to AQRVs. According to the most recent valid permit issued by CDPHE, the Foidel Creek Mine is not a major PSD source for any criteria pollutant.

Environmental Consequences of the Proposed Action

Direct and Indirect Effects of the Proposed Action

Implementation of the Proposed Action Alternative would result in emissions of criteria pollutants, hazardous air pollutants (HAPs), and greenhouse gases (GHGs). Fugitive particulate matter would be emitted when haul trucks and other vehicles associated with the mining activities travel on existing dirt roads or overland access routes to load-out locations. Emissions of particulate matter would be generated from processing equipment, material handling transfer points (including rail load-out locations), storage piles, and mine ventilation shafts. Air quality would also be impacted by fuel combustion sources, such as the engine exhaust emissions from locomotives, mobile material handling equipment, personnel transport equipment, and any stationary fuel combustion sources. Neither the proposed action nor the no action alternative would authorize emissions rates above those currently analyzed and authorized by CDPHE.

Direct Emissions

With the exception of particulate matter all of the directly emitted criteria pollutants originating from the mine's operations are from fuel combustion sources, such as mobile mining equipment, haul trucks, and stationary sources (emergency generators, light poles, heaters, etc...). HAPs and GHGs

are also emitted from fuel combustion sources, albeit in de minimis amounts. Coal Mine Methane (CMM) would also be emitted by the ventilation air handling system required by MSHA to reduce the combustion / explosion potential of the mines underground atmosphere (also known as Ventilation Air Methane or VAM). Twentymile Coal, LLC does not drill gob vent boreholes (GVB) for its long wall operations at the Foidel Creek Mine to vent methane due to the area's naturally low occurring presence of the gas in the coal formation, overburden, and surrounding strata. Furthermore, the mine does not possess or plan on obtaining MSHA permits to authorize GVB drilling at this time. VAM will be the only source of CMM emissions at the Foidel Creek Mine.

Stationary sources (including any area and fugitive emissions) at the Foidel Creek Mine are regulated by CDPHE where applicable and are authorized by APCD permit number 93RO1204. The permit provides limitations and requirements to limit potential emissions from the site to below major source thresholds for certain criteria pollutants. The Foidel Creek Mine is currently classified as a synthetic minor source for all criteria pollutants and would therefore not be subject to the PSD rule requirements for permitting at this time. When pollutants are not explicitly addressed in an APCD permit it is due to the fact that those emissions are below CDPHE's permitting thresholds, or in the case of GHG's, are not part of the minor source permitting program. The Foidel Creek Mine last had its air permit revised and issued by APCD on Jan. 12, 2012. As previously stated Twentymile Coal, LLC does not anticipate modifying their permit to accommodate any additional production rate increases that could be realized from the availability of additional coal reserves within the proposed lease modification area. According to the mine's most recent three years' worth of production data, they are operating well below their permitted production limits at approximately 60% of approved capacity (which means their actual emissions are also well below the permit levels). Stationary sources of direct emissions at the Foidel Creek Mine include the following:

- Material Handling Conveyors
- Mine Ventilation Shafts
- Internal Combustion Engines
- Fuel Storage Tanks
- Material Processing Screens (93RO1204)
- Material Processing Crushers (93RO1204)
- Surface Operations (fugitive PM)
- Misc. Facility Heating Equipment

Although methane is not a regulated volatile organic compound, recent analyses of CMM gas from other mines in Colorado, including the West Elk and Elk Creek mines in the North Fork Valley (Delta and Gunnison Counties), indicate that regulated volatile organic compounds make up a minor component of the CMM constituents, and these gases would be released as result of CMM venting. CDPHE, as the regulatory authority for such emissions, sent a letter to coal mines throughout the state requesting that mines provide data that would allow them to determine the status of each mine with respect to the state's VOC permitting thresholds. The status of the request and responses, and what data CDPHE might have, is unknown to BLM at this time.

HAP emissions from stationary sources are considered de minimis. For the purposes of disclosing impacts from the alternatives proposed, insufficient data and analysis exists (as stated above) to determine if any component of the ventilation air emissions would be considered a hazardous air pollutant. Any HAP emissions from VAM would most likely be a tiny fraction of the VOC component, and would not be significant enough to analyze. Of the sources identified above, only the fuel tanks, internal combustion engine, and miscellaneous heating equipment would generate

HAP emissions. Because of the limited use or the exempt status (CDPHE APEN and permitting) of the identified units, expected cumulative HAP emissions from these sources would be on the order of a few pounds per year, and therefore will not be analyzed any further in this document.

Mobile sources at the facility include underground mining equipment, listed under source classification code (SCC) 2270009010, aboveground construction equipment identified under SCC 2270002000, as well as light duty gasoline trucks and light and heavy duty diesel trucks. The underground mining mobile sources are specialized, industry specific equipment designed to function in the unique environment of an underground mine, while the aboveground sources would be typical heavy construction equipment used for material handling and stockpile management.

To provide quantifiable emissions estimates from the facility's mobile sources, BLM staff utilized EPA's Non-road model (2008a) to generate SCC specific emissions factors (grams per horsepower-hour) for Routt County based equipment inventories for the year 2005. The year 2005 inventory was chosen to match the inventory that was provided to CDPHE from the Sage Creek Mine's modeling report, which also included the Foidel Creek Mine equipment emissions. To estimate emissions from the sources, BLM staff had to determine a reasonable thermal efficiency (TE) for the diesel equipment in order to determine the total horsepower-hours the mine's annual fuel use would provide to the equipment. This was necessary because the annual fuel use was the only fleet specific variable the BLM had to estimate emissions. Appendix A contains a more thorough description of the basis for the calculations, example TE calculations, total horsepower-hours calculations, emissions factor selection, emissions calculations, and any applicable references used to support the mobile source emissions data in Table 3.4 below.

Foidel Creek Mine also uses light duty gasoline and diesel trucks (LDGT & LDDT) to ferry personnel, equipment, and supplies around the mine to conduct daily business. Peabody provided the annual fuel use (diesel and gasoline) for these sources, however BLM staff could not delineate the minor amount of diesel that would be consumed by the LDDT from the Heavy equipment use since no information was available to describe the LDDT fleet characteristics or annual vehicle miles travelled, and therefore no emissions estimates from these sources are provided. The analysis simply assumes that all of the diesel fuel is consumed in the heavy equipment, which would produce conservative emissions estimates based on their higher emissions rates.

Table 5, Direct Criteria and GHG Emissions from Stationary and Mobile Sources (tons)

Sources Types	PM ₁₀	PM _{2.5}	VOC	CO	NO _x	SO ₂	CO ₂	CH ₄	N ₂ O
Aggregates / Mine Vents (93RO1204)	55.07	17.88	NA	NA	NA	NA	NA	NA	NA
Fugitives (93RO1204)	105.27	14.95	NA	NA	NA	NA	NA	NA	NA
Fuel Storage Tanks (XA)	NA	NA	3.99 ^a	NA	NA	NA	NA	NA	NA
Emergency Generator	0.01	0.01	0.01	0.14	0.13	0.00	19.43	0.00	ND
Methane Sources (VAM)	NA	NA	ND	NA	NA	NA	19,666	936.46 ^b	NA
Mics.	0.08	0.20	0.32	2.97	5.15	0.20	4,952.48	0.08	0.04

Heating Equipment									
Underground & Surface Mining Equipment	8.08	7.83	13.17	53.57	59.64	0.04	4,481.08	0.20	0.11
Pick-ups (LDGT)	0.05	0.05	0.08	1.13	0.12	0.04	166.56	ND	ND
Total Direct Emissions	168.56	40.92	17.57	57.81	65.04	0.28	29,285.55	936.74	0.15

^a Emissions based on APEN exemption (XA) threshold in attainment area (< 2.0 tpy) x 2 tanks.

^b The CO₂e of the methane gas is approximately 19,666 tons and is shown in the row for informational purposes only. No CO₂ is emitted in the VAM itself.

Indirect Emissions

Electrical energy consumed at the site can reasonably be expected to produce emissions from the supplying source, unless that source is some form of renewable energy. It is possible to provide rough estimates of emissions resulting from mine electricity consumption if the annual energy consumption data is known. Reasonable emissions estimates can be made for some pollutants (NO_x, SO₂, CO₂, N₂O, & CH₄) by making use of EPA's Emissions & Generation Resource Integrated Database (eGRID). The eGRID tool is a comprehensive inventory of environmental attributes of electric power systems and is based on available plant-specific data for all U.S. electricity generating plants that provide power to the electric grid and report data to the U.S. government, including the following agencies: EPA, the Energy Information Administration (EIA), and the Federal Energy Regulatory Commission (FERC). Emissions data collected by EPA is integrated with generation data from EIA to produce useful values like pounds of emissions per megawatt-hour (lb/MWh), which allows direct comparison of the environmental attributes of electricity generation by state, U.S. total, company, and by three different sets of electric grid boundaries. Table 3.5 provides an estimate of indirect emissions for the mine's electrical consumption data for 2013. The most recent data available online (2010) suggests Colorado imports only 1-3% of its total electricity demand on an annual basis. For the practical purposes of this EA the BLM considers Colorado to be neither a net energy exporter, nor importer, and therefore all indirect emissions estimates from mine electricity consumption are based on Colorado source data.

Locomotive emissions from hauling the mined and processed coal are currently occurring in the proposed action area and would continue under the Proposed Action Alternative. It is estimated that 70% of all railroad traffic in the U.S. is dedicated to the transport of coal. Although this statistic may be appropriately applied to certain metropolitan statistical areas, it may not reflect actual rail traffic composition for Routt County. BLM could not locate any data to suggest otherwise, but to be conservative in our analysis an assumption was made that all rail emissions in Routt County are from coal hauling, and further, that all rail emissions are attributed to the Foidel Creek Mine's operations (although the Trapper Mine in Craig, Colorado, is also likely responsible for some of the coal hauling rail traffic). It is highly likely that emissions from this source class have been decreasing, and will continue to do so in the future, due to the implementation of new emissions standards for new and reconstructed locomotives (2000 and 2008). EPA estimates that the average useful life for these engines is 750k miles or 10 years, whichever occurs first, meaning that on average an engine is replaced or reconstructed every ten years and will have to comply with the most stringent emissions requirement applicable to the engine at that time.

Combustion of the mined and processed coal would produce all of the pollutants discussed above. According to U.S. EPA figures contained in the Draft US GHG Inventory Report (2012), nearly 95% percent of all coal consumed in the U.S. during 2010 was used in the generation of electric power. Because of this, it can reasonably be assumed that the coal from the Foidel Creek Mine would be shipped to a coal-fired power plant. It would be possible to provide an estimate of Criteria, HAP, and GHG emissions associated with the burning of the mined coal at a specific facility; however, the types and location of the facilities the coal might be processed and consumed in is speculative and not foreseeable. The contractual agreements between the coal fired power plant and the coal supply company are outside the scope of this analysis, and the BLM does not determine at which facilities the coal would be consumed. Additionally, different emissions control devices, firing practices, and the age/overall efficiency of any specific power plant could greatly affect the amount of Criteria, HAP and GHG emissions that are released into the atmosphere. For example, a power plant that is equipped with selective catalytic reduction or one with CO₂ capture would ultimately release much smaller quantities of NO_x and CO₂ than a power plant lacking such controls.

Even though the BLM cannot reasonably say where all of the coal produced within the lease modification would be consumed, it is still possible to do emissions calculations to estimate certain criteria and GHG emissions from the combustion of the coal. Just as the mines electrical consumption data can be utilized in concert with the eGRID data to produce emissions estimates, the same can be done for coal combustion for any production volume if the energy content of the coal is known or can be reasonably estimated. To produce these estimates BLM staff used eGRID data for state, regional, and national profiles to produce a worst case emissions scenario from the data.

Table 6 Indirect Criteria and GHG Emissions (tons)

Source ¹	PM ₁₀	PM _{2.5}	VOC	CO	NO _x	SO ₂	CO ₂	CH ₄	N ₂ O
Electricity Consumption	ND	ND	ND	ND	163	126	127,633	1.52	1.97
Rail Hauling ²	7.98	7.35	11.87	34.22	231.30	2.42	ND	ND	ND
Coal Combustion (State -CO)	ND	ND	ND	ND	26,606	22,936	19,043,480	219	319
Coal Combustion (Regional – WECC)	ND	ND	ND	ND	17,432	11,927	15,341,575	339	211
Coal Combustion (National)	ND	ND	ND	ND	14,679	34,863	16,459,945	322	244
Total Indirect Emissions (tons)³	7.98	7.35	11.87	34.22	27,000	34,991	19,171,113	341	321

¹ ND = No Data

² Emissions from 2011 EPA NEI Mobile – Locomotives Data for Routt County, CO. Assumes all emissions from Foidel Creek coal hauling.

³ Total Indirect Emissions include the worst case (highest emissions) scenario for coal combustion out of the 3 presented for each pollutant.

Air Quality Impacts

The Foidel Creek Mine is primarily a source of PM₁₀ emissions. PM₁₀ tends to be a localized pollutant where concentrations can vary considerably. A detailed air quality assessment, including modeling, of the mine was recently conducted to support APCD permitting of the Foidel Creek Mine at currently authorized production rates. The current APCD permit issued by the State authorizes up to 13.3 million tons of Run of the Mine (ROM) coal to be produced and processed annually. ROM coal includes any produced waste aggregates separated from the coal product that is sold from the mine.

A near field dispersion model (AERMOD), and a subsequent analysis conducted by CDPHE, was accomplished for the Foidel Creek Mine in May, 2010 and August, 2010, respectively. The modeling protocol was approved by CDPHE prior to running the model and simulated multiple operating scenarios and included a cumulative impact assessment by aggregating (ran as discrete sources within the domain) nearby facilities including: the Sage Creek Coal Mine⁷, Hayden Power Plant, Connell Pit, Routt County Landfill, Milner Landfill, and Mesa Gravel Pit. The modeled pollutants included stationary and fugitive sources of PM₁₀ and PM_{2.5}, as these are the primary pollutants of concern emitted from aggregate handling and mining operations, as well as CO and SO₂. The model did not predict any significant impact level exceedances to ambient air quality resulting from the Foidel Creek Mine's operations, and subsequently APCD issued the initial approval permit for the mine.

Given that: 1.) the BLM is not the regulatory authority authorizing the mine's emissions and enforcing applicable permit conditions, 2.) the proposed action does not authorize or anticipate an increase in emissions from the Foidel Creek Mine, and 3.) the mine does not meet the criteria for analysis under the PSD rules, the BLM will not be providing any additional analysis for any potential Class I area direct impacts (AQRVs) for the proposed action. Further, given the distance to the designated areas and the fact that fugitive dust (the majority of the PM₁₀ emissions) settles out quickly from entrained air, impacts to these areas are very unlikely.

With respect to potential ozone formation, the Foidel Creek Mine sources (including all of the diesel fired mobile sources) and associated processing equipment are not significant sources of VOC emissions (see earlier discussion on CMM VOC data limitations), the photochemical reactivity potential of methane in the troposphere is considered negligible (40 CFR § 51.100 (s)), and therefore the mines operations are not expected to contribute significantly to any regional ozone formation from its VOC emissions. The mine does emit a nontrivial amount of NO_x (the majority from mobile sources) on an annual basis, however the amount is not regionally significant compared to county emissions (< 1%). Given that the area is currently attaining the ozone standard, and the mine is not anticipating changes in operations that would affect its current emissions volumes, impacts to regional air quality are not expected to produce changes from the current levels.

As related to railway emissions, in March 2008, EPA finalized a three part program that will dramatically reduce emissions from diesel locomotives of all types -- line-haul, switch, and passenger rail. The rule will cut PM emissions from these engines by as much as 90 percent and NO_x emissions by as much as 80 percent when fully implemented. The rule sets new emission standards for existing locomotives when they are remanufactured--to take effect as soon as certified systems are available (as early as 2008). The rule also sets Tier 3 emission standards for newly-built locomotives, provisions for clean switch locomotives, and idle reduction requirements for new and remanufactured locomotives. Finally, the rule establishes long-term, Tier 4, standards for newly-

⁷ The Sage Creek Coal Mine has been idle since 2012.
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built engines based on the application of high-efficiency catalytic after treatment technology, beginning in 2015. Therefore it is reasonable to conclude that rail emission in Routt County going forward should continue to substantially decrease in the near future, and ultimately provide a benefit to the surrounding communities and environment.

Emissions from all the mobile sources at the site are not expected to impact regional air quality due to the fact that they are not significant in the context of the regional county emissions inventory and the fleet should have decreasing emissions as a whole in the future as changes are made to upgrade to newer equipment.

Methane emissions associated with the Foidel Creek Mine are anticipated to be very low when compared to other Colorado underground coal mines. The geology of the surrounding strata and composition of the coal itself produce very little emissions during longwall panel mining. As previously stated, no gob vent boreholes (GVB) would be drilled in advance of the mining to adequately provide for the health and safety of the miners, since emissions of any methane liberated are being adequately managed via the main vent fans at the facility. Methane emissions estimates are provided in the direct emissions table above (Table 3.5). The data represents what the mine reported to EPA (2103 emissions) under the Greenhouse Gas Reporting Rule.

According to the U.S. Global Change Research Program (2009), global warming is unequivocal, and the global warming that has occurred over the past 50 years is primarily human-caused.

Standardized protocols designed to measure factors that may contribute to climate change, and to quantify climatic impacts, are presently unavailable. As a consequence, impact assessment of specific impacts related to anthropogenic activities on global climate change cannot be accurately estimated. Moreover, specific levels of significance have not yet been established by regulatory agencies. Therefore, climate change analysis for the purpose of this environmental assessment within this air quality section is limited to accounting for GHG emissions changes that would contribute incrementally to climate change and disclosing the generally accepted changes that have been predicted regionally from global climate change modeling scenarios. Approximately 12.75 percent of U.S. emissions of methane come from coal mining activities (EPA 2012). Based upon the Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2012, and the Final Colorado Greenhouse Gas Inventory 2013 (Draft), the total coal mining related methane emissions (CMM) in 2012 and 2010 were 81.10 Tg (teragrams=one million metric tons), and 6.63Tg on a CO₂e basis for the US and Colorado, respectively. Estimated total CMM emissions from the Proposed Action are approximately 19,666 short tons of CO₂ equivalent (at current or 2013 production rates) or 0.022% and 0.27% of the total calculated CO₂ equivalent emissions of CMM from the U.S. and Colorado totals. Based on BLM's analysis, all of the GHG emissions from the Proposed Action (direct and indirect – which assumes all the mined coal from the lease modification is combusted) are equivalent to approximately 19.2 Tg on a CO₂e basis. This represents approximately 0.29% & 15.17% of all the gross GHG emissions (does not consider GHG sinks, i.e. “net emissions”) from the U.S. (2012 – 6,525.6Tg) and Colorado (2010 – 126.57Tg), respectively on an annualized basis. If the calculated GHG emissions were compared with the global figures (estimated 2010 CO₂ equivalent emissions of 46,000Tg (EPA 2013)⁸), the relative significance of the impact to the global scale of GHG emissions would be even further negligible.

Regardless of the accuracy of emission estimates, predicting the degree of impact any single emitter of GHGs may have on global climate change, or on the changes to biotic and abiotic systems that accompany climate change, is not possible at this time. As such, the controversy is to what extent GHG emissions resulting from continued mining may contribute to global climate change, as well as

⁸ <http://www.epa.gov/climatechange/science/indicators/ghg/global-ghg-emissions.html>
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the accompanying changes to natural systems cannot be adequately quantified. The degree to which any observable changes can, or would be attributable to the Proposed Action cannot be reasonably predicted at this time.

To provide some additional context, the EPA has recently modeled global climate change impacts from a model source emitting 20% more GHGs than a 1500MW coal-fired steam electric generating plant (approx. 14,132,586 metric tons per year of CO₂, 273.6 metric tons per year of nitrous oxide, and 136.8 metric tons per year of methane). It estimated a hypothetical maximum mean global temperature value increase resulting from such a project. The results ranged from 0.00022 and 0.00035 degrees Celsius occurring approximately 50 years after the facility begins operation. The modeled changes are extremely small, and any downsizing of these results from the global scale would produce greater uncertainty in the predictions. The EPA concluded that even assuming such an increase in temperature could be downscaled to a particular location, it "would be too small to physically measure or detect", see Letter from Robert J. Meyers, Principal Deputy Assistant Administrator, Office of Air and Radiation re: "Endangered Species Act and GHG Emitting Activities (Oct. 3, 2008). The project emissions are a fraction of the EPA's modeled source and are shorter in duration, and therefore it is reasonable to conclude that the project would have no measurable impact on the climate. Additionally, according to the Intergovernmental Panel on Climate Change, the world's surface temperatures have risen at a slower rate over the past 15 years than at any time since 1951.

With respect to GHG emissions, the following climate change predictions were identified by the EPA⁹ for Colorado:

- The region will experience warmer temperatures with less snowfall.
- Temperatures are expected to increase more in winter than in summer, more at night than in the day, and more in the mountains than at lower elevations.
- Earlier snowmelt means that peak stream flow will be earlier, weeks before the peak needs of ranchers, farmers, recreationalist, and others. In late summer, rivers, lakes, and reservoirs will be drier.
- More frequent, more severe, and possibly longer-lasting droughts will occur.
- Crop and livestock production patterns could shift northward; less soil moisture due to increased evaporation may increase irrigation needs.
- Drier conditions will reduce the range and health of ponderosa and lodge pole pine forests, and increase the susceptibility to fire.
- Grasslands and rangelands could expand into previously forested areas.
- Ecosystems will be stressed and wildlife such as the mountain line, black bear, long-nose sucker, marten, and bald eagle could be further stressed.

Environmental Consequences of the Proposed Action:

Cumulative Effects

The following actions within the region are known or are reasonably foreseeable.

- Potential Oil and Gas Lease Sales and Development
- Future Modifications of Sage Creek Mine (Exploration and LBAs)
- Future Modifications of Sage Creek Mine (Longwall)

⁹ <http://www.epa.gov/climatechange/impacts-adaptation/southwest.html>
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- Oil Shale Development

The lease modification decision for the Foidel Creek Mine would not authorize mining operations. The EA evaluates the potential impacts of mining the lease modification area, because mining is a logical consequence of issuing a lease for continued operation of the mine. The EA assesses the cumulative impact on the environment which results from the operation of the proposed lease modification when added to other past, present, and reasonably foreseeable future actions that would add to the anticipated impacts of the proposed action.

The site-specific impacts analyzed in this EA are based on the assumption that if the lease modification is issued, mining would proceed at the currently authorized production rate of 13.3 million tons per year.¹⁰ We further assume that the applicant would be the lessee and extraction of the coal resource would proceed in accordance with all current permit conditions. In addition, it is also assumed the mined coal would be sold to coal users in response to forecasts of demand for this coal. Historically these users have been electric utilities in the United States, although there is potential for sales outside the U.S. This coal market is open and competitive, and users can buy from the most cost effective suppliers that meet their needs.

Area Emissions

The cumulative impacts to air quality in the Foidel Creek Mine area would result primarily from emissions of PM, NO_x, and CO from the current and future mining of coal within the region. As previously stated, the long term plan for the Foidel Creek Mine is to gradually replace declines in production with those from the Sage Creek Mine such that mining intensity for the region should not increase above currently authorized and evaluated levels.

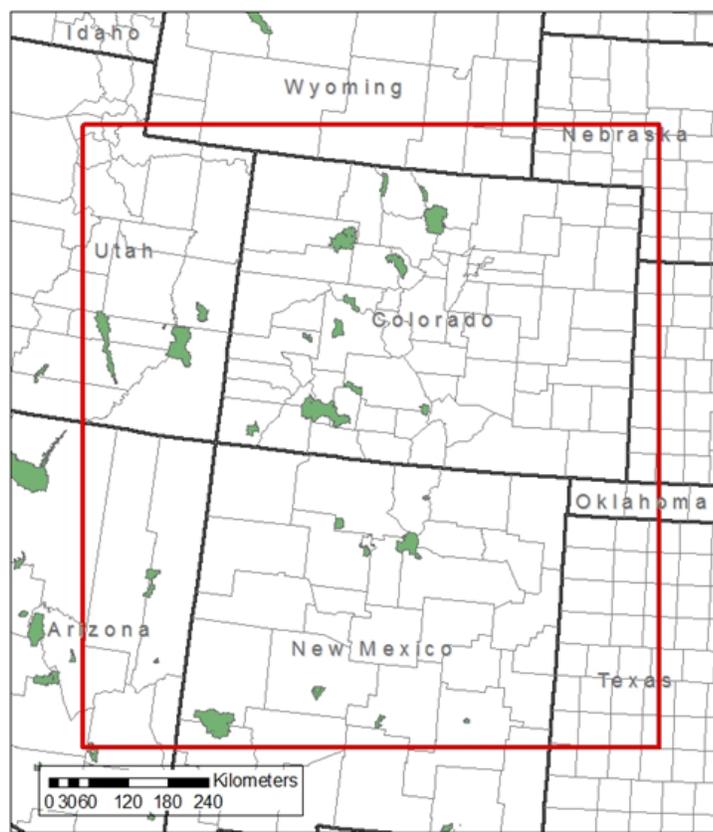
In consideration of disclosing cumulative impacts, the BLM has initiated the Colorado Air Resources Management Modeling Study (CARMMS). The study includes assessing statewide impacts of projected oil and gas development and mining (both federal and fee (i.e. private)) out to year 2021 for three development scenarios (oil and gas only - low, medium, and high). Projections for development are based on either the most recent FO Reasonably Foreseeable Development (RFD) document (high), or by projecting the current 5 year average development paces forward to 2021 (low). The medium scenario included the same well count projections as the high, but assumed restricted emissions, where the high and low assumed current development practices and on the books emissions controls and regulations (2012). The study is now complete, and available for public review on the BLM Colorado website at:

http://www.blm.gov/co/st/en/BLM_Information/nepa/air_quality.html. The model itself, CAMx, is a one atmosphere photo-chemical grid model and represents state of the science methodologies for modeling atmospheric chemistry and physics. Each FO or study area was modeled with the source apportionment option, meaning that incremental impacts to regional ozone and AQRVs from development in these areas are essentially tracked to better understand the significance of such development on impacted resources and populations. Mining emissions were modeled as their own source apportionment group, and thus those impacts are representative of all federal Colorado mines. The CARMMS project leverages the work completed by the West Jump Air Quality Modeling Study (WestJumpAQMS)¹¹, and the base model platform (and associated model performance metrics) and meteorology are based on those products (2008). There is far too much information about the CARMMS model and emissions inventory development to list or describe here, but readers are encouraged to read the full report at the website listed above.

¹⁰ Actual production averages 6-7 million tons per year.

¹¹ <http://www.wrapair2.org/WestJumpAQMS.aspx>

Figure 2, CARMMS Modeling Domain



Coordinates of 4km Domain:
 SW Corner: (-1260,-720) km
 NE Corner: (-396,216) km
 (nx,ny) = (216,234)
 Projection = Lambert Conformal
 parameters: (-97, 40, 33, 45)

Table 7, Selected Source Category Modeled Emissions (High Development Scenario) July 1st 2008 (i.e. the modeled year) in Tons per Day and as a Percent of the Total Modeled Emissions (anthropogenic only)

Source Group	NO _x	VOC	SO ₂	PM _{2.5}	NO _x	VOC	SO ₂	PM _{2.5}
Mining	2.53	0.16	0.03	19.12	0.13%	0.01%	0.01%	2.56%
LSFO O&G (fed)	5.54	12.70	0.04	0.20	0.29%	0.41%	0.02%	0.03%
Biogenics	324.00	6781.80	0.99	131.03	NA	NA	NA	NA
New Non-Fed O&G all BLM PAs	178.70	624.00	0.81	12.42	9.41%	20.12%	0.32%	1.66%
Existing O&G all BLM PAs	220.90	624.50	0.69	4.24	11.63%	20.14%	0.27%	0.57%
Remaining Anthropogenic	1244.70	825.40	239.50	698.42	65.54%	26.62%	93.51%	93.62%
Total Anthropogenic	1899.19	3100.67	256.12	745.99	100.00 %	100.00 %	100.00 %	100.00 %
Total Anthropogenic & Biogenic	2223.19	9882.47	257.11	877.02	NA	NA	NA	NA

Table 8, Visibility Impacts to Class 1 Areas & Special Class II Areas

Group Name	Class I Area Impacts				Class II Area Impacts			
	dv >0.5		dv >1.0		dv >0.5		dv >1.0	
	Max # of Days	Area Max Occurs	Max # of Days	Area Max Occurs	Max # of Days	Area Max Occurs	Max # of Days	Area Max Occurs
Mining	23	Flat Tops	3	Flat Tops	58	Dinosaur NM	26	Dinosaur NM
LSFO O&G (fed)	0	NA	0	NA	0	NA	0	NA
Natural Emissions	192	Bosque Little	142	Bosque Little	59	Greenhorn	29	West Elk
New Fed & Non-Fed O&G and Mining - all BLM PAs	344	Mesa Verde	254	Mesa Verde	347	Raggeds	145	Raggeds

Deciview (dv) thresholds of 0.5 & 1.0 from FLAG 2010 guidance (http://www.nature.nps.gov/air/pubs/pdf/flag/FLAG_2010.pdf)

NOTE: The dv thresholds above are for “Project” level analysis, and do not represent cumulative thresholds.

Table 9, Deposition Impacts to Class 1 Areas & Special Class II Areas

Nitrogen Deposition (average from all intersecting model grid cells)				
Group Name	Max @ any Class I area	Class I Area where Max occurred	Max @ any Class II area	Class II Area where Max occurred
Mining	0.0054	Mount Zirkel	0.0054	Mount Zirkel
LSFO O&G (fed)	0.0131	Mount Zirkel	0.0132	Mount Zirkel
New Fed & Non-Fed O&G and Mining - all BLM PAs	0.2564	Flat Tops	0.2424	White River
Natural Emissions	0.6178	Bandelier	0.1233	Spanish Peaks
All Modeled Sources	3.3371	Mount Zirkel	3.1981	Mount Zirkel
Sulfur Deposition (average from all intersecting model grid cells)				
Mining	0.0122	Mount Zirkel	0.0122	Mount Zirkel
LSFO O&G (fed)	0.0002	Mount Zirkel	0.0002	Mount Zirkel
New Fed & Non-Fed O&G and Mining - all BLM PAs	0.0213	Mount Zirkel	0.0209	Mount Zirkel
Natural Emissions	0.0183	Bandelier	0.0014	Spanish Peaks
All Modeled Sources	1.2246	Wheeler Peak	0.9729	Mount Zirkel

Project level Data Analysis Thresholds (DATs) are generally set at 0.005 kg/ha-yr, cumulative thresholds or critical loads vary from 1.5 – 3.0 kg/ha-yr, depending on the sensitivity of the resource.

Figure 3, Cumulative Predicted Ozone Concentrations (ppb) (Base – 2008 & High – 2021)

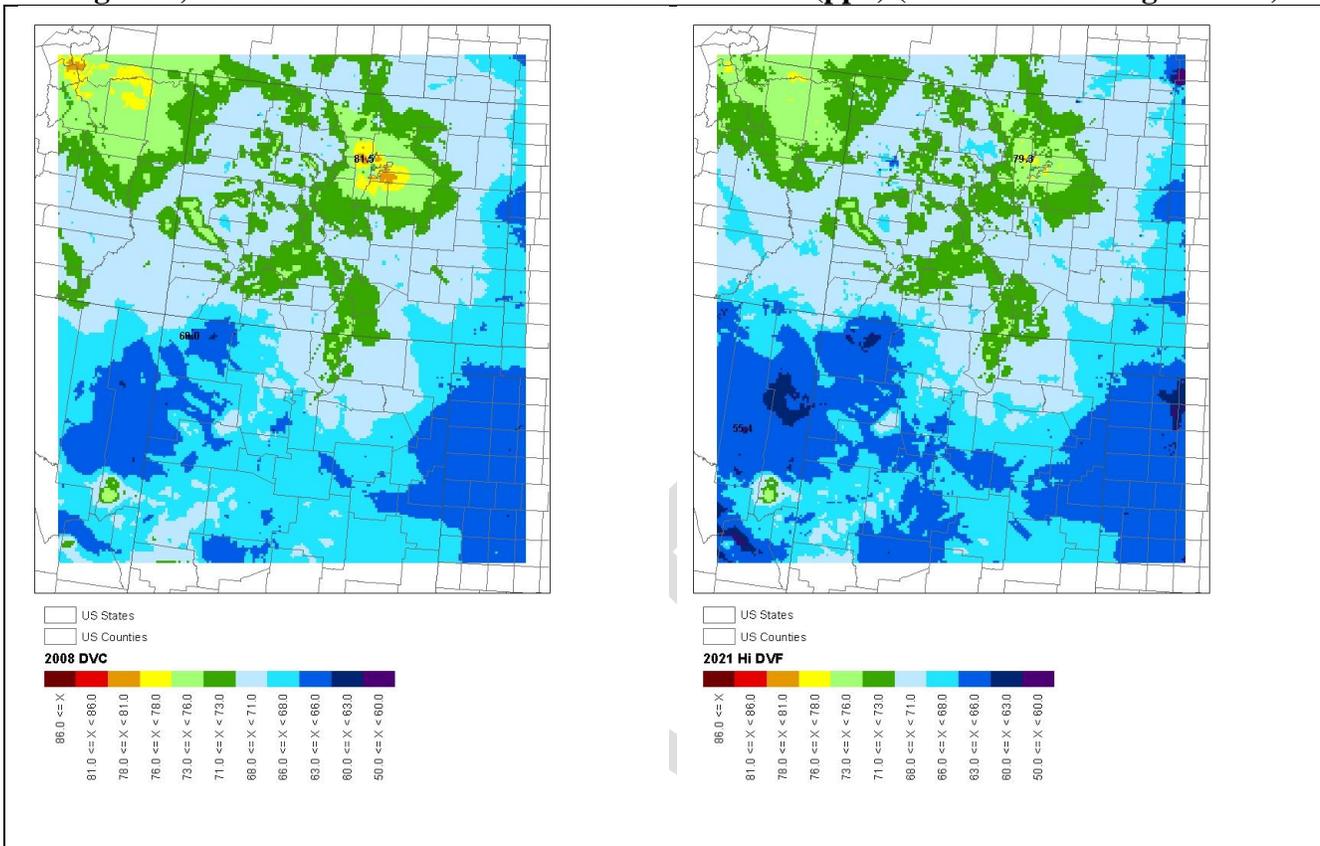
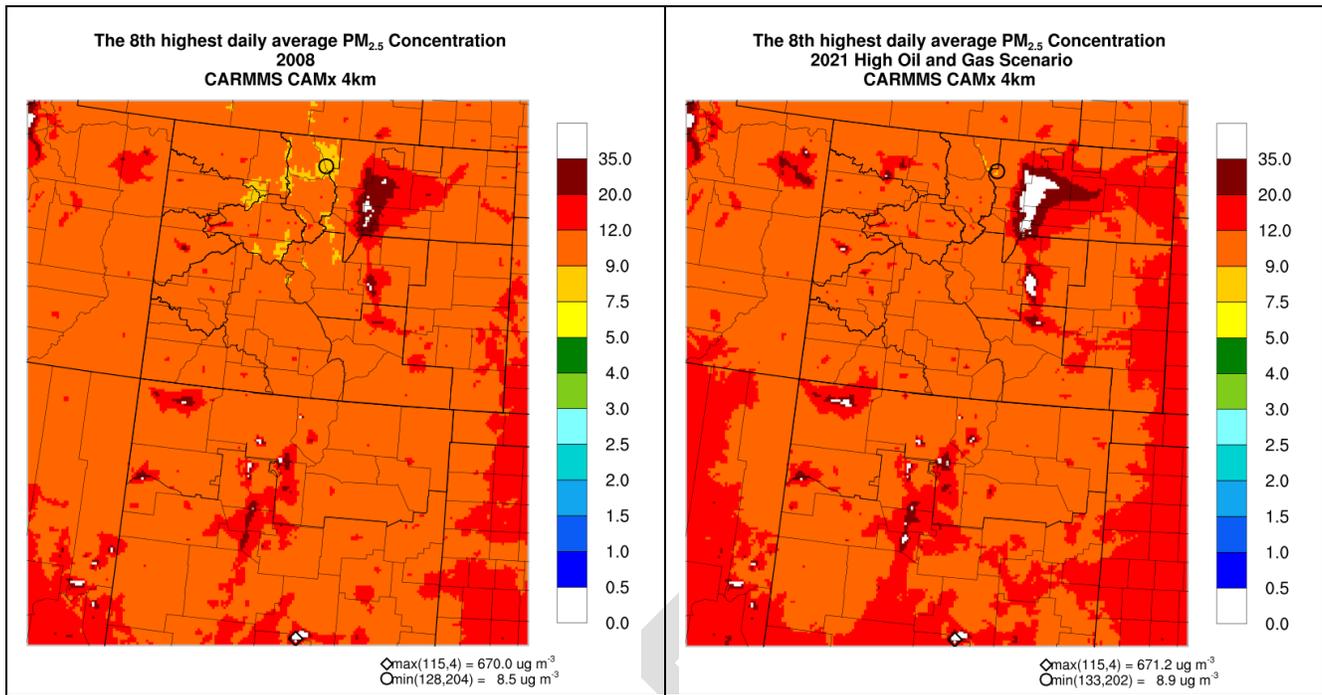


Table 10, Maximum contribution to the 4th high DMAX8 ozone (ppb) for the Selected Source Groups

Source Group	Ozone
Little Snake FO	1.0
Federal Mining in Colorado	0.9
New Federal O&G and Mining In Colorado	7.9
New Federal/Non-Federal O&G/Mining in CO/NM	8.4
Existing and New Fed/Non-Fed O&G in 4 km Domain	9.4
Natural Emissions	5.6

Figure 4, Cumulative Predicted PM_{2.5} Concentrations (µg/m³) (Base – 2008 & High – 2021)



With respect to actual oil and gas development, the BLM will address potential impacts from oil and gas development activities through the NEPA process when subsequent APD's are filed and operators will provide pertinent details of their proposals and operations such that BLM staff can evaluate the design features and assess any potential mitigation alternatives based on the project and cumulative impact projections. At the pre-lease or lease stage any assumptions on development would be highly speculative and would need to account on economic factors such as supply, demand, and the current and projected price of natural gas, among various other considerations. However, when APDs are received BLM would accomplish the analysis and include any applicable cumulative impacts from mine lease authorizations located within the region of influence of any well. A review of the COGCC database revealed a total of 30 producing, 10 located (not yet drilled), and 9 shut in wells for all of Routt County.

With respect to oil shale development, the technologies to extract this potential energy source are not yet proven, and therefore any future impacts (cumulatively or otherwise) associated with its development are too speculative to consider in this EA. However, the BLM recently prepared a Programmatic EIS¹² to address potential issues associated with oil shale development that may be beneficial to the reader. Project specific impacts from oil shale development would be evaluated when the economic viability of the resource is proven and reasonable alternatives for NEPA analysis can be developed.

Ultimately, any near or far field impacts from criteria or HAP emissions associated with coal combustion emissions sources will, or have already, received analysis (and most likely permitting) from their respective regulatory agencies. Therefore, this action should not cause or contribute to the likeliness, frequency, or increasing severity of any detrimental impacts in areas around those respective sources.

Climate Change

¹² <http://ostseis.anl.gov/documents/index.cfm>
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Climate change by nature is a cumulative process; the discussion of direct and indirect emissions relative to the current global GHG emissions rates and the projected impacts provided above is for all practical purposes is the same one that would be provided here, and therefore does not bear repeating. However, it is worth noting that sea level rise and ocean acidification (while not a regional concern) are a major cumulative concern that the proposed action would contribute toward, albeit insignificantly.

Environmental Consequences of the No Action Alternative:

Direct and Indirect Effects:

Under the No Action Alternative, the lease modification area would not be approved for leasing. Criteria, HAP, and GHG emission associated with the eventual mining of the proposed lease modification area at Foidel Creek Mine would not occur.

Cumulative Effects of the No Action Alternative

Under the No Action Alternative, mining of the lease modification area would not be permitted. No emissions (criteria, HAP, and GHG) from resource extraction would occur. Mining would continue until the remaining reserves are depleted, as would emissions at or below currently authorized rates. In all likelihood the impacts associated with climate change from the global accumulation of GHG in Earth's atmosphere would still occur.

Mitigation

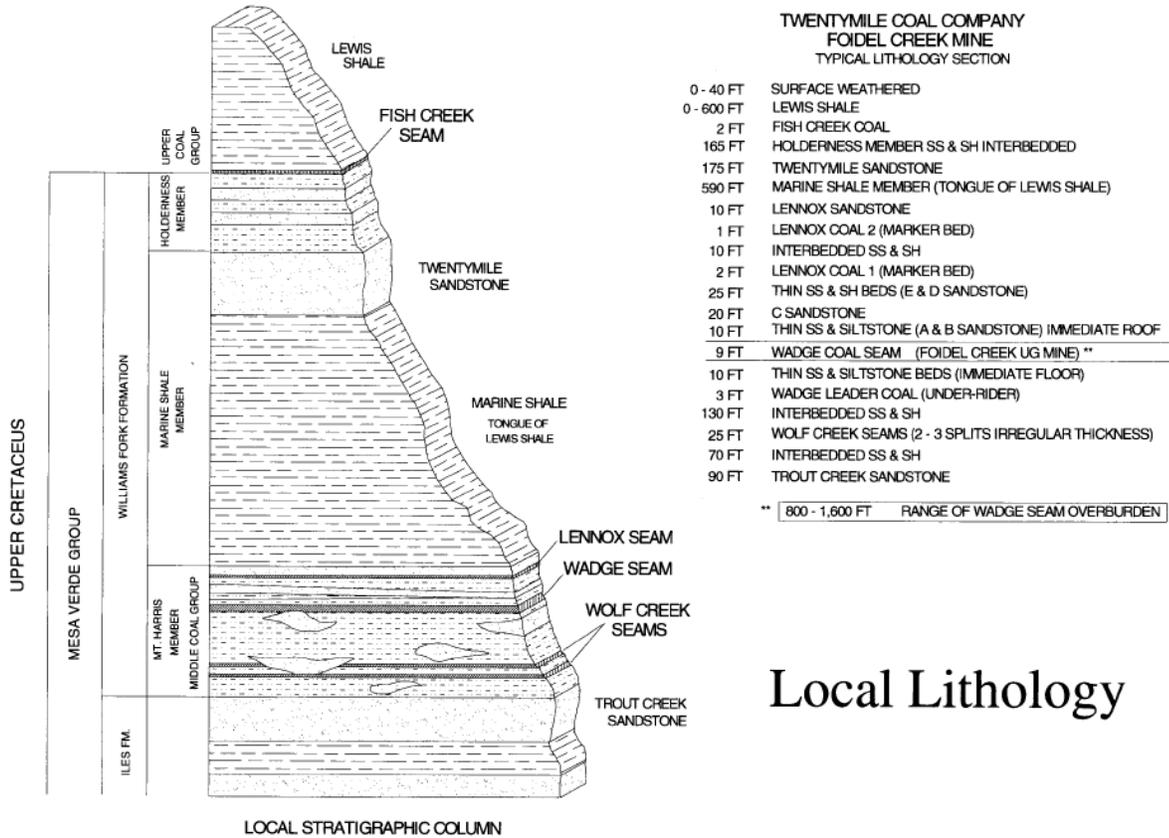
No additional mitigation is required. It is assumed the facility would continue to comply with their APCD issued air emissions permit provisions, and any other regulatory requirements the facility is subject to, now or in the near future (GHG emissions reductions, methane capture, New Source Performance Standards, etc...).

With regard to production activities at the mine, methane liberation from the mine may be reduced through mine planning, sealing previously mined areas, and degasification efforts. Although no dedicated methane drainage system (i.e. GVB drainage wells) would be employed at the mine due to the inherently low levels of methane originating from the overburden and mine itself, VAM controls could still be considered by the mine in light of the future expansion of operations currently being considered by the mine owner for the adjacent Sage Creek Mine, which would utilize the Foidel Creek Mine's surface facilities and main vents for its operations.

The BLM recently announced that it was seeking public comment on a possible rulemaking that could reduce the waste of methane from mining operations on public lands. Any final rule making may subject future actions at the mine to additional requirements.

3.1.2 Minerals, Solid

Affected Environment: The proposed action area lies within the Twentymile Park on the southeast tip of the Yampa Coal Field of the Green River Region. Twentymile Park is a structural and topographic basin. The Wolf Creek Seam is in the 75 million year old Upper Cretaceous Mesaverde Group. This sedimentary sequence was deposited in offshore, shallow, and near-marine environments at the western edge of an epeiric seaway. Coal lease COC54608 is the only solid mineral authorization within the area of the proposed action. The lease modification would add 310 acres of the Wolf Creek coal seam to existing lease COC54608. The Wolf Creek seam is below the Wadge seam, which has been mined by TC. The interburden between the two seams is 100-170 feet. The overburden ranges from 1,250- 1,500 feet. The Wolf Creek coal seam thickness ranges from 7.5 – 10 ft. thick.



Local Lithology

Figure 5

Environmental Consequences of the Proposed Action:

Direct and Indirect Effects: The proposed action would result in removal of the recoverable portions of the Wolf Creek coal seam within the lease modification boundary by underground longwall techniques. TC anticipates mining the 340,000 tons in the lease modification over a 1½-2 years period.

Indirect effects to solid mineral resources would include controlled subsidence over the mined longwall areas. Subsidence would be uniform over broad areas. Strata would subside as a block and retain their internal structure. Subsidence under power lines, County Road 27, Foidel and Fish Creek, and the Union Pacific railroad has occurred with no effect to the systems. The TC Foidel Creek mine plan predicts maximum subsidence ranging from 3-6 feet in the longwall panels. Previously predicted subsidence has been greater than recorded subsidence.¹³ Ninety-five to 98 percent of subsidence from longwall mining occurs during active mining. Long-term subsidence effects are not expected with longwall mining since such effects occur in a fairly short time. Except for the removal of the coal bed, the overall nature of the solid mineral resources of the area would not change. The proposed action constitutes 0.11% of the 623,860 acres of the Little Snake coal planning area.

¹³ CDRMS Permit C-1982-056, Exhibit 7
DOI-BLM-CO-N010-2014-0044-EA

Cumulative Effects: The BLM does not authorize mining by issuing a lease modification for federal coal, but the impacts of mining the coal are considered in the cumulative impacts summary because it is a logical consequence of issuing a lease modification.

Past coal mining in the area includes the surface Energy Strip #1, the surface Yoast Mine, the surface Seneca I, Seneca II, and Seneca IIW Mines, the surface Johnson, the surface Commander Strip #1 and #3, the surface Fish, the surface Linholm, the underground Mt. Harris Mine and the surface Edna Mine. Reclamation of the Seneca II, Seneca IIW, and Yoast Mines will continue. TC has mined coal using underground methods at the Foidel Creek Mine since 1983. Approximately 100 million tons of coal has been mined at the Foidel Creek Mine. Currently, Foidel Creek is the only active coal mine in Routt County. There are approximately 5-7 more years of mining left at Foidel Creek Mine. The 2006 Colorado Geological Survey estimated the remaining coal reserves in the Green River Coal Region to be 23,263 million tons. Mining the 340,000 tons would reduce the Green River Coal Region reserve by 0.0009%. Peabody Sage Creek Mining's permit borders TC Foidel Creek Mine permit to the northwest. The Sage Creek Mine is currently idled.

There are two permitted private sand and gravel operations in T6N, R85W and two permitted private sand and gravel operations in T6N, R86W. These sand and gravel operation permits total 300 acres.

Reasonably foreseeable future actions include: The continued mining at Twentymile Coal Foidel Creek Mine for approximately 5- 7 more years. Sage Creek Mining was issued a 400 acre lease effective October 1, 2012. Mining began at Sage Creek in May of 2012, but is now temporarily halted until market conditions improve. Reclamation of past surface mining would continue. Mining of sand and gravel would continue.

Environmental Consequences of the No Action Alternative:

Direct and Indirect Effects: The 340,000 tons of recoverable coal would not be recovered. Denying the lease modification would reduce recovery of coal resources on adjoining leases due the configuration of the longwall panels and not being able to extend the panels as far if the lease modification were approved. It is unlikely these coal reserves would be recovered at a future time since there is no logical competitive interest based upon the patchwork of coal ownership. The lease modification would allow a continuum of an existing mining block and would not represent an economic venture based on a stand-alone development of the property. The only logical access is from the applicants existing operation and adjacent leases.

Cumulative Effects: None.

Mitigation: None.

3.1.3 Cultural Resources

Affected Environment:

A number of laws mandate that federal agencies consider the effect of proposed land use activities on cultural resources (i.e. historic and archaeological sites). The National Environmental Policy Act states that it is the responsibility of the federal government to preserve important historic and cultural aspects of the national heritage. The National Historic Preservation Act (NHPA) requires federal agencies to take into account the effect of federal undertakings (such as coal leasing) on cultural resources that are eligible for inclusion in the National Register of Historic Places (National Register). In Colorado, the requirements of the NHPA are implemented under the terms of the

Protocol Agreement between the Bureau of Land Management and the State Historic Preservation Officer.

Historic and archaeological sites present in the lease modification area have been recorded during a number of cultural resource inventories that together have provided a fairly thorough, although not 100 percent, coverage of the lease modification area. A majority of the ground surface in the proposed lease modification area has been inventoried for cultural resources. A cultural resource inventory of a large tract of land for a previous coal lease covered the eastern half of the lease modification area (Zier 1979). Many small-scale inventories have taken place in the western half of the lease modification and are fairly evenly distributed across the area. Three sites are recorded within or adjacent to the lease modification boundary.

5RT3259 A segment of a railroad spur within the lease modification was recorded as 5RT3259 and was determined to be not eligible to the National Register. In 1962, the so-called Energy Spur was built from the main east-west railroad along the Yampa River near Milner, Colorado to the Twentymile coal mine loadout facility in order to transport coal from northwest Colorado. The main rail line along the Yampa follows the route of the so-called Moffat Road, which was founded in 1902 and, in 1913, connected Craig, Colorado with the then existing railroad. In 1947, the rail line became the Denver and Rio Grande Western Railroad. The 103-mile section between Craig and Bond, Colorado on the Colorado River connected the Yampa Valley with a main east-west railway across Colorado and was essential to the coal and livestock industries in the northwestern portion of the state. The Denver and Rio Grande Western Railroad is recorded as 5RT1396 and has been determined to be eligible to the National Register. The Energy Spur, however, has been determined to not contribute to the eligibility of the main lines of the Denver and Rio Grande Western.

5RT921 This site is a section of an irrigation ditch that is not eligible to the National Register. The ditch is situated south of Fish Creek, which flows generally to the east. The beginning and end of the ditch are outside of the area inventoried for historic sites. The site recorders suspect that the ditch transported water from a headgate on Fish Creek (apparently located to the west of the recorded segment of the ditch) eastward to a reservoir built on a tributary of Fish Creek. The reservoir is east of the recorded segment of the ditch and appears on the Milner, Colorado 7.5' USGS quadrangle. Likely the water would have been used for agricultural purposes, such as watering hay fields.

5RT177 An archaeological site recorded as 5RT177 is a campsite that has been determined by SHPO to be in need of more information in order to determine its eligibility to the National Register. The site is represented by a sparse scatter of surface artifacts occurring along a tributary of Foidel Creek. Artifacts observed on the surface include a number of waste flakes, a retouched flake, a point tip that is not diagnostic of a particular time period, two manos, and one grinding slab.

Environmental Consequences of the Proposed Action:

Direct and Indirect Effects: The proposed action is not expected to pose direct effects to cultural resources. Subsidence that could be caused by underground mining of the Wolf Creek Seam is not anticipated to affect cultural resources. Outcrops of the cliff-forming Twentymile Sandstone occur southwest of the lease modification area. Coal mine subsidence is known to cause formation of joints and to produce rockfalls along cliffs formed by the Twentymile Sandstone. This can in turn adversely affect rock art and rockshelters. Because no cliffs of Twentymile Sandstone are present within the lease modification area, subsidence would not affect any unrecorded rock art or rockshelter sites. The subsidence that could occur if the proposed action is approved is the potential lowering in elevation of the ground surface after the coal seam is mined. The seam measures at most

11 feet in thickness in the area beneath the lease modification, therefore, the elevation of the terrain above the lease modification area may decrease by this amount. However, the existing topography is expected to remain intact. Formation of cracks in areas covered by Quaternary and Recent sediment is not expected to occur as the ground subsides. Thus, subsidence is not expected to affect the irrigation ditch, railroad, and prehistoric campsite present within the boundary of the lease modification area.

Approval of the lease modification is also not expected to cause indirect effects to cultural resources. Indirect effects include such things as increased vandalism to historic sites and surface collecting of archaeological sites that can occur when a permitted undertaking improves public access into an area via construction of roads, for example. The cultural resources described above are located on land that is privately owned with no public access.

Cumulative Effects: Permitting of the lease modification is not expected to have significant cumulative effects on cultural resources. Past underground and surface mining of coal in northwest Colorado has primarily affected archaeological sites. Excavations or some other activity intended to mitigate damage or destruction of archaeological sites can retrieve the information about prehistory that makes the site important. Activities related to coal mining in the past have impacted archaeological sites in northwest Colorado, but the cumulative effect of past leasing has not resulted in the destruction of so many sites that the ability of archaeologists to improve understanding of prehistory has been curtailed. Mitigation of the adverse effects of coal mining on archaeological sites through large-scale excavation of the sites has actually contributed much to what is currently known about northwest Colorado prehistory.

Environmental Consequences of the No Action Alternative:

Direct and Indirect Effects: The No Action Alternative would not have direct or indirect effects on cultural resources.

Cumulative Effects: The no action alternative would not cause negative cumulative effects on cultural resources (destruction of a non-renewable resource), nor would the no action alternative result in the positive cumulative effects of an improved knowledge of prehistory that excavation of sites prior to destruction would provide.

Mitigation: None.

3.1.4 Paleontological Resources

Affected Environment: The affected environment is the 310 lease modification area.

The BLM has implemented a Potential Fossil Yield Classification (PFYC) system for classifying paleontological resources on public lands. Under the PFYC system, geologic units are classified from Class 1 to Class 5 based on the relative abundance of vertebrate fossils or uncommon invertebrate or plant fossils and their sensitivity to adverse impacts. A higher classification number indicates a higher fossil yield potential and greater sensitivity to adverse impacts. The project area contains portions of geological formations known to produce a range of fossils, from PFYC 3 (moderate potential) to PFYC 5 (high potential). Bedrock outcrops would be the most sensitive to adverse impacts. There is no bedrock on the surface of the proposed lease modification. Within the lease modification area, the surface is the Cretaceous Iles Formation (PFYC 3) formation.

Environmental Consequences of the Proposed Action:

Direct and Indirect Effects: Mining of the coal could create the potential for scientifically significant fossils to be found within the roof, floor, or coal of the Wolf Creek seam. If such fossils are found,

the information gained would be a beneficial impact to the science of paleontology. Scientifically significant fossils that may be inadvertently destroyed or not reported and curated would be an adverse impact due to the loss of paleontological information.

Cumulative Effects: The cumulative effects analysis area includes the existing TC Foidel Creek Mine leases and permit area. The proposed lease modification in addition to other uses in the area could incrementally add to the general erosion of the area. Erosion could cause exposure of fossil resources. Continued human activity in the area could uncover scientifically significant fossils and add to existing information of the area. Scientifically significant fossils could be destroyed either inadvertently or if unauthorized collection occurs.

Environmental Consequences of the No Action Alternative:

Direct and Indirect Effects: Fossils would not be destroyed as a result of mining. Potentially scientifically significant fossils would not be discovered.

Cumulative Effects: None

Mitigation: None

3.1.5 Hazardous or Solid Wastes

Affected Environment: There are no known hazardous waste sites within the proposed lease modification area. If production occurs in the lease modification area, petroleum products and solvents would be used as part of the general mining operations. Use of these products would comply with all applicable state and federal regulations, as described in this section.

Mining operations at TC must comply with regulations promulgated under the Resource Conservation and Recovery Act, Federal Water Pollution Control Act (Clean Water Act), Safe Drinking Water Act, Toxic Substances Control Act, Mine Safety and Health Act, Department of Transportation, and the federal CAA. Mining operations must also comply with all state rules and regulations relating to hazardous material reporting, transportation, management, and disposal. Disposal requirements for waste rock/ore derived from coal mining operations are based on whether the waste material is determined to be acid-forming and/or toxic-forming. If the material is determined to be non-acid-forming or non-toxic-forming, there are generally no restrictions on disposal. The material may be stockpiled within the permit area or disposed of per the Disposal of Excess Spoil, Coal Mine Waste Bank, or Coal Mine Waste Regulations (2 CCR 407-2.2.04.09 – 407-2.2.04.11). Acid forming and toxic-forming waste material must be disposed of in accordance with 2 CCR 407-2.4.05.8 (Acid-forming and Toxic-forming Spoil), 2 CCR 407-2.4.10.1 (Coal Mine Waste Banks General Requirements), and 2 CCR 407-2.4.14.3. Potential sources of hazardous or solid waste materials in the project area would include spilling, leaking, or dumping of hazardous substances, petroleum products, and/or solid waste associated with coal development or agricultural or livestock activities. If the lease modification area goes into production, petroleum products and solvents would be used underground as part of general operations. Use of these products would comply with all applicable state and federal regulations.

Environmental Consequences of the Proposed Action:

Direct and Indirect Effects: The 310 acre lease modification area would be limited to underground mining. Impacts to the environment resulting from the release of hazardous or solid waste are not expected. The potential for impacts resulting from substance release would depend upon the responsible use of chemicals, and the immediate containment and adequate clean-up in the event of unintentional releases. The potential for exposure to hazardous or solid wastes would be low. Limited volumes of

underground development waste would be generated from roof falls. To the extent practical, this material would be disposed of underground in mined-out areas. Coal refuse material (non-specification coal) and incombustible waste rock generated at Twentymile Coal is transported to the surface by conveyor, segregated and transported to Foidel Creek Mine’s approved refuse disposal area for permanent placement. Based on sampling and analysis of the geologic materials associated with Wadge and Wolf Creek seams in the Twentymile Coal permit area of the Foidel Creek Mine, the associated strata above and below the coal seams have little or no potential to generate acid- or toxic-forming refuse materials.

Cumulative Effects: In the past, the area has been mined by surface and underground methods. Present mining activities include TC Foidel Creek Mine and reclamation of the Seneca surface mines. Operations at the Sage Creek Mine, an underground coal mine have been idled since September of 2012. The 310 acre lease modification would be mined using the same equipment that is currently operating at the TC Foidel Creek Mine. The amount of petroleum products and solvents related to mining would remain at the current levels. These materials would continue to be managed and controlled under current regulations and best management practices. Cumulative impacts would be kept within state and federal guidelines and would be minor.

Environmental Consequences of the No Action Alternative:

Direct, Indirect, and Cumulative Effects: Under the No Action Alternative, there would be no impacts associated with hazardous or solid wastes.

Mitigation: None.

3.1.6 Social and Economic Conditions

Affected Environment: The social and economic study area for the proposed lease action and associated mining includes Routt and Moffat counties and the communities of Steamboat Springs, Oak Creek, Hayden and Craig. These communities currently provide the workforce for the Foidel Creek Mine, as well as providing mining services, retail, business and consumer services in the area. Steamboat Springs is the county seat of Routt County; Craig is the county seat of Moffat County.

The proposed lease modification and mine are in Routt County. In 2013, TC employed 350 Moffat County residents and 234 Routt County Residents. Using the U.S. Bureau of Economic Analysis industry multiplier of 4.4, employment associated with the coal mining industry increases to 1,540 in Moffat County and 1,030 in Routt County. The industry multiplier accounts for other industry jobs that are created by labor, services and goods needed to operate a coal mine. In 2013, TC was the largest employer of Moffat County residents and the eighth largest employer in Routt County. Weekly coal mining wages in Routt County are the third highest wages in the State; Moffat coal mining wages are the sixth highest wages in the State.¹⁴ The 2009 TC payroll was \$28.3 million.

Table 11, Mining Wages

LOCATION	HOURLY	WEEKLY	ANNUAL
ROUTT	\$52.15	\$2,086	\$108,472
MOFFAT	\$39.83	\$1,593	\$82,836
COLORADO	\$44.88	\$1,795	\$93,340

¹⁴ Yampa Valley Data Partners, Colorado Dept. of Labor
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TC accounts for more than 6% of property tax revenue in Routt County and is the top taxpayer in Routt County. TC paid \$3,209,691 in property taxes in 2013.¹⁵ Peabody contributes to local charities such as United Way, supports 4H, and also helps to sponsor local community events.

Population

Table 5 presents basic population and demographic information for Moffat and Routt County and the state of Colorado. Approximately sixty percent of the workforce resides in Moffat County; forty percent reside in Routt County.

Table 12, Population by Category, 2010 and 2013, Moffat County and the State of Colorado

Population	Moffat County	Routt County	Colorado
2013	13,103	23,5013	5,268,367
2010			
% Change	-5%	0%	+4.8%
Male (2013)	51.8%	52.7%	50.2%
Female (2013)	48.2%	47.3%	49.8%
Under 5 years	6.8%	4.8%	6.4%
Under 18 years	25.8%	19.6%	23.5%
65 years and over	12.4%	11.3%	12.3%
% Non-White (2013)	6.1%	3.5%	12.9%
% Below poverty (2008-2013)	12.0%	7.5%	12.9%

Source: US Census Bureau, <http://quickfacts.census.gov/qfd/states/08/08081.html>

The town of Craig is the largest town in Moffat County with a 2013 estimated population of 8,981, a decrease of 5.1% since 2010. Other communities in the county include Maybell (2010 population of 72), and Dinosaur (2010 population of 339).¹⁴ The US Census reports that from 2008-2012, there were 6,179 housing units in Moffat County that housed 5,243 households, indicating a vacancy rate of approximately 15.1 %. Approximately 9.8% of rental units were classified as vacant. There was an average of 2.53 persons per household. The median value of an owner occupied housing unit was \$184,800, well below the state average of \$236,800.¹⁶

The town of Steamboat is the largest town in Routt County with a 2013 estimated population of 12,100, a 0.1% increase from 2010. Other communities in the county include Oak Creek (2010 population of 884) and Hayden (2010 population of 1,810)¹⁷. The US Census reports that from 2008-2012, there were 16,131 housing units in Routt County that housed 9,833 households. The homeowner vacancy rate was 2.8 %; the rental vacancy rate was 15.9%. There was an average of 2.27 persons per household. The median value of an owner occupied housing unit was \$407,700 well above the state average of \$236,800.¹⁴

Identification of Minority and Low Income Populations

For purposes of this section, minority and low income populations are defined as follows:

¹⁵ Routt County Assessor's Office

¹⁶ US Census Bureau 2008-2012

¹⁷ US Census Bureau, 2010

Minority populations are persons of Hispanic or Latino origin of any race, Blacks or African Americans, American Indians or Alaska Natives, Asians, and Native Hawaiian and other Pacific Islanders.

Low-income populations are persons living below the poverty level. In 2000, the poverty weighted average threshold for a family of four was \$17,603 and \$8,794 for an unrelated individual. Estimates of these two populations were then developed to determine if environmental justice populations exist in Moffat County (see Table 6).

In 2009, Moffat County had a population of 31,322 persons, of which approximately 5,137 (16.4%) were minorities and approximately 3,790 (12.1%) were living below the poverty level. Minority populations were lower in Moffat County than in the state of Colorado; the low-income population in Moffat County was higher than for the state of Colorado. The Council on Environmental Quality (CEQ) identifies minority and low income groups as Environmental Justice populations when either (1) the population of the affected area exceeds 50 % or (2) the population percentage in the affected area is meaningfully greater (generally taken as being at least 10% more) than the population percentage in the general population of the region or state. Neither the minority population percentage nor the low-income population percentage meets the CEQ guidelines. As a result, it is assumed that no environmental justice populations exist within the area of influence, and no impact analysis is required.

Protection of Children

Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (April 21, 1997), recognizes a growing body of scientific knowledge which demonstrates children may suffer disproportionately from environmental health risks and safety risks. These risks arise because (1) children's bodily systems are not fully developed, (2) children eat, drink, and breathe more in proportion to their body weight, (3) their size and weight may diminish protection from standard safety features, and (4) their behavior patterns may make them more susceptible to accidents. Based on these factors, the President directed each Federal agency to make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children. The President also directed each Federal agency to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.

Children are very seldom present at the coal mining facilities. On such occasions, the coal mining companies have taken and would continue to take precautions for the safety of children by using a number of means, including fencing, limitations on access to certain areas, and provision of adult supervision. No additional impact analysis is required.

Environmental Consequences of the Proposed Action:

Direct and Indirect Effects:

If the coal lease modification is approved, the existing TC Foidel Creek Mine's operations and facilities would be used; there would be no new or added employment at the Foidel Creek Mine. No additional demand for housing or municipal services would be anticipated. Mining operations would be extended throughout the period required to mine recoverable coal reserves. This extension of mining operations would also extend the annual payroll, local expenditures, and taxes and royalty payments for approximately a year or more.

If the lease modification is approved, TC would have to pay the Fair Market Value (FMV) price per ton on the recoverable coal. Additionally, royalties would be paid on the federal coal mined by underground methods at 8 percent of the gross sales price. The BLM receives annual payments from

coal lease holders based on rents at not less than \$3.00 per acre. The rental of the lease area would be \$930 per year for this 310 acre lease. The revenues from the FMV of the coal, rental, and royalties of a lease go to US Treasury General Fund and to the State of Colorado. Royalties from the Federal coal are distributed in the following way: 50% returns to the Federal treasury in the general fund. The other 50% is returned to the State where the coal was mined, with a portion of that percentage being returned to the county where the coal was mined. In Colorado, those funds are managed by the State Department of Local Affairs in the Energy Impact Fund. These monies are distributed on a grant-like basis to counties affected by energy resource development for community benefit projects.

Cumulative Effects:

The cumulative socioeconomic effects of continued mining would include a constant level of employment and tax revenues during the operation of the Foidel Creek mine. That source of income would stop when the mine closes. Residential and other development activities could increase the local population of Routt and Moffat Counties. The cumulative social and economic effects of past, present, and reasonably foreseeable actions in Moffat and Routt Counties relative to coal mining operations would be to extend the mining employment sector, mining services sector, and property tax payments.

Mining of the coal also has future foreseeable effects on socio-economics. The population centers nearest to TC are the city of Steamboat Springs in Routt County, the communities of Oak Creek and Hayden in Routt County, and Craig in Moffat County. In the past and presently, Peabody has been responsible for paying sales taxes, property taxes, royalties, and other payments. According to The Socioeconomic Impact of Sage Creek Mine on Routt County, Colorado, and Surrounding Areas (Tetra Tech 2010) Peabody Energy has paid the following:

- ❖ \$4.2 million in property taxes.
- ❖ \$1.3 million in sales and use taxes.
- ❖ \$13.0 million in royalties.
- ❖ \$1.0 million to the Abandoned Mine Fund.
- ❖ \$7.9 million to the Black Lung Fund.
- ❖ In addition to taxes and other payments, Peabody made charitable donations of nearly \$69,000 to area organizations.
- ❖ TC's sales 2008 were approximately:
 - \$255.1 million, generating additional sales by other businesses in Routt County of \$107.4 million (Peabody 2009).
- ❖ TC employed 584 people in its Foidel Creek Mine operations in 2013, generating 2,570 additional jobs in the local economy (U.S. Bureau of Economic Analysis industry multiplier of 4.4).

The cumulative effects on the estimated earnings on the wages and benefits to the local economy include wages and benefits to employees, income to local businesses, and taxes currently paid by TC due to the operation of the Foidel Creek Mine would continue with the lease modification.

The cumulative socioeconomic effects of continued mining would include a constant level of employment, personal income, and federal, state and local revenues during the operation of the mine and the removal of that source of income when the mine is closed. Residential and other development activities are expected to increase the local population and infrastructure in the area.

Environmental Consequences of the No Action Alternative:

Direct, Indirect, and Cumulative Effects: Under the No Action Alternative, the impact would be that the estimated 340,000 tons of recoverable federal coal would not be recovered. Mining of the reserves at the Foidel Creek Mine would continue at existing rates until the coal reserves are depleted. Reductions in jobs and associated salaries, local expenditures, royalty and tax payments would be realized after the reserves are depleted. The cumulative social and economic effects of the no action alternative in the Moffat County and Routt County area relative to coal mining operations would not extend the mining employment sector proportionately to the length of the remaining reserves, so that jobs would be lost. The Federal government (US Treasury) and the State of Colorado would not receive the rents and royalties associated with mining the coal in the lease modification. Royalties from underground coal are 8% of the sales price. Using EIA 2012 average price of \$37.54 per ton, the lost revenues from the sale of 340,000 tons of recoverable coal at 8% would be \$1,021,088.00

On a cumulative basis, if the lease modification were not approved, and not offered for sale, coal mining in the Twentymile Park Area is expected to continue at existing mines until existing reserves are depleted. At that point, the coal mining employment sector would be terminated. Mining the coal reserves in the LBA would increase the life of the mine.

Mitigation: None

3.1.7 Hydrology, Ground

Affected Environment: All of the impacts presented in this analysis are expected to occur as a result of the approved current mining operations, regardless of the decision to modify lease COC54608. No significant increased degradation of groundwater quality is anticipated as a result of the proposed leasing activity. Within the proposed lease modification area, the only bedrock units capable of regionally storing and transmitting water are the Trout Creek and the Twentymile Sandstones and the lenticular and interbedded sandstones of the three coal groups. Ground water occurrence, storage, and movement are associated with and controlled by the porosity and continuity of water bearing units, as well as structural gradients and faults. Ground water in the lease modification area is not suitable for domestic use (DRMS Cumulative Hydrologic Impact Assessment, Yampa River Basin, May 4, 2010). The one well within the lease modification area is owned by Twentymile Coal, Permit number 66799-F. This well provides for pumped transfer of water from an underground sump and is used for various industrial uses.

Environmental Consequences of the Proposed Action:

Direct and Indirect Effects: No water quality effects in the Twentymile Sandstone or the Trout Creek Sandstone would be anticipated during mining operations. The planned underground mining operations would result in localized and temporary drainage of ground water from the Wadge overburden (interbedded sandstones, siltstones and shales). The Twentymile Sandstone and Trout Creek Sandstone would not be affected since the thick, low permeability shales limit vertical water transmission between units. Following completion of mining, the mined-out area would be sealed and allowed to flood. Oxidation effects associated with contact between the ground water and exposed coal and overburden may result in changes in ground water quality and chemistry including increases in TDS and metals. These effects would be buffered by dilution by continued inflows and contact mixing with undisturbed ground water sources. These increased TDS concentrations would be limited to the overburden unit. Any localized reduction in piezometric surfaces and/or changes in water quality and chemistry should not adversely affect water users since the well (Twentymile Coal) within the proposed lease area or adjacent areas do not intercept the Wadge overburden.

Piezometric surface is defined as “The level at which the hydrostatic water pressure in an aquifer will stand if it is free to seek equilibrium with the atmosphere.”

Cumulative Effects: The Twentymile Coal Foidel Creek Mine has been in operation since 1983. Since that time groundwater quality has been monitored by monitoring wells. To date, there is no evidence that there is any significant connection between the mine workings and either the underlying Trout Creek Sandstone or the overlying Twentymile Sandstone. TC has an existing ground water monitoring system. It is used to document and assess any mining-related impacts to ground water. Cumulative effects from the Proposed Action could include dewatering of the Wadge overburden aquifer, the Twentymile Sandstone aquifer and the Trout Creek aquifer. Monitoring has shown that mining has had no impact at the Trout Creek Sandstone and water quality data from the mine inflow does not indicate any significant connection to either the overlying Twentymile Sandstone or the underlying Trout Creek Sandstone. Calculations predict that the Foidel Creek mining operation would cause a diminution of bedrock discharge from the Wadge overburden unit of about 11,000 gallons per day, equivalent to 0.02 cubic feet per second, for at least 360 years (DRMS Cumulative Hydrologic Impact Assessment, Yampa River Basin, May 4, 2010). This discharge is equivalent to 0.5 percent of the average low flow in Fish Creek which is the major creek receiving bedrock discharge. A diminution of this magnitude is not significant to flow conditions in Fish Creek. Periodic evaluation of the existing monitoring system would be conducted to adequately monitor impacts resulting from mining coal from the proposed action.

There are monitoring wells in the Twentymile Sandstone, the Trout Creek Sandstone, the Fish Creek Sandstone, and alluvial deposits. Upon completion of mining of the Wolf Creek seam, mined-out areas would be sealed and allowed to flood, with gradual reestablishment of a stable piezometric surface within the water-bearing units and the mined-out units. TC conducts continual hydrologic monitoring and submits annual hydrology reports. The 2013 Annual Hydrology Report of the shows no significant hydrology impacts from activities at the Foidel Creek Mine. Leasing would have no effect on groundwater.

Environmental Consequences of the No Action Alternative:

Direct, Indirect, and Cumulative Effects: None. Not issuing the lease modification would have no impacts on ground water quality as there would be no mining.

Mitigation: None.

3.1.8 Hydrology, Surface

Affected Environment: Runoff from the area affected by the proposed action would flow to Fish Creek, a perennial tributary to Trout Creek, and Grassy Creek, a perennial tributary to the Yampa River. The water quality of Fish Creek must support Aquatic Life Cold 1, Recreation E, and Agricultural beneficial uses. Water quality of Grassy Creek must support Aquatic Life Warm 2, Recreation N, and Agricultural beneficial uses. Fish Creek, Trout Creek and Grassy Creek meet standards, and are not listed as impaired.¹⁸

Longwall mining in the vicinity has occurred since approximately 1988 and runoff water from the subsided areas as well as mine inflows, has flowed or been released into Fish Creek (after treatment in accordance with all state and federal regulations). The Foidel Creek mine makes use of and

¹⁸ <https://www.colorado.gov/pacific/sites/default/files/Regulation-93.pdf>
DOI-BLM-CO-N010-2014-0044-EA

recycles much of the mine inflow water in various mining activities, especially dust suppression. The subsequent handling and holding of this water tends to increase the total dissolved solids (TDS) levels.

The Colorado Department of Public Health and Environment, Water Quality Control Division has issued Colorado Discharge Permit System (CDPS) discharge permits to TC for various discharge points, including Fish Creek. At the Foidel Creek mine, current TDS levels in these creeks are monitored upstream of the mine activities and discharges are treated to meet CDPS discharge permit effluent limits.

Environmental Consequences of the Proposed Action:

Direct and Indirect Effects

Subsidence of the ground surface likely would cause localized gradient changes stream channels and potential pooling. Additional sediments could be generated in the short term from overland flow across soil surfaces however localized deposition is expected to occur within the stream channel, except during high runoff events. Slightly higher levels of TDS and Total Suspended Solids could result from sediment transport in the short term.

Cumulative Effects

An increase in erosion and deposition would continue until Foidel Creek adjusts to the changes that could be caused by subsidence. The discharge of mine inflow water to surface water drainage from the sediment ponds could affect the water quality. The relatively continuous inflow discharges to Foidel Creek make up a significant proportion of the total creek flow, particularly during the period of low flow from September to February. The quality of surface and ground water could possibly be affected by water handling and treatment methods under the planned operations of the mine. The effects of leaching in exposed spoil and waste rock piles, detention of water in sedimentation ponds, and pumping water out of pits and underground mine workings have the potential to increase TDS concentrations and change ionic composition of surface waters.

Environmental Consequences of the No Action Alternative:

Direct, Indirect, and Cumulative Effects: Surface water quality would not be affected.

Mitigation: None.

CHAPTER 4 - PUBLIC LAND HEALTH STANDARDS

4.1 INTRODUCTION

STANDARDS FOR PUBLIC LAND HEALTH

In January 1997, Colorado BLM approved the Standards for Public Land Health. The five standards cover upland soils, riparian systems, plant and animal communities, threatened and endangered species, and water quality. Standards describe conditions needed to sustain public land health and relate to all uses of the public lands. Environmental analyses of proposed projects on BLM land must address whether the Proposed Action or alternatives being analyzed would result in impacts that would maintain, improve, or deteriorate land health conditions identified in the applicable Land Health Assessment (LHA). Since there is no BLM surface within this project area, none of the Standards apply.

CHAPTER 6 - COORDINATION AND *CONSULTATION*

6.1 TRIBES, INDIVIDUALS, ORGANIZATIONS, OR AGENCIES CONSULTED:

Uintah and Ouray Tribal Council, Colorado Native American Commission, Colorado State Historic Preservation Office.

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APPENDIX A

Example Calculations for Emission Sources

1.) Horsepower-hour Calculations for Underground Mobile Sources

Example Parameters:

- 1.) Foidel Creek Mine's annual diesel fuel use 489,368 (Underground Equip.) gal
*source: Peabody
- 2.) The average density of the diesel fuel is 7.11 lb/gal *source: LSD MSDS
- 3.) The LHV based energy density of the diesel fuel is 18,500 btu/gal *source: Ave. of literature
- 4.) Conversion: btu/hp-hr = 2,544.43 *source: Common conversion
- 5.) CO2 EF = 643.29 g CO2/hp-hr *source: EPA Nonroad (2008a)
- 6.) Carbon content of diesel fuel = 2,778 g C/gal *source: 40 CFR 600.113
- 7.) CO2 : C Molecular Weight Ratio = 44/12 = 3.667 (unit less) *source: Periodic Table

Calculate Parameters (Underground Equipment Example):

1.) Total Available Energy of fuel =
 489,368 gal x 7.1 lb/gal x 18,500 btu/lb
 = 64,278.48
 MMbtu

2.) Energy Converter to HP (Energy IN) =
 64,278,486,800 btu / 2,544.43 btu/hp-hr
 = 25,262,430
 hp-hr

3.) Convert CO2 EF of Diesel Fuel to C EF =
 643.29 g CO2/hp-hr x 3.667-1
 =175.443 g
 C/hp-hr

4.) Derived hp-hr/gal of fuel from know Carbon Content of fuel =
 2,778 g C/gal / 175.443 g C/hp-hr
 = 15.834 hphr/
 Gal

5.) Derived hp-hr from fuel use (Energy Out) =
 15.834 hp-hr/gal x 489,368 gal
 =7,748,653
 hp-hr

6.) TE = Energy Out / Energy IN x 100% =
 7,748,653 hp-hr / 25,262,430 hp-hr x 100% =
 **30.67%**

Conclusions:

The Thermal Efficiency of the underground equipment is approximately 30.67% based on the EPA Model data for CO2. The value is realistic for working engines where hp is developed at various RMPs (based on loading and work cycles). Further the EPA Model takes this into

account when developing the EFs (see Nonroad Technical Document NR009d “Exhaust and Crankcase Emission factors for Nonroad Engine Modeling – Compression- Ignition”). All 43emissions estimates are based on the EPA Nonroad Model emissions factors and the total hphrs derived in calculated parameter 5 for all underground equipment.

2.) Example Emissions Calculations for Underground Diesel Mobile Sources
General Equation for all Emissions:

Emissions (tons) = Total hp-hr (Energy Out1) x NR EFE g/hp-hr x 453.6-1 g/lb x 2000-1 lb/ton
 Where:

EFE = Underground Equipment Emissions Factor
 1 For N2O, substitute (Energy In). EF based on fuel use only.

A.) For NOX (underground)

$$7,748,653 \text{ hp-hr} \times 8.561 \text{ g/hp-hr} \times 453.6-1 \text{ g/lb} \times 2000-1 \text{ lb/ton} = 73.12 \text{ tons}$$

3.) Example Emissions Calculations for Gasoline Mobile Sources

Example Parameters:

- 1.) Foidel Creek Mine’s estimated annual unleaded fuel use 12,983 gal *source: Peabody Energy
- 2.) 2004 CAFE for LDGT = 20.7 miles per gallon (mpg) *source: NHTSA (2004)
- 3.) Emissions Factors (grams per vehicle mile traveled (g/VMT) are from 2003 IERA Mobile Source Emissions Tables 4.5, 4.6, 4.7, & 4.50
- 4.) Gasoline carbon content per gallon = 2,421 g C/gal *source: EPA 420-F-05-001,2005
- 5.) CO2 : C Molecular Weight Ratio = 44/12 = 3.667 (unit less) *source: Periodic Table

Calculate Parameters:

1.) Total Vehicle Miles Traveled (theoretical) =
 12,983 gal x 20.7 mpg =268,745.8
 miles

2.) CO2 Emissions Factor =
 12,983 gal x 2,421 g C/gal x 3.667 x 268,745.8-1 miles = 428.87 g/VMT

General Equation for all Emissions:

Emissions (tons) = Total Annual Fuel Use (gal) x CAFE (mi/gal) x EF g/mi x 453.6-1 g/lb x 2000-1 lb/ton

A.) CO

12,983 gal x 20.7 mi/gal x 2.9 g/mi x 453.6-1 g/lb x 2000-1 lb/ton = 0.859 tons

B.) CO2

12,983 gal x 20.7 mi/gal x 428.84 g/mi x 453.6-1 g/lb x 2000-1 lb/ton = 127 tons

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APPENDIX B

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APPENDIX C

ABBREVIATIONS AND ACRONYMS

ACEC	Area of Critical Environmental Concern
APE	Area of Potential Effect
BLM	Bureau of Land Management
BMP	Best Management Practices
BO	Biological Opinion
BTU	British Thermal Unit
CAA	Clean Air Act
CCR	Code of Colorado Regulations
CDPHE	Colorado Division of Public Health and Environment
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CMOP	Coalbed Methane Outreach Program
CWA	Clean Water Act
DOI	Department Of Interior
LBA	Lease by Application
DRMS	Division of Reclamation, Mining and Safety
EA	Environmental Analysis
EIA	Energy Information Administration
EPA	Environmental Protection Agency
FCLAA	Federal Coal Leasing Amendment Act
FEMA	Federal Emergency Management Agency
FLPMA	Federal Land Policy Management Act
FONSI	Finding of No Significant Impact
G	Grams
GAL	Gallon
HP	Horsepower
HR	Hour
IM	Instructional Memo
LSFO	Little Snake Field Office
LUP	Land Use Plan
MBTA	Migratory Bird Treaty Act
MLA	Minerals Leasing Act
MOA	Memorandum of Agreement
MPG	Miles per Gallon
MSHA	Mine Safety and Health Administration
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
ONRR	Office of Natural Resources Revenue Data Warehouse Portal
OSM	Office of Surface Mining
PA	Programmatic Agreement
RMP	Resource Management Plan
ROD	Record of Decision
SHPO	State Historic Preservation Officer
SMCRA	Surface Mining Control and Reclamation Act
T&E	Threatened and Endangered
TC	Twentymile Coal

TDS	Total Dissolved Solids
VAM	Ventilation Air Methane
VMT	Vehicle Miles Traveled
VRM	Visual Resource Management
WO	Washington Office
WSA	Wilderness Study Area

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