United States Department of Agriculture

Forest Service

United States Department of Interior

Bureau of Land Management

Office of Surface Mining Reclamation Enforcement

State of Colorado

Division of Reclamation Mining and Safety

August 2017

Supplemental Final Environmental Impact Statement

Federal Coal Lease Modifications COC-1362 & COC-67232 (including on-lease exploration plan)

Paonia Ranger District, Grand Mesa, Uncompahgre and Gunnison National Forests; Gunnison County, Colorado

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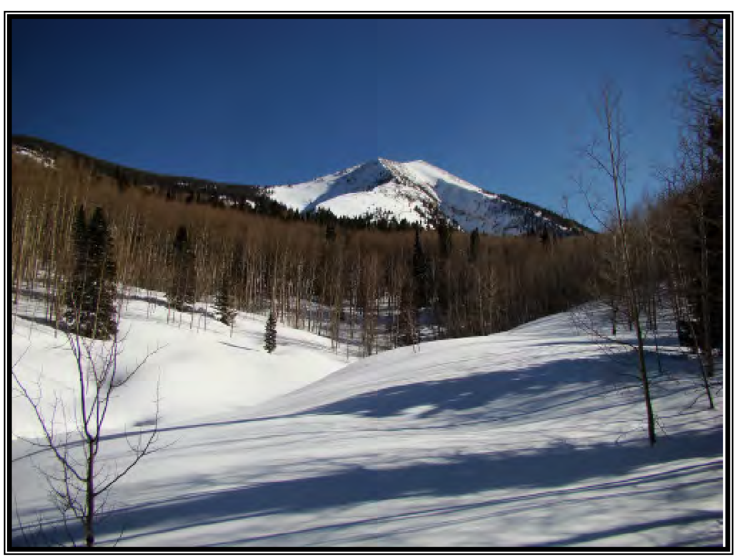
Cooperating Agencies:

Uncompahgre Field Office, Bureau of Land Management

Colorado State Office, Bureau of Land Management

Western Region, Office of Surface Mining Reclamation and Enforcement

Colorado Division of Reclamation Mining and Safety



Federal Coal Lease Modifications COC-1362 & COC-67232
Supplemental Final Environmental Impact Statement
Gunnison County, Colorado

Lead Agency:	USDA Forest Service
Cooperating Agencies:	Bureau of Land Management-Uncompahgre Field Office Bureau of Land Management, Southwest District Office Bureau of Land Management, Colorado State Office Office of Surface Mining Reclamation and Enforcement Colorado Division of Reclamation Mining and Safety
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Abstract: The proposed action is to modify existing federal coal leases COC-1362 and COC-67232 by adding 800 and 920 additional acres (respectively) to ensure that 10.1 million tons of compliant and super-compliant federal coal is recovered and not bypassed and to prescribe stipulations for the protection of resources. In 2012, during the preparation of the Draft Environmental Impact Statement (DEIS), the 2001 Roadless Area Conservation Rule was in effect; this represents Alternative 2 in the DEIS. On July 3, 2012 the Colorado Roadless Rule became effective; this represents Alternative 3 (Proposed Action) in the analysis. Alternative 2 was removed from the Supplemental Draft Environmental Impact Statement (SDEIS). Alternative 4 was brought forward for detailed consideration based on comments in the DEIS. Alternative 4 only considers consenting to and leasing the COC-1362 lease. Assuming lease modification(s) are approved, on-lease exploration will be used to delineate coal reserves prior to State regulatory agency mining approval. This Supplemental Final Environmental Impact Statement (FEIS) has been prepared to address Court-identified deficiencies and to provide general updates since 2012.

emissions through 2018 to evaluate the progress that would be made by 2018 toward the visibility goal. The inventories used in the modeling analysis included the emissions from the West Elk Mine at its permitted rate and projected rates using economic growth analyses. The plan was accompanied by individual technical support documents that examined impacts to each of the Class I areas in detail, including the West Elk Wilderness and Black Canyon of the Gunnison. The state will re-examine visibility progress in five year intervals and determine whether additional steps are needed to meet visibility progress goals. Because the annual coal processing rate under any alternative will not exceed the rates analyzed in Colorado's study, no additional visibility analysis was conducted for this EIS.

3.4.1.5 Emissions Source Classifications and Regulatory Status

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 non-moving, fixed-site producers of pollution such as power plants, petro-chemical refineries, manufacturing facilities, and other industrial sites such as oil and gas production pads. 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 either major or minor. A major source is one that emits, or has the potential to emit, a regulated air pollutant in quantities above a defined threshold. Stationary sources that are not major are considered minor or area sources. A stationary source that takes federally enforceable limits on production, consumptions rates, or emissions to avoid major source status are called synthetic minors. The Colorado Department of Health and Environment, Air Pollution Control Division (APCD), has authority under their EPA approved State Implementation Plan (SIP) to regulate and issue Air Permits for stationary sources of pollution in Colorado.

The West Elk mine is classified as a synthetic minor source, and has been issued APCD permits for its surface facility operations (see Table 3-7 below). Most emissions of criteria pollutants resulting from stationary sources at the mine are in the form of particulate matter. Sources of particulate matter include various coal handling equipment such as conveyors and transfers, coal storage silos and feeders, coal storage and refuse piles, coal mine ventilation shafts, a coal preparation plant, coal hauling operations, an emergency generator, and miscellaneous exempt sources (such as heating equipment and fuel storage tanks). The APCD permits limit emissions of particulate matter by limiting the total amount of coal that can be processed in a year to 8.5 million tons of coal per year. The mine's primary permit (09GU1382) also limits the sizes of different coal stockpiles that are allowed, the hours of operation of various maintenance activities, the total quantity of refuse material from the coal preparation plant and the and the amount of coal that can be processed by the coal preparation plant. This permit also contains a requirement for the operator to follow a fugitive dust control plan which applies to all of the coal processing, handling, and management activities. In addition, the Colorado Division of Reclamation, Mining, and Safety (CDRMS) Mining and Reclamation plan includes general air pollution control requirements. These include applying water to any active unpaved roadways, parking areas, and refuse disposal area to control dust emissions from these areas, and could include compacting and spraying of coal stockpiles when necessary to eliminate particulate emissions created during coal handling operations. In addition to regular watering of the regularly travelled gravel roads on the mine site, these roads are treated at least once a year with magnesium chloride for dust suppression.

As discussed above, the mine would be required to drill and operate methane drainage wells over the life of its operations at points on the surface above active panel mining to avoid potentially unsafe accumulations of methane within the mines underground environment. The drilling technology used to drill holes the diameter and depth needed for MDWs also requires construction of drill pads and the use of heavy equipment to access these locations. MDWs are on the landscape an average of 2-3 years with an active life of 1-3 months, after which they are decommissioned and the land surface is reclaimed and returned to pre-mining land uses.

Mobile sources include any air pollution that is emitted by motor vehicles, engines, and equipment that can be moved from one location to another. Due to the large number of sources, which includes cars, trucks, buses, 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, off-road, and non-road), classification (light duty, heavy duty, horse power rating, weight, fuel types, etc.), and the year of manufacture or in some circumstances their reconditioning. Mobile sources are not regulated by the state unless they are covered under an applicable SIP (usually as part of an inspection and maintenance program).

Mobile sources at the West Elk mine consist primarily of heavy equipment (loaders and bulldozers, source classification code 2270002000) for surface operations and specialized underground mining equipment (source classification code 2270009000). There are also on-road trucks used to ferry personnel and smaller equipment and tools around the facility as well. Mobile source emissions estimates were developed from the mines annual diesel fuel use, utilizing area specific (county level) emissions factors from EPA's NONROAD 2008a model (http://www.epa.gov/otaq/nonrdmdl.htm).

Table 3-7. West Elk Emissions (max tons per year)

Source	Permit[1,2]	PM_{10}	$PM_{2.5}$	VOC	NO_X	CO	SO_X	CO_2	CH_4	N_2O	CO_2e
Multiple - Point	09GU1382	60.3	---	---	---	---	---	---	---	---	---
Multiple - Fugitive	09GU1382	27.9	---	---	---	---	---	---	---	---	---
Emergency Generator	10GU1130	---	---	---	12.36	15.23	---	---	---	---	---
Rock Dust Silo	13GU1462	0.05	0.05	---	---	---	---	---	---	---	---
Mobile - Underground	NA	10.39	10.08	15.92	73.02	61.47	0.99	4,615	0.24	0.04	4,636
Mobile - Surface	NA	1.53	1.48	1.86	21.14	9.89	0.33	1,538	0.03	0.01	1,542
Misc. Heaters[3]	NA	2.04	2.05	1.47	27.49	22.08	0.67	32,682	0.61	0.58	32,877
Fuel Tanks[4]	NA	---	---	1.99	---	---	---	---	---	---	---
VAM[5]	NA	---	---	---	---	---	---	---	15,566	---	560,376
MDWs[5]	NA	---	---	---	---	---	---	---	10,483	---	377,388
Totals		102.21	13.67	21.24	134.01	108.67	1.99	38,835	26,049	0.63	976,818

[1] All permitted source emissions are based on the permit limits which have a corresponding production of 8.5 MMtons/yr.
[2] Non-permitted source emissions are based on the maximum analyzed annual production of 6.5 MMtons/yr, which is higher than the current 5 year average production rate.
[3] Miscellaneous heater data is estimated from 2015 GREET data & 2016 CMM Market Research Report (Appendix A)
[4] VOC data is based on maximum APEN exemption amount of 2 tons per year.
[5] Max methane is disclosed for a similar coal production year (2014 – 6.28 tons). CH_4 liberation rates generally follow production levels over the GHG reporting period (2011-2015), but are neither linear or consistent from year to year with respect to production to form a reasonable correlation that would enable an accurate prediction of future liberation potential.

3.4.1.6 Climate Baselines

Somerset Colorado is located in the North Fork Gunnison River Valley and rests at approximately 6,040 feet above sea level. The area is rural, has mountainous terrain, and supports a population of approximately 526 residents (http://2010.census.gov/2010census/). The normal temperatures (minimum and maximum) for the area range from 14.7 to 38.5 ˚F in January to 56.7 to 90.1 ˚F in July. The average annual precipitation amounts to approximately 15.07 inches, which according to historical records is relatively evenly distributed throughout the year. Average annual wind resultants are generally from the southeast at a speed of approximately 7.1 mph. The area enjoys sunshine for approximately 70% of the time and has an annual average sky cover of around 52%.

Best available science indicates at combination of factors are combining to change the chemical composition of Earth's atmosphere. Activities such as fossil fuel combustion, industrialization, deforestation, and other changes in land use are resulting in the accumulation of trace greenhouse gases (GHGs) such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and several industrial gases in the Earth's atmosphere. The following synopsis of current climate change baseline information has been summarized from the Intergovernmental Panel on Climate Change's (IPCC), 5th Assessment Report (AR5). The IPCC is the leading international scientific body under the auspice of the United Nations charged with reviewing and assessing the most recent scientific, technical and socio-economic information produced worldwide relevant to the understanding of climate change. IPCC assessments provide rigorous and balanced scientific information that reflect a range of views and expertise to ensure an objective and complete assessment of current information.

Between 1750 and 2011, cumulative CO_2 emissions emitted to the atmosphere were approximately 2040 ± 310 $GtCO_2$ above the baseline About 43% of these emissions have remained in the atmosphere (880 ± 35 $GtCO_2$); the rest was removed from the atmosphere and stored in natural terrestrial ecosystems (plants and soils – 29%) and in the oceans (28%). Although CO_2 levels in the atmosphere have varied perpetually throughout Earth's history (along with corresponding variations in climatic conditions), CO_2 concentrations have increased measurably, from approximately 280 ppm in 1750 to 400 ppm in 2015 which also corresponds with industrialization and the burning of carbon based fossil fuel sources. The rate of change has also been increasing. This fact is demonstrated by data from the Mauna Loa CO_2 monitor in Hawaii that documents atmospheric concentrations of CO_2 going back to 1960, at which point the average annual concentration was recorded at approximately 317 ppm. The record shows that approximately 70% of the increases in atmospheric CO_2 concentration since 1750 have occurred within the last 55 years. The trend corresponds to an increasing population and rising standards of living and modernization around the globe. From 1750 to present, emissions from fossil fuel combustion and cement production have released 375 [345 to 405] GtC to the atmosphere (68%), while deforestation and other land use change are estimated to have released 180 [100 to 260] GtC (32%). Concentrations of CO_2, CH_4, and N_2O now substantially exceed the highest concentrations recorded in ice cores during the past 800,000 years. Since 1750 the estimated concentrations of CH_4 have more than doubled (722ppb to 1,803ppb), while N_2O concentrations have increased by a fifth (270ppb to 324ppb).

Scientists believe that increases in atmospheric GHG concentrations results 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, all of which is collectively referred to as climate change.

Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over time spans of decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, and sea level has risen. Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850. In the Northern Hemisphere, 1983–2012 was likely the warmest 30-year period of the last 1400 years (medium confidence). The globally averaged combined land and ocean surface temperature data as calculated by a linear trend, show warming of 0.85 [0.65 to 1.06] °C, over the period 1880 to 2012.

Ocean warming has dominated the increase in energy stored in the climate system, accounting for more than 90% of the energy accumulated between 1971 and 2010 (high confidence). On a global scale, the ocean warming is largest near the surface, and the upper 75 m warmed by 0.11 [0.09 to 0.13] °C per decade over the period of 1971 to 2010. More than 60% of the net energy increase in the climate system is stored in the upper ocean (0–700 m), and about 30% is stored in the ocean below 700 m (40-year period from 1971 to 2010). The rate of sea level rise since the mid-19th century has been larger than the mean rate during the previous two millennia (high confidence). Over the period 1901 to 2010, global mean sea level rose by 0.19 [0.17 to 0.21] m. It is very likely that the mean rate of global average sea level rise was 1.7 [1.5 to 1.9] mm yr^{-1} between 1901 and 2010, 2.0 [1.7 to 2.3] mm yr^{-1} between 1971 and 2010, and 3.2 [2.8 to 3.6] mm yr^{-1} between 1993 and 2010, a trend that is increasing.

The driver for the buildup in heat within the climate system is best described in terms of radiative forcing (RF). The term describes the energy balance that will occur (i.e. heating (+) or cooling (-)) in units of W m^{-2}. The total anthropogenic RF for 2011 relative to 1750 was 2.29 [1.13 to 3.33] W m^{-2} (includes both heating and cooling parameter estimates). For well mixed GHG's the total positive forcing is estimated to be 2.83 [2.54 to 3.12] W m^{-2}. The largest contribution to total radiative forcing since 1750 is caused by the increase in the atmospheric concentration of CO_2. Emissions of CO_2 alone caused an RF of 1.82 [± 0.19] W m^{-2} (64%), while CH_4 caused an RF of 0.48 [± 0.05] W m^{-2} (17%). The data highlights methane's important role as a potent greenhouse gas, given its RF value in relation to its atmospheric loading trend, approximately 556 Tg (or million netric tons) yr^{-1} (64% anthropogenic, 36% natural) and relatively short atmospheric lifetime (12 years). N_2O has the third largest forcing of the anthropogenic gases, at 0.17 [± 0.03] W m^{-2} (6%). Collectively the three GHG's of concern account for approximately 87% of the positive forcing within the climate system.

According to the 2014 Climate Change in Colorado synthesis report (prepared by the Colorado Department of Natural resources, Water Conservation Board), statewide annual average temperatures have increased by 2.0° F and 2.5° F over the past 30 and 50 years respectively. Warming trends have been observed over this period in most parts of the state, and show that daily minimum temperatures have warmed more than daily maximum temperatures. Additionally, temperature increases have occurred in all seasons. No long-term trends in average annual precipitation (30-50 years) have been detected across Colorado, although since 2000 the state has experienced below-average annual precipitation and snow pack. The warming trends have contributed to an earlier shift in snowmelt and peak runoff timing in spring by approximately 1 to 4 weeks.

3.4.2 Alternative 1 (No Action) Environmental Effects

3.4.2.1 Direct Effects

Under the no action alternative, consent to modify the leases would not be granted, and no mining would occur in these specific areas. Impacts from mining coal under these areas would not occur, but it is anticipated that mining operations will continue on existing leases. The mine life is currently projected to last an additional 8 years on existing federal coal reserves, with perhaps as much as an additional 2 years on non-federal minerals (fee reserves). Additionally, other activities currently authorized at the site including coal processing and venting of gases would also continue in accordance with the permits and site operations plans that are currently active. The intensities of these activities and the resulting emissions would not exceed the levels disclosed in Table 3-7 above. In conjunction with the estimated production rate of 6.5 million tons per year, the mine is estimated to have approximately 53.5 million tons of coal that could be mined.

The application for the primary permit (09GU1382) was accompanied by a dispersion modeling analysis (*PM-10 Dispersion Modeling Study, Coal Prep Plant Modification, West Elk Mine: Gunnison County, Colorado*, prepared by Air Resource Specialists, Inc., February 25, 2010) as required by CDPHE. This analysis was completed to support the mine's permit modification request, which included a proposal to build the coal preparation plant mentioned above. West Elk's air permit is included in Appendix F. The analysis examined the potential particulate matter emissions that would occur from the new facility, as well as other facilities at the mine (which included PM emissions generated by mobile source activities). The dispersion modeling analysis also included sources from the nearby Elk Creek mine, and included a background particulate matter concentration to account for other sources of particulate matter not associated with either mine. The analysis estimated the maximum direct impact to PM_{10} concentrations due to the West Elk and Elk Creek mines, as well as the resulting ambient air concentrations due to other sources (i.e., the two mines plus the background). The analysis used conservative assumptions in order to ensure that the analysis would not underestimate the particulate matter emissions (which also included slightly higher emissions levels than those currently permitted). The results are shown in Table 3-8. The maximum predicted concentration of PM_{10} due to the mines and other background sources was 148 $\mu g/m^3$, which is below the primary ambient air quality standard. These results indicate that the area around the mine can be expected to remain within ambient air quality standards for PM_{10}. Further, these results are likely overstated now that the Elk Creek mine has been permanently shuttered.

Table 3-8. Maximum Predicted PM_{10} Impacts Due to West Elk Mine and Oxbow Mines

Averaging Period	PM_{10} Modelled Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total PM_{10} Impact ($\mu g/m^3$)	% NAAQS
24-Hour (1st High)	118.89	29.0	147.89	98.6
Annual Average (1st High)[1]	16.99	16.0	32.99	65.9

[1] Annual PM_{10} NAAQS standard has since been rescinded

At the time the mine's primary permit modification request was submitted, the state did not require reporting for $PM_{2.5}$ as was allowable under the EPA's "surrogate policy". This policy allowed regulatory authorities to use PM_{10} emissions as a surrogate for $PM_{2.5}$ due to technical difficulties that existed in analyzing $PM_{2.5}$ emissions (http://www.epa.gov/NSR/documents/20100204repealfs.pdf). As a result, the permit itself does not contain emissions limits for $PM_{2.5}$.

There are no other criteria pollutant emissions from stationary sources at the mine that are in excess of CDPHE's minor source permitting thresholds, and therefore the permit does not contain any limits other than those for particulate matter. By extension, no other criteria pollutant emissions associated with the mine's stationary sources would be considered to be significant with respect to their potential to degrade area air quality.

As discussed above it is inappropriate to assess potential ozone formation from the precursor emissions of a single project. However, we analyzed all of the mines that produce federal minerals in Colorado cumulatively, via the Colorado Air Resources Management Modeling study (CARMMS). The CARMMS model, the analysis scenarios, and results are all described in the cumulative impacts section below. The CARMMS model was also used to assess $PM_{2.5}$ impacts from the mines producing federal minerals in Colorado.

To provide context for the West Elk mine's potential nitrogen deposition impacts, the agencies compare emissions to the Bull Mountain Unit (a nearby oil and gas project) that was recently modeled for AQRV impacts utilizing the CALPUFF air quality model and local meteorology. The project analyzed significantly more nitrogen dioxide emissions (approximately 50 tpy more) than those generated by the West Elk mine and was able to show that total nitrogen deposition would be below the DAT of 0.005 kg/ha-yr. The Bull Mountain impacts were estimated to be the highest at the West Elk Wilderness area. Given that the mine is slightly farther removed from the West Elk Wilderness Class I area, and has about a third of the emissions of the Bull Mountain Unit, it is reasonable to conclude that the NO_X emissions from the mine would also be below the deposition DAT and would not significantly impact the West Elk Wilderness Area. This same logic would apply to the Black Canyon of the Gunnison National Park, which is west of the mine. The estimated nitrogen deposition at the Park from the Bull Mountain analysis was 0.0003 kg/ha-yr. Although the mine is slightly closer to the Class I area (by approximately 8 miles), the Bull Mountain results are so far below the DAT that it is very unlikely the West Elk mine would significantly impact on the Park. The Bull Mountain analysis is publically available for review at https://eplanning.blm.gov/epl-front-office/projects/nepa/66641/81769/95992/Bull_Mtn_DEIS_Jan2015 _reduced_web.pdf.

The amount of methane released by the West Elk Mine has varied considerably over the life of the mine, and is not well correlated with production levels. In general, the amount of methane released has decreased as the mining operations have progressed into a shallower seam, but there is no clear relationship that would make it possible to accurately predict the amount of methane that will be released to the atmosphere during future mining operations. Figure 3-7 shows the general trends for annual VAM and MDW methane releases vs. production. For the purposes of this analysis we simply assume that the total methane emissions from ventilation system (main vent(s) and bore vents) is the same as shown in Table 3-7 above, and will continue as such for future mining years.

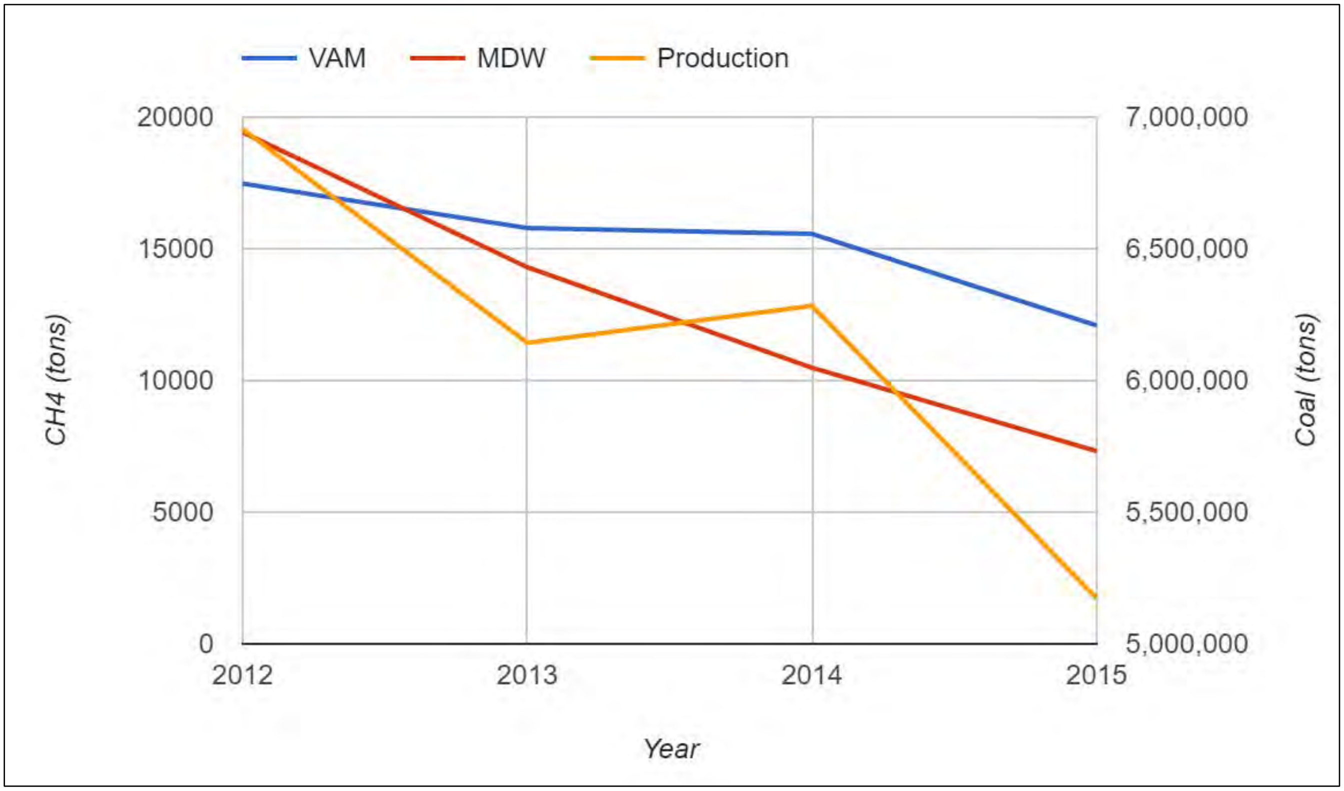

Figure 3-7. Methane vs. Production at West Elk Mine

Source: EPA FLIGHT, Colorado Department of Natural Resources, Division of Mine Reclamation and Safety

In order to effectively vent methane from the mine and provide for a safe work environment, the West Elk mine will need to develop MDWs. This will require the construction of roads and well pads over active mine panels in order to move heavy equipment in to the area to bore the holes and maintain the methane pumps when active. The agencies estimated the emissions associated with the MDW development activities using a spreadsheet developed from EPA's document AP-42, Compilation of Air Pollutant Emission Factors (http://www.epa.gov/ttnchie1/ap42/), and the EPA NONROAD 2008a model. The construction and drilling of roads and vent boring is contracted out by the mining company, so the exact mix of equipment may vary slightly from the equipment assumed in this analysis. The analysis took into account dust and tailpipe emissions of typical road construction equipment (including a blade, backhoe and roller), one truck mounted drill rig, support vehicles (such as a water truck), and pickup trucks used by site personnel to access the bore sites. It also included wind erosion of exposed road and well pad surfaces. Average emission factors were taken from AP-42 and conservative estimates were used for the amount of time needed to construct well pads and roads. The analysis did not include any assumptions regarding control of fugitive dust emissions from exposed surfaces on roads or drill pads, although the mining company does water these surfaces periodically to suppress fugitive dust emissions in accordance with its permit requirements. Actual windblown dust emissions are therefore expected to be less than those assumed in this analysis. The analysis assumes that the maximum number of MDWs the mine could develop in any single year would be 12, although the average is probably closer to 6 to 8. The data is summarized in Table 3-9, and as can be seen the construction-related emissions are relatively small and are not expected to contribute significantly to localized or regional air quality degradation.

Table 3-9. MDW Development Emissions (tons)

Activity	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOC	HAPs	CO_2	CH_4	N_2O
Road / Well Pad Construction & Reclaimation - Fugitive Dust	3.192	0.319	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	0.154	0.150	2.084	0.050	0.758	0.181	0.018	237.279	0.003	0.003
Wind Erosion	0.556	0.083	---	---	---	---	---	---	---	---
Commuting Vehicles - Crew Trips	5.823	0.582	0.057	0.000	0.332	0.019	0.002	18.624	0.001	0.003
Totals	**9.726**	**1.135**	**2.141**	**0.051**	**1.090**	**0.200**	**0.020**	**255.903**	**0.004**	**0.006**

In addition to methane, other organic gases are released through the mine ventilation boreholes in small quantities. The previous FEIS contained data that showed the compositional analysis from two CMM spot samples obtained from two MDWs. The samples were used to support a technical and economic feasibility assessment prepared by the mine at the request of the BLM (made in response to the leasing addendum placed on the original lease, described in Table 2-2). The purpose of the study was to determine if the methane could be captured for beneficial use or otherwise destroyed and not to determine the composition of the gas itself. The previous FEIS made no attempt to quantify any non-methane emissions components on an annualized basis or otherwise, and similarly no attempt is made here for the following reasons:

- There are no established protocols for sampling nor accurately analyzing VOCs in mine ventilation air from MDW or shaft emissions (for which the APCD has acknowledged).
- It is not known how accurately the sample values represent average or potential quantities of various non-methane hydrocarbons and other gaseous compounds, given that the methane emissions themselves (if used as a surrogate), have proved to be highly variable and not closely related to coal production levels.
- The limited number of samples available (two) taken on a single day (15 May 2009) within a relatively short period of time do not provide for a scientifically defensible or statistically significant basis from which to draw conclusion about potential VOC emissions levels.

The Colorado Air Pollution Control Division has examined the VOC concentration measurements submitted in the report and has since been in contact with most of the coal mines in the state, including the West Elk Mine, to gather additional data from the facilities in order to form a more accurate estimate of potential VOC emissions, and to determine the facilities overall compliance status (personal communication, Debra Miller, USFS, with Charles Pray, Permitting Engineer, Colorado Air Pollution Control Division, 11 July 2012). As of January, 2017, CDPHE is still reviewing the facts of West Elk's specific circumstances and has not rendered a decision regarding reporting (via APEN) or permitting applicability for any VOC emissions the mine emits. In general, APCD is still trying to understand the technical issues related to accurately determining the level of VOC emissions emanating from all the various coal mines in Colorado, not just the West Elk. While manmade VOC emissions are regulated in Colorado by the CDPHE, they are not themselves considered a criteria air pollutant, and no standards exist to limit their concentrations in ambient air. We note that the concern here is for the potential of these emissions to form ground level ozone. The mine itself has been in operation since the 80's and yet the area remains in attainment for the ozone standard. That fact in and of itself speaks volumes for the potential of the issue. However, as noted above the BLM did analyze the West Elk mines criteria pollutant emissions as well as all of the mines in Colorado that produce federal coal within the CARMMS study. A link to the study itself and the results are all detailed in the cumulative section below. Finally, the sample analysis data (removed here) is still available for viewing within the above referenced addendum report itself (project file).

Although the mine's GHG emissions will directly contribute to potential climate change, the cumulative nature of the problem and the lack of currently available project specific assessment tools, does not make a direct analysis of the issue in the context of the alternative(s) a practical exercise at this time. A more detailed discussion of potential climate change impacts and how the mine emissions might contribute to it is provided in the cumulative analysis section below. This alternative is expected to produce methane emissions from the mine at a rate consistent with that shown in Table 3-7 above for approximately 10 more years. The total CO2e of the methane released under this alternative is approximately 9.38 million tons.

3.4.2.2 Indirect Effects

Mined coal will be transported away from the mine by rail to various facilities. Transportation by train will result in emissions of pollutants such as carbon monoxide, sulfur dioxide, nitrogen oxides, particulate matter, and volatile organic compounds. Locomotive emissions will also include greenhouse gases such as carbon dioxide. It is highly likely that criteria 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 (see Control of Emissions of Air Pollution from Locomotives and Marine Compression-Ignition Engines Less Than 30 Liters per Cylinder, published May 6, 2008 and republished June 30, 2008). EPA estimates that the average useful life for these engines is 750,000 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. Additionally, the indirect effects of coal transport from the region are analyzed and disclosed in the 2001 North Fork Valley Coal (Iron Point) EIS for all three area mines (West Elk, Elk Creek, and Bowie). The effects for West Elk alone (the only remaining operational and producing mine) will be far less than those analyzed in the afore mentioned EIS due to the area's overall coal production reductions and for reasons outlined above concerning the locomotives themselves.

According to U.S. EPA figures contained in the Draft US Greenhouse Gas Inventory Report (2012), nearly 95% percent of all coal consumed in the U.S. during 2010 was used in the generation of electric power. Although coal's share of the electrical generating fuel market has been decreasing in recent years, it can still be reasonably assumed that the coal from the West Elk mine will be shipped to and consumed by a coal-fired power plant. According to EPA data there are approximately 463 power plants in the U.S. that use coal as a primary fuel source (approximately 61 others report coal use as a secondary fuel). In general, it is reasonable to assume that coal combustion in these facilities will result in emissions of pollutants including sulfur dioxide, nitrogen oxides, volatile organic compounds, particulate matter, sulfuric acid, and mercury, as well as some hazardous air pollutants. It is also likely that coal combustion-related emissions will contribute to atmospheric concentrations of ozone and secondary particulates when the required proper atmospheric conditions for formation are present.

What is not clear at this point is exactly what which facilities these might be and exactly how they are configured (locations, physical and operational characteristics, controls, permit limitations, monitoring, etc.). In recent years, MCC has been selling increasing amounts of coal from the West Elk Mine on the spot market. The spot market provides for a one-time open market transaction for near term delivery of coal (where near term is the quarter following the order date quarter) where the commodity is purchased at current market rates. Due to the nature of this market, it is not possible to determine in advance where this coal will be consumed (it is unknown where the coal will be delivered until the quarter before it gets delivered (https://www.eia.gov/coal/markets/)). A detailed analysis of any current and potential future contractual agreements between MCC and any coal fired facility power plant (or fuels broker) for a time in the future when the lease modification coal would be mined and MCC is unknown and outside the scope of this analysis, and neither the Forest Service nor BLM determines at which facilities the coal will be consumed.

Although it would be possible to provide an estimate of emissions associated with the burning of the mined coal at a specific facility; the types facility controls configurations, applicable regulatory structures, age, and firing practices make this exercise speculative, and impractical from a criteria pollutant disclosure standpoint. The facilities that could combust the coal purchased on the spot market are currently unforeseeable. Further, the heavily regulated nature of these combustion sources provides limited decision space or scope to the decision makers. However, the FS and BLM can disclose estimated emissions on broad geographic scales for pollutants reported and estimated by EPA's Emissions & Generation Resource Integrated Database (eGRID, 2014 v2). eGrid is a comprehensive source of data on the environmental characteristics of almost all electric power generated in the United States, and includes emissions for nitrogen oxides, sulfur dioxide, carbon dioxide, methane, and nitrous oxide; emissions rates; net generation; resource mix; and other attributes. For this analysis, we report the total nitrogen oxide and sulfur dioxide for West Elk coal combustion relative to the Colorado and U.S. average coal fired power plant fleet mix emissions rates (these are the only criteria pollutants reported to the eGrid database). The rates are derived by dividing the subtotal of the targeted fleet emissions (tons) by their heat input (MMbtu). West Elk coal is estimated to have a btu content of approximately 11,800 btu/lb. The total Colorado and U.S. eGrid based combustions emissions are shown in Table 3-10 below and are the result of multiplying the foreseeable total coal to be mined (cumulatively) by the derived emissions factors.

Because the afore mentioned specific facility configurations are not known, any further analysis or disclosure of either the other criteria and HAP related emissions and their locality related impacts to relative near-field or regional air resources is not feasible for this analysis. However, given the nature of these facilities, in that they are major stationary source of air pollution and are heavily regulated, any impacts resulting from their continued operations are highly likely to have been appropriately analyzed by the applicable permitting authority. Any impacts to local or regional air quality from these facilities would not exceed those already authorized, and in theory should be in compliance with all applicable standards regulating their operations. Compliance with applicable operating permits should provide for compliance with air quality standards within the areas where these facilities operate. Facilities with operations producing ambient air concentrations (as the result of compliance with a permit or rule) of a regulated pollutant less than an applicable standard (as determined and set by EPA) is equivalent to an insignificant affect as it relates to human health impacts. Given that these combustion facilities have operational parameters that are fixed regardless of the alternatives analyzed here, there is very little decision space or scope available to the decision makers to consider combustion related impacts as being significantly different in the context of any of the alternatives analyzed. Simply stated, we assume for the purposes of analysis that no new coal fired facilities will be brought online as a result of this decision, and no existing facilities will go offline for any alternative, regardless of the governments influence with this decision.

We can however also disclose the estimated GHG emissions from coal combustion due to the fact that specific facility details have less of an influence over these types of emissions, and few if any potential sources provide for carbon capture or otherwise abate these emissions presently. For the purposes of disclosure, we are providing estimates for the total foreseeable coal to be mined under the alternative. The total GHG emissions presented in Table 3-10 and are the result of multiplying the foreseeable total coal to be mined by the appropriate EPA emissions factors.

Table 3-10. Coal Combustion GHG Emissions (MMtons)

Coal (MMtons)	Colorado NO_X	Colorado SO_2	U.S. NO_X	U.S. SO_2	CO_2	CH_4	N_2O	CO_2e
53.5	0.14	0.096	0.114	0.238	137.11	0.016	0.002	138.22

EPA GHG emissions factor source: https://www.epa.gov/sites/production/files/2015-07/documents/emission-factors_2014.pdf (bituminous coal)

Similar to the direct affects discussion above, the GHG emissions from coal combustion will contribute to potential climate change impacts. A more detailed discussion of these impacts, and how the coal combustion emissions might contribute to it, is provided in the cumulative analysis section below.

3.4.3 Alternative 3 (Proposed Action) Environmental Effects

The lease modifications are estimated to extend the life by approximately 1.6 years. In addition to these reserves, another 3.3 million tons federal coal and 4.2 million tons of fee coal would be accessible on adjacent lands already under reserve. The total coal to be mined (in addition to the reserves under Alternative 1) based on the estimated production rates would be approximately 17.6 million tons over a total of approximately 2.7 years.

3.4.3.1 Direct Effects

The proposed lease modifications represent a continuation of the existing activity occurring at the mine location, and will not increase the intensity of operations above currently evaluated levels (there is no proposed change in the rate of coal extraction under any alternative). The current existing facilities would also be used for mining the proposed lease modification areas (there is no additional construction or capacity required to process the additional coal). These facilities include office, warehouse, shop, and coal handling units, and are located about 6 miles north of the proposed modifications. The mine would continue to develop and operate MDWs above active coal panel mining as necessary to meet the health and safety concerns as required by law. This alternative assumes a maximum production rate of 6.5 million tons of coal per year (the same as Alternative 1), and thus all of the air quality impacts associated with this alternative would be identical to those disclosed in Alternative 1.

This alternative is expected to produce methane emissions from the mine at a rate consistent with that shown in Table 3-7 above for approximately 10.9 more years. The total CO_2e of the methane released under this alternative is approximately 11.91 million tons.

In addition, this alternative includes an exploration plan proposal (see details in Table 2-3) that would allow MCC to ascertain the qualitative properties of the coal in the lease mod areas and formulate a mining strategy necessary to safety mine this coal. Given these details, the agencies estimated the emissions associated with the exploration activities (road construction, well pad construction, well drilling, and reclamation activities) using the same methods as described above for the MDW development. The data for the worst-case year out of the two years of planned exploration under this alternative (i.e., 6 pads, and acres of disturbance for the associated access roads) is summarized in Table 3-11 below. As can be seen from the table, the construction-related emissions are relatively small and are not expected to contribute significantly to localized or regional air quality degradation.

Table 3-11. Exploration Emissions (max tons per year)

Activity	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOC	HAPs	CO_2	CH_4	N_2O
Road / Well Pad Construction & Reclamation - Fugitive Dust	5.384	0.538	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	0.135	0.131	1.798	0.043	0.662	0.158	0.016	201.188	0.002	0.002
Wind Erosion	0.208	0.031	---	---	---	---	---	---	---	---
Commuting Vehicles - Crew Trips	2.859	0.286	0.030	0.000	0.198	0.011	0.001	9.787	0.001	0.002
Totals	**8.586**	**0.986**	**1.827**	**0.043**	**0.860**	**0.169**	**0.017**	**210.975**	**0.003**	**0.004**

3.4.3.2 Indirect Effects

Same as Alternative 1, with the exception of the total combusted coal estimates.

This alternative will incrementally contribute GHG emissions above those disclosed in alternative 1. However, the potential affects would be similar to those disclosed in the cumulative section below. This is due to the fact that no tools exist to describe how the minor amount of incremental GHG increase (relative to the cumulative, i.e. global annual GHG burden) would directly contribute to modeled climate change impacts (2100 future year projections) evaluated by the leading international scientific bodies (for example IPCC scientists).

Table 3-12. Coal Combustion Emissions (MMtons)

Coal (MMtons)	Colorado NO_X	Colorado SO_2	U.S. NO_X	U.S. SO_2	CO_2	CH_4	N_2O	CO_2e
71.1	0.187	0.129	0.151	0.317	182.22	0.021	0.003	183.69

EPA GHG emissions factor source: https://www.epa.gov/sites/production/files/2015-07/documents/emission-factors_2014.pdf (bituminous coal)

3.4.4 Alternative 4 Environmental Effects

Similar to Alternative 3, the lease modifications here would be expected to extend the life of the mine by another 2.6 years, which would allow for approximately 16.8 million tons of coal (in addition to the reserves under Alternative 1) to be mined from both federal and fee reserves that would be accessed from the modification.

3.4.4.1 Direct Effects

The proposed lease modification represents a continuation of the existing activity occurring at the mine location, and will not increase the intensity of operations above currently evaluated levels (there is no proposed change in the rate of coal extraction under any alternative). The current existing facilities would also be used for mining the proposed lease modification areas (there is no additional construction or capacity required to process the additional coal). These facilities include office, warehouse, shop, and coal handling units, and are located about 6 miles north of the proposed modifications. The mine would continue to develop and operate MDWs above active coal panel mining as necessary to meet the health and safety concerns as required by law. This alternative assumes a maximum production rate of 6.5 million tons of coal per year (the same as alternative 1), and thus all of the air quality impacts associated with this alternative would be identical to those disclosed in alternative 1.

This alternative is expected to produce methane emissions from the mine at a rate consistent with that shown in Table 3-7 above for approximately 10.8 more years. The total CO_2e of the methane released under this alternative is approximately 11.82 million tons.

For this alternative, exploration would be curtailed such that there would be roughly a 21% reduction in the access roads, and a projected reduction of 2 bore holes/pads needed to define the extent and parameters of the coal contained within the lease modification area. However, we assume that all of the exploration would more or less occur within a single year and that the intensity of such exploration would be approximately the same as that disclosed for alternative 3 in Table 3-12 above (with equally similar non-significant impacts).

3.4.4.2 Indirect Effects

Same as alternative 1, with the exception of the total combusted coal estimates. Same as alternative 1, with the exception of the total combusted coal estimates. This alternative will incrementally contribute GHG emissions above those disclosed in alternative 1, but less than those evaluated under alternative 3. However, the potential affects would be similar to those disclosed in the cumulative section below. This is due to the fact that no tools exist to describe how the minor amount of incremental GHG increase (relative to the cumulative, i.e. global annual GHG burden) would directly contribute to modeled climate change impacts (2100 future year projections) evaluated by the leading international scientific bodies (for example IPCC scientists).

Table 3-13. Coal Combustion GHG Emissions (MMtons)

Coal (MMtons)	Colorado NO_X	Colorado SO_2	U.S. NO_X	U.S. SO_2	CO_2	CH_4	N_2O	CO_2e
70.3	0.184	0.127	0.15	0.313	180.17	0.021	0.003	181.62

EPA GHG emissions factor source: https://www.epa.gov/sites/production/files/2015-07/documents/emission-factors_2014.pdf (bituminous coal)

3.4.5 Cumulative Effects & Climate Change

3.4.5.1 Cumulative Effects

To examine potential cumulative air quality impacts from activities that it authorizes, BLM initiated the Colorado Air Resources Management Modeling Study (CARMMS). The study was primarily concerned with assessing statewide impacts of projected oil and gas development (both federal and fee (i.e., private)) out to year 2021 for three development scenarios (low, medium, and high). Projections for development are based on either the most recent Reasonably Foreseeable Development (RFD) document (high), or a projection of the current 5-year average development pace forward to 2021 (low). The medium scenario includes the same well count projections as the high scenario, but assumes restricted emissions, whereas the high assumes current development practices and existing emissions controls required by regulations (2012). Each BLM field office was modeled with the source apportionment (SA) 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 (see other sections and affected populations in Section 3.35).

The CARMMS study leverages the work completed by the WestJumpAQMS, and the base model platform configuration (CAMx), meteorology (WRF), and model performance metrics are based on those products. The complete report and associated data is available on our website at https://www.blm.gov/sites/blm.gov/files/program_natural%20resources_soil%20air%20water_airco_quick%20link_CARMMS.pdf. The CARMMS model domain has a minimum grid resolution of 4km.