



**Identifying Opportunities for Methane Recovery
at U.S. Coal Mines: Profiles of Selected Gassy
Underground Coal Mines (2002–2016)**
Updated July 2019



Executive Summary

This report provides information about specific opportunities to develop methane recovery and use projects at large, underground coal mines in the United States (U.S.). It contains profiles of the 35 gassiest U.S. coal mines (by state in Chapter 4), and provides details about ongoing recovery and use projects at 13 of these mines (Table 4-13). The U.S. Environmental Protection Agency (EPA) designed the profiles to help mine owner/operators and project developers perform an initial screening of potential projects. While the mines profiled in this report appear to be good candidates for a coal mine methane (CMM) project, a detailed evaluation would need to be done on a site-specific basis to determine whether the development of a specific methane recovery and use project is technically and economically feasible.

Total CMM produced from gas drainage systems peaked at 59 billion cubic feet (Bcf) in 2010, and has since declined to 42 Bcf in 2016. The amount of CMM recovered and used also peaked in 2010 at 49 Bcf, but has since declined to 34 Bcf in 2016. The decline in gas drainage and CMM utilization is due to several factors, including changes in the gas content of mined coals, natural fluctuations in methane production, a continued reduction in underground coal production, closure of a limited number of gassy mines, and low natural gas prices.

Methane Emissions and Recovery Opportunities

Methane is a greenhouse gas (GHG) that exists in the atmosphere for approximately 9–15 years. As a GHG, methane is more than 25¹ times more effective in trapping heat in the atmosphere than carbon dioxide (CO₂) over a 100-year period. Major anthropogenic sources of methane include landfills, natural gas and petroleum systems, agricultural activities, coal mining, stationary and mobile combustion, wastewater treatment, and certain industrial processes.

As a primary constituent of natural gas, methane is a relatively clean-burning energy source. Utilizing CMM emissions using commercially available, cost-effective technologies can provide significant energy, economic, and environmental benefits.

EPA

EPA's Coalbed Methane Outreach Program (CMOP) has worked voluntarily with the coal mining industry and other key stakeholders since 1994 to recover and use methane released in and emitted from mines. CMOP supports CMM project development to overcome institutional, technical,

¹ EPA. 2019. *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990–2017*. EPA 430-R-19-001. U.S. Environmental Protection Agency. Available: <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks>. Accessed 5/30/2019.

regulatory, and financial barriers to implementation; and educate the general public on the benefits of CMM recovery. More specifically, these efforts include:

- Identifying, evaluating, and promoting methane reduction options, including technological innovations and market mechanisms to encourage project implementation
- Workshops to educate the CMM project development community on the environmental, mine safety, and economic benefits of methane recovery
- Preparing and disseminating reports and other materials that address topics ranging from technical and economic analyses to overviews of legal issues
- Interfacing with all facets of the industry to advance project development
- Conducting pre-feasibility and feasibility studies for U.S. mines that examine a range of end-use options
- Managing a website that is an important information resource for the CMM industry.

CMM Recovery Opportunities

In the U.S., coal mines account for approximately 9 percent of all manmade methane emissions (EPA, 2018); however, the recovery and use of CMM has been in practice for many years. Today, there are methane recovery and use projects at active underground mines in Alabama, Colorado, Pennsylvania, Virginia, and West Virginia. In addition, as shown in this report, there are other gassy coal mines where utilization projects do not exist, but that could offer the potential for the profitable recovery of methane.

CMM projects deliver direct financial benefits to project operators through the sale of gas to pipelines or for use in applications ranging from electric power generation to industrial uses. In addition, indirect financial and economic benefits may also be realized. To illustrate the impact of methane recovery, developing a project at a mine recovering 300 thousand cubic feet of methane per year could feed a 3-megawatt power plant, and result in GHG emissions reductions equating to about 125,000 tonnes carbon dioxide equivalent (tCO_{2e}).² Because of the large environmental benefits that may be achieved, CMM projects could serve as cost-effective alternatives for utilities and other industries seeking to offset their own GHG emissions. For example, certain CMM projects produce emissions offsets that can be sold into the California Cap-and-Trade program, generating a source of revenue for the project in addition to gas sales in energy and industrial markets.

CMM projects also provide other benefits. Degasification systems prevent gas from escaping in mine working areas, increase methane recovery, improve worker safety, and reduce ventilation costs. Increased recovery also reduces methane-related mining delays. To learn about CMM capture-and-use technologies, visit the CMOP website at <https://www.epa.gov/cmop>.

Opportunities for Methane Recovery Projects

This report profiles the 35 gassiest U.S. coal mines (Chapter 4), and provides details about ongoing recovery and use projects at 13 of these mines. Since the last version of this document was published in 2017, the number of mines with gas drainage systems nationwide decreased from 26 in 2015 to 25 in 2016. Twenty of these mines with gas drainage systems are profiled in this document (Table 4-8). Further, the number of mines with active methane recovery and use

² The CO_{2-e} of methane emissions is calculated by determining the weight of the methane collected (on a 100% basis), using a density of 19.2 grams per cubic feet (cf). The weight is then multiplied by the global warming potential of methane, which is 25 times greater than CO₂ over a 100-year time period. This value is downwardly adjusted to account for CO₂ emissions from combustion of the methane at some point in the supply chain. One metric tonne (t) of combusted methane produced 2.75 tCO₂.

projects decreased from 18 in 2015 to 15 in 2016. At least 13 of these mines already sell recovered methane, and at least 3 mines consume methane onsite for power generation, to heat mine ventilation air, flare CMM, or use produced gas as fuel in onsite vacuum pumps. This document only profiles 13 out of the 15 mines with use projects (Table 4-13). The Road Fork #51 Mine in West Virginia and the Emerald Mine No. 1 in Pennsylvania have pipeline utilization projects. Mine drainage systems in place may be especially good candidates for the development of cost-effective methane recovery and use projects because a ready supply of high- or medium-concentration mine gas already exists.

There are also projects at abandoned mines in the U.S.; however, this report only profiles mines that were active in 2016. For additional information on methane recovery projects at abandoned coal mine sites, see the EPA report, *U.S. Abandoned Coal Mine Methane Recovery Project Opportunities*, available on the CMOP website at <https://www.epa.gov/cmop/coal-mine-methane-sources#abandonedUndergroundMines>.

Surface mines may also be candidates for recovery and utilization projects. Surface mine opportunities are addressed in EPA's report, *U.S. Surface Coal Mine Methane Recovery Project Opportunities*, which is available on the CMOP website at <https://www.epa.gov/cmop/coal-mine-methane-sources#activeSurfaceMines>.

Overview of Methane Liberation, Drainage, and Use at Profiled Mines

This report profiles 35 mines located in 9 states (Chapter 4). West Virginia has the largest number of profiled mines with 12 mines; followed by Illinois with 6; Alabama, Indiana, and Pennsylvania with 4; Virginia with 2; and Colorado, New Mexico, and Oklahoma with 1 each. In 2016, the 35 mines profiled in this report liberated an estimated 289 million cubic feet per day (mmcf/d) of methane, or about 105 Bcf/yr (89 percent of all methane liberated from underground mines in the U.S.).

As of 2016, 20 of the profiled mines operate drainage systems although not all systems were operational that year. West Virginia has the largest number with seven; followed by Pennsylvania and Alabama with four each; Indiana with two; and Colorado, New Mexico, and Virginia with one each. In 2016, the 20 mines operating drainage systems reported an estimated 114 mmcf/d of methane drained, or about 41 Bcf/yr. Table 4-8 shows mines that employ drainage systems, the type of drainage system employed, and the estimated drainage efficiency.

Summary of Opportunities for Project Development

Most underground coal mines in the U.S. still do not recover and use methane. However, the profiles in this report indicate that many of these mines appear to be strong candidates for cost-effective recovery projects that potentially could result in substantial environmental, economic, and energy benefits.

The featured mines are quite variable in terms of the amount of methane they liberate, their gassiness or "specific emissions" (methane liberated per ton of coal mined), and their annual coal production. The volume of methane liberated from each mine ranges from 2 mmcf/d to over 62 mmcf/d. Similarly, specific emissions range from 182 cf/ton to approximately 12,389 cf/ton. Annual coal production ranges from approximately 0.3 million tons at some mines to over 12 million tons per year at others. These metrics affect each mine's potential as a project opportunity. Furthermore, as shown in the profiles (Chapter 4), the candidate mines vary with respect to other important metrics, such as the distance from the mine to a natural gas pipeline.

Accordingly, the overall feasibility of developing a methane recovery project will likely vary widely among the candidate mines.

Use of the profiles in this document can serve to guide interest and decision-making on prospects for CMM project development and implementation, with the goal of focusing attention on those mines that present the most favorable opportunities in the near- to medium-term based on publicly available data. Users should still remember, however, that mining and market conditions often change. Further, mines not listed in this edition of the Gassy Mine Profiles may also present attractive CMM opportunities in the future, whether they are existing mines with growing gas emissions or new mines being developed to mine gassy seams.

Acknowledgements

This document provides profiles of underground gassy U.S. mines compiled by EPA's Coalbed Methane Outreach Program (CMOP).

The EPA thanks the U.S. Mine Safety and Health Administration for the ventilation emissions data used in this document.

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Terms Used in Report

Coalbed methane: A generic term for the methane-rich gas naturally occurring in coal seams typically comprising 80 percent to 95 percent methane with lower proportions of ethane, propane, nitrogen, and carbon dioxide. In common international use, this term refers to methane recovered from un-mined coal seams using surface boreholes.

Coal mine methane (CMM): Gas captured at a working coal mine by underground methane drainage techniques. The gas consists of a mixture of methane and other hydrocarbons and water vapor. It is often diluted with air and associated oxidation products due to the unavoidable leakage of air into gas drainage boreholes or galleries through mining-induced fractures, and also due to air leakage at imperfect joints in underground pipeline systems. Any gas captured underground, whether drained in advance of or after mining, and any gas drained from surface gob wells is included in this definition. Pre-mining drained CMM can be of high purity and is considered CMM only when the well is mined through.

Coal Mine Methane Inventory: The U.S. Environmental Protection Agency publishes an annual *Inventory of U.S. Greenhouse Gas Emissions and Sinks*, which includes a comprehensive assessment of methane emissions from coal mining, including emissions from active underground and surface mines, post-mining emissions, and abandoned mines.

Degasification system: Refers to methods for capturing the naturally occurring gas in coal seams to prevent it from entering mine airways. The gas can be removed from coal seams in advance of mining using pre-drainage techniques and from coal seams disturbed by the extraction process using post-drainage techniques. If methane is the main gas component target to be captured, this is often referred to as **methane drainage** and mine degasification. A drainage system may consist of only one well or borehole or multiple wells or boreholes.

Methane drained: The amount of methane removed via a drainage system.

Methane emissions: This is the total amount of methane that is not used and therefore emitted to the atmosphere. Methane emissions are calculated by subtracting the amount of methane used from the amount of methane liberated (emissions = liberated – used).

Methane liberated: The total amount of methane that is released, or liberated, from the coal and surrounding rock strata during the mining process. This total is determined by summing the volume of methane emitted from the ventilation system and the volume of methane that is drained.

Methane recovered: The amount of methane that is captured through methane drainage systems.

Methane used: The amount of captured methane put to productive use (e.g., natural gas pipeline injection, fuel for power generation) or destroyed (e.g., flaring or oxidation).

Ventilation air methane (VAM): Methane emitted from coal seams that enters the ventilation air and is exhausted from the ventilation shaft at a low concentration, typically in the range of 0.01 percent to 1.0 percent by volume.

Ventilation system: A system that is used to control the concentration of methane within mine working areas. Ventilation systems consist of powerful fans that move large volumes of air through the mine workings to dilute methane concentrations.

Abbreviations

Bcf	billion cubic feet
CARB	California Air Resources Board
CCO	California Compliance Offset
cf	cubic feet
CMM	coal mine methane
CMOP	Coalbed Methane Outreach Program
CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalent
EPA	U.S. Environmental Protection Agency
GHG	greenhouse gas
ID	identification
mcf	thousand cubic feet
mmcf	million cubic feet
MSHA	Mine Safety and Health Administration
NA	not available
T (or T)	short ton (for coal production)
U.S.	United States
VAM	ventilation air methane

1. Introduction

Purpose of Report

This report provides information about specific opportunities to develop methane recovery and use projects at gassy underground mines in the United States (U.S.). The audience for this report consists of those who may be interested in identifying such opportunities, including coal miners, utilities, gas resource developers, independent power producers, and local industries or institutions that could directly use the methane recovered from a nearby mine.

This introduction provides a broad overview of the technical, economic, regulatory, and environmental issues concerning methane recovery from coal mines. Chapter 2 contains information that will assist the reader in understanding and evaluating the data presented in Chapters 3 and 4. Chapter 3 contains data summary tables, and finally, Chapter 4 profiles individual underground coal mines that appear to be good candidates for the development of methane recovery projects.

Recent Developments in the Coal Mine Methane Industry

Since the last version of this document was published in August 2017, the number of mines with gas drainage systems decreased from 26 in 2015 to 25 in 2016, and the number of mines with active methane recovery and use projects decreased from 18 in 2015 to 15 in 2016 (Figure 1-1). The total methane produced from gas drainage systems declined from 48 billion cubic feet (Bcf) to 42 Bcf, but the amount of methane recovered and used remained constant at 34 Bcf from 2015 to 2016 (Figure 1-1). Gas drainage and coal mine methane (CMM) use peaked in 2010 with 59 Bcf drained and 49 Bcf used. The decline in drainage and utilization since 2010 is due to several factors, including changes in the gas content of mined coals, natural fluctuations in methane production, a continued reduction in underground coal production, closures of some gassy mines, and low natural gas prices.

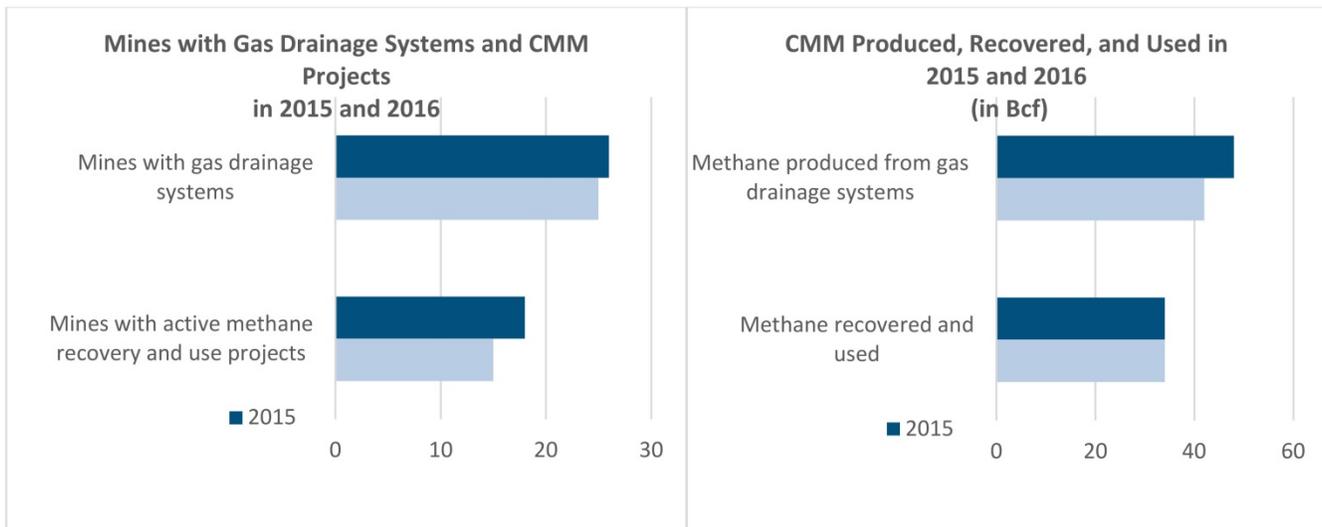


Figure 1-1: Comparison of CMM Projects and CMM Drainage, Recovery, and Use in 2015 and 2016

Coal production from underground mines decreased significantly in 2015 and 2016, and several gassy mines either closed or were

idled for significant periods of time, reducing the volume of available gas. Low natural gas prices resulting from the rapid growth in

natural gas supply from hydraulically fractured gas wells made utilization of some drained gob gas uneconomic. This led to larger volumes being vented rather than being treated and sold to natural gas pipelines. In 2010, for example, 84 percent of the drained methane was used, but in 2016, only 80 percent of the available drained gas was utilized.

Despite these challenges, many promising developments are expected to encourage greater CMM capture and use in future years. Two commercial ventilation air methane (VAM) projects have been implemented in the U.S. since 2009. The Biothermica VAM project operated at the Warrior Met Coal Blue Creek Number 4 Mine from 2010 to 2013; and the Verdeo McElroy VAM Project began operation at the Murray Energy Marshall County Mine in 2012 (then the CONSOL McElroy Mine), and remains in operation as of September 2018. The success in demonstrating both the technical and commercial viability of these projects suggests the potential for additional VAM project deployment in coming years.

In addition, another notable development has been the California Air Resources Board (CARB) adoption of the Mine Methane Capture Protocol allowing CMM projects, other than natural gas pipeline sales, to qualify as offsets in the California Cap-and-Trade program. CARB allows covered entities to purchase and trade California Compliance Offsets (CCOs), including emissions reductions from CMM projects anywhere in the U.S. This has renewed interest in CMM projects, especially VAM destruction projects and projects that use drained gas for power production, flaring, and liquefied or compressed natural gas production. CCO prices are attractive and capable of generating cash flow to make the projects economically sustainable. Since the adoption of the Protocol, CCO prices have ranged from \$9.00 to 14.00 per metric ton of CO₂ equivalent (CO₂e).³

Figure 1-2 shows the number of mines engaging in CMM recovery and use since 1994. Figure 1-3 shows the volume of gas recovered from CMM projects since 1990. Table 1-1 and Table 1-2 summarize the methane recovery and use projects.

³ California Carbon. 2019. California Carbon.info.

Trading & Auctions. Available: <http://californiacarbon.info/>. Accessed 5/30/2019.

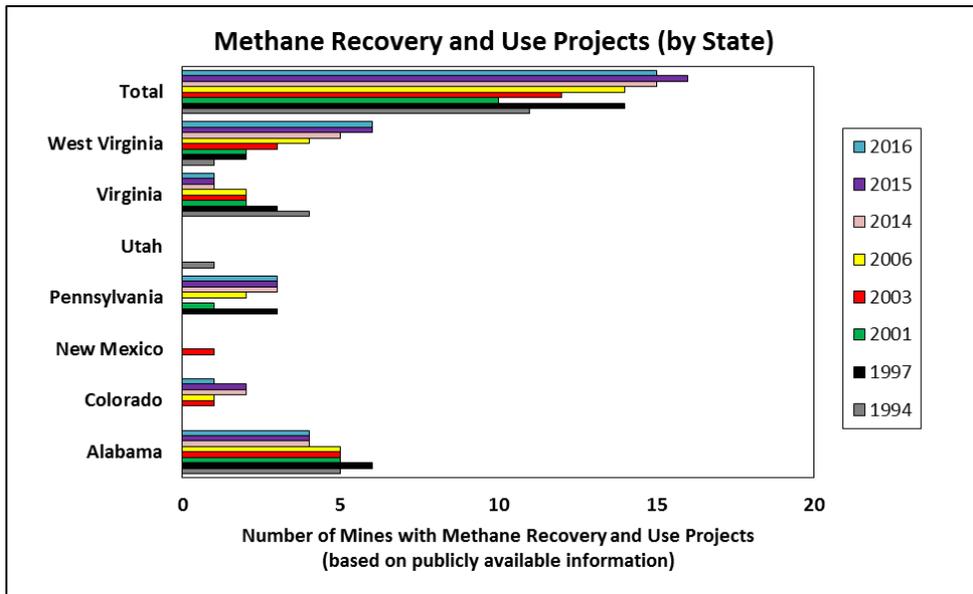


Figure 1-2: Mines with Active Coal Mine Methane Recovery and Use Projects

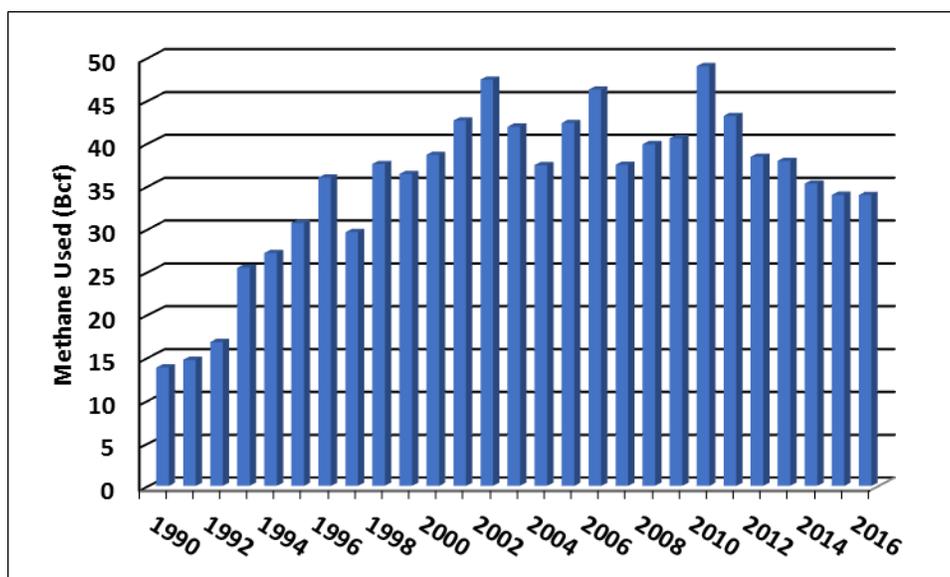


Figure 1-3: Estimated Annual Use of Methane Recovered from U.S. Coal Mines (based on publicly available information)

Table 1-1: Summary of Existing Methane Recovery and Use Projects in Alabama, Colorado, Pennsylvania, and Virginia

Mine Name	Mine Location (State)	Approximate Amount of Gas Used in 2016*	Methane Use Option	Notes	Degasification System
No. 4 Mine No. 7 Mine	Alabama	22.5 mmcf/day	Pipeline sales	The two mines collectively liberated 42.4 mmcf/day of gas in 2015.	Vertical gob boreholes; horizontal pre-mine boreholes; vertical pre-mine boreholes
Oak Grove	Alabama	3.3 mmcf/day	Pipeline sales	Most of the production in the Oak Grove Field is beyond the limits of the mine plan and is therefore not included in this summary.	Vertical gob boreholes; horizontal pre-mine boreholes; vertical pre-mine boreholes
Shoal Creek	Alabama	6.8 mmcf/day	Pipeline sales	Most of the production from the White Oak Field is outside the limits of the mine plan and is therefore not included in this summary.	Horizontal gob boreholes with pumps
West Elk Mine	Colorado	0.2 mmcf/day	Heaters	Began recovering methane in 2003. Used for heating the mine.	Horizontal and vertical gob boreholes with pumps
Cumberland Mine	Pennsylvania	1.0 mmcf/day	Pipeline sales	Began recovering methane in 2005.	Vertical gob boreholes with pumps
Bailey Mine	Pennsylvania	Small volumes	Pipeline sales		Vertical gob boreholes with pumps
Buchanan Mine #1	Virginia	53.8 mmcf/day	Pipeline sales, onsite power generation	This mine liberated 62.7 mmcf/day of gas in 2016.	Vertical gob boreholes; horizontal pre-mine boreholes; vertical pre-mine boreholes

mmcf = million cubic feet.

Table 1-2: Summary of Existing Methane Recovery and Use Projects in West Virginia

Mine Name	Mine Location (State)	Approximate Amount of Gas Used in 2015*	Methane Use Option	Notes	Degasification System
Monongalia County Mine (formerly Blacksville #2 Mine) Marion County Mine (formerly Loveridge No. 22)	West Virginia	0.3 mmcf/day	Pipeline sales	The two mines liberated 22.4 mmcf/day in 2016. Now owned by Murray Energy, the prior owner/operator CONSOL Energy began reporting methane recovered from the two mines together in 2005.	Vertical gob boreholes with pumps and horizontal pre-drainage wells
Pinnacle Mine	West Virginia	0.2 mmcf/day	Pipeline sales	A unique, horizontal pre-mine drainage program is utilized using a pinnate pattern.	Horizontal gob boreholes with pumps
Marshall County Mine (formerly McElroy Mine)	West Virginia	2.4 mmcf/day	VAM destruction	Largest commercial VAM project to date; started in 2012 and use of drained gas for pipeline sales started in 2009	No drainage
Harrison County Mine (formerly Robinson Run Mine)	West Virginia	0.3 mmcf/day	Pipeline sales	Started in 2015	Horizontal pre-drainage wells

*For use of drained gas, the U.S. Environmental Protection Agency (EPA) only includes gas drained and used from wells that are located within the coal mining plan, and only counts the gas as “coal mine methane” rather than coalbed methane once the well is mined through.

2. Mine Profiles Guide

Chapter 2 contains information that will assist the reader in understanding and evaluating the data presented in Chapters 3 and 4.

This report contains profiles of the 35 gassiest U.S. coal mines (Chapter 4), and provides details about ongoing recovery and use projects at 13 of these mines. The profiled mines were selected primarily based on their annual methane liberation from ventilation systems as recorded in quarterly U.S. Mine Safety and Health Administration (MSHA) inspections used for the U.S. Coal Mine Methane Inventory found in the *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990–2016*.

The mine profiles presented in this report are designed to assist in identifying mines that can sustain a profitable methane recovery and use project. Each mine profile is comprised of the following sections:

- Geographic data
- Corporate information
- Mine address
- General information regarding the mine
- Production, ventilation, and drainage data

Chapter 3 includes summary tables (Table 3-1 through Table 3-13) that list key data elements shown in the mine profiles. The individual mine profiles follow the summary tables and are ordered alphabetically by state, and arranged by mine name in Chapter 4. Below are explanations for each of the data elements included in the mine profiles.

Mine Status

Each mine's operating status as of September 2018 is listed at the top left-hand corner of each profile. The operating status may be listed as described below.

Active: These mines are currently producing coal.

Non-Producing: A mine that is open but not currently producing coal.

Temporarily Idled: A mine that is open but has temporarily ceased coal production.

All mines profiled in this version are classified as either Active or Non-Producing. The current operating status was determined by reviewing the MSHA Mine Data Retrieval System at <http://arlweb.msha.gov/drs/drshome.htm>.

Drainage System

The presence of a drainage system is indicated at the top right-hand corner of each profile. If a drainage system is used at the mine, "Yes" appears in the Drainage System field.

Use Project

If a mine recovers (captures) and uses methane, the type of utilization project is designated in this field in the top left-hand side of the profile under mine status. Use projects include pipeline injection, electric power, and heaters. If there is currently no use project at the mine, "NA" (not available) appears in the field.

MSHA ID

This field in the top right-hand side of the profile under the drainage system contains the mine's identification (ID) from MSHA.

Geographic Data

The first section of each profile gives the geographic location of the mine, including the state, county, coal basin where the mine is located, and the coalbed(s) from which it produces coal. The sources for this information were MSHA (2018) and Coal Age (2016).

State: Mines included in this report are located in the following states – Alabama, Colorado, Illinois, Indiana, New Mexico, Oklahoma, Pennsylvania, Virginia, and West

Virginia. Table 4-2 shows the mines listed by state.

County: A relatively small number of counties contain a majority of the gassy mines in the entire U.S. Table 4-2 shows the mines listed by state and county.

Basin: Mines are located in one of the major coal producing regions: The Black Warrior Basin, the Central Appalachian Basin, the Northern Appalachian Basin, the Illinois Basin, or one of the "Western basins" (Central Rockies, San Juan, or Uinta Basin), which are located in the states of Colorado, Utah, and New Mexico. Major geological characteristics of coal seams, including methane content, sulfur content, depth, and permeability tend to vary by basin and within a basin. Table 4-3 lists the mines by coal basin.

Corporate Information

Current Operator: Current operator refers to the mining company that operates the mine. Table 4-4 lists the mines by owner/parent company. The source for this information was the MSHA database (MSHA, 2018).

Owner/Parent Company: Many coal mines are owned by a parent company. In addition to showing the coal companies, Table 4-4 also shows the parent corporation of the mining company. This information was taken from MSHA (2018), or based on industry knowledge.

Previous Owner(s): The names of previous mine owners are useful due to the degree of restructuring in the coal industry since 2008. This information, along with the previous or alternate name of the mine, is based on the MSHA database (MSHA, 2018) and industry knowledge.

Previous or Alternate Name of Mine: Mines frequently undergo name changes, particularly when they are purchased by a new company. This section lists previous or alternate mine names.

Mailing Address

This field includes the mailing address of the mine. The principal source of this information was MSHA (2018). The information in this section is current as of September 2018.

General Information

Number of Employees at Mine: This field shows the number of people employed by the mine, as reported by the MSHA Mine Data Retrieval System (MSHA, 2018). The total number of employees during 2016 was used.

Year of Initial Production: This field indicates the age of the mine. For mines appearing in previous additions of the mine profiles, those were used. Otherwise, the MSHA Mine Data Retrieval System was used (MSHA, 2018).

Mining Method: Mines are classified as either longwall or continuous (room-and-pillar), based on *Coal Age* magazine's annual longwall survey (Coal Age, 2016) and on information in coal industry publications. The mining method used is important for several reasons. First, longwall mines tend to emit more methane than room-and-pillar mines, as the longwall technique tends to cause a more extensive collapse and relaxation of the methane-rich strata surrounding the coal seam. Most of the high-emitting mines profiled in this document use the longwall mining method. Table 4-5 lists mines by mining method.

Primary Coal Use: Coal may be used for steam and/or metallurgical purposes. Steam coal is used by utilities to produce electricity, while metallurgical coal is used to produce coke. The primary coal use is based on information from annual Security and Exchange Commission filings, parent company annual reports, and industry websites. Table 4-6 lists mines by primary coal use.

Production, Ventilation, and Drainage Data

This section presents the quantity of methane emitted from, and the amount of coal produced by the profiled mines for each year from 2002 to 2016.

Coal Production: Annual coal production is an important factor in determining a mine's potential for profitable methane recovery. Generally, larger mines will be better candidates because they will have potential for high methane production and they are more likely to be able to finance capital investments in methane recovery and utilization projects. Coal production is derived primarily from the MSHA database (MSHA, 2018). Table 3-7 lists the coal mines by the amount of coal they produced in 2016.

Estimated Total Methane Liberated: Methane liberation is the total volume of methane that is removed from the mine by ventilation and drainage. Liberation differs from emissions in that the term emissions, as used in this report, refers to methane that is not used and is therefore emitted to the atmosphere. For mines that do not use or sell any of their methane, estimated total methane liberated equals estimated methane emissions to the atmosphere. Table 3-9 shows mines listed by their estimated total daily methane liberation for 2016.

Emissions from Ventilation Systems: Methane released to the atmosphere from ventilation systems is emitted in very low concentrations (typically less than 1 percent in air). MSHA field personnel test methane emission rates at each coal mine on a quarterly basis. Testing is performed underground at the same location each time. However, MSHA does not necessarily conduct the tests at precise three-month intervals, nor are they always taken at the same time of day. The ventilation emissions data for a given year are therefore averages of the four quarterly tests, and are accurate to the extent that the data collected at those four times are representative of actual emissions. Table 3-10 lists the mines

by their 2016 ventilation emissions, as reported by EPA's Greenhouse Gas (GHG) Inventory (EPA, 2018).

Estimated Methane Drained: Mines that employ degasification systems emit large quantities of methane in high concentrations. Table 3-11 lists mines according to the estimated daily methane drained. Based on information obtained from EPA's GHG Inventory (EPA, 2018), EPA has developed a list of 20 U.S. mines that have drainage systems in place, and have active utilization projects or a high potential for implementing a utilization project.

Estimated specific Emissions: "Specific emissions" refer to the total amount of methane liberated per ton of coal that is mined. Specific emissions are an important indicator of whether a mine is a good candidate for a methane recovery project. In general, mines with higher specific emissions tend to have stronger potential for methane recovery. Table 3-12 shows a list of mines ordered according to specific emissions in 2016. Note that the coal production and methane liberation values shown in this report have been rounded, whereas the data actually used to calculate the specific emissions values have not been rounded. Therefore, the specific emissions data shown in this report may differ from results that the reader would obtain by dividing the methane liberation values by the coal production values. This difference is strictly due to rounding, and does not reflect any error in the calculation of the methane liberated.

Methane Used: Methane used refers to the total amount of drained methane and captured VAM that was put to productive use (e.g., natural gas pipeline injection, fuel for onsite power generation). Methane used does not always equal methane drained as some mines vent the methane liberated from degasification systems to the atmosphere. Table 3-13 shows a list of mines employing methane recovery and use projects.

Estimated Current Drainage Efficiency:

Drainage efficiency is the quantity of methane produced by the gas drainage system divided by the total quantity of methane released at the mine by the mine's methane drainage and mine ventilation systems. Expressed as a percentage, it is a measure of the effectiveness of the gas drainage system. It also provides insight into the remaining volumes of methane that could be potentially extracted by gas drainage. Where a mine employs only ventilation to remove gas from the underground workings, there is no drainage efficiency value.

Estimated Current Market Penetration: In order to estimate the market penetration of CMM utilization, this field represents the percentage of drained methane that is used rather than vented to the atmosphere. Mines

already draining methane that do not fully utilize, or do not utilize at all, the methane drained represent potential CMM project opportunities.

Drainage System Used: 20 of the mines profiled in this report used some type of drainage (or degasification) system to capture coal mine methane in 2016. One additional mine had previously used methane drainage but did not do so in 2016. Drainage systems used include vertical pre-mine boreholes (drilled in advance of mining), vertical gob wells, long-hole horizontal pre-mine boreholes, and horizontal pre-mine boreholes. Table 3-8 lists mines by drainage system used.

3. Mine Summary Tables

Chapter 3 contains data tables (Table 3-1 through Table 3-13) summarizing information for the 35 gassiest U.S. mines.

Table 3-1: Mines Listed Alphabetically

Mine Name	State
American Eagle Mine	WV
The American Coal Company New Era Mine	IL
The American Coal Company New Future Mine	IL
Bailey Mine	PA
Beckley Pocahontas Mine	WV
Buchanan Mine #1	VA
Cumberland Mine	PA
Deep Mine 41	VA
Enlow Fork Mine	PA
Federal No. 2	WV
Gibson Mine	IN
Gibson South	IN
Hamilton County Coal Mine #1	IL
Harrison County Mine	WV
Harvey Mine	PA
Leer Mine	WV
Mach #1 Mine	IL
Marion County Mine	WV
Marshall County Mine	WV
MC #1 Mine	IL
Monongalia County Mine	WV
No. 4 Mine	AL
No. 7 Mine	AL
Oak Grove	AL
Oaktown Fuels Mine No. 1	IN
Oaktown Fuels Mine No. 2	IN
Ohio County Mine	WV
P8 North	OK
Pattiki Mine	IL
Pinnacle Mine	WV
San Juan Mine 1	NM
Sentinel Mine	WV
Shoal Creek	AL
Tunnel Ridge Mine	WV
West Elk Mine	CO

Table 3-2: Mines Listed by State and County

Mine Name	State	County
Oak Grove	AL	Jefferson
Shoal Creek	AL	Jefferson
No. 4 Mine	AL	Tuscaloosa
No. 7 Mine	AL	Tuscaloosa
West Elk Mine	CO	Gunnison
MC #1 Mine	IL	Franklin
Hamilton County Coal Mine #1	IL	Hamilton
The American Coal Company New Era Mine	IL	Saline
The American Coal Company New Future Mine	IL	Saline
Pattiki Mine	IL	White
Mach #1 Mine	IL	Williamson
Gibson Mine	IN	Gibson
Gibson South	IN	Gibson
Oaktown Fuels Mine No. 1	IN	Knox
Oaktown Fuels Mine No. 2	IN	Knox
San Juan Mine 1	NM	San Juan
P8 North	OK	Le Flore
Bailey Mine	PA	Greene
Cumberland Mine	PA	Greene
Enlow Fork Mine	PA	Greene
Harvey Mine	PA	Greene
Buchanan Mine #1	VA	Buchanan
Deep Mine 41	VA	Dickenson
Sentinel Mine	WV	Barbour
American Eagle Mine	WV	Kanawha
Harrison County Mine	WV	Harrison
Marion County Mine	WV	Marion
Marshall County Mine	WV	Marshall
Ohio County Mine	WV	Marshall
Federal No. 2	WV	Monongalia
Monongalia County Mine	WV	Monongalia
Tunnel Ridge Mine	WV	Ohio
Beckley Pocahontas Mine	WV	Raleigh
Leer Mine	WV	Taylor
Pinnacle Mine	WV	Wyoming

Table 3-3: Mines Listed by Coal Basin

Coal Basin/Mine Name
Black Warrior
No. 4 Mine
No. 7 Mine
Oak Grove
Shoal Creek
Central Appalachian
American Eagle Mine
Beckley Pocahontas Mine
Buchanan Mine #1
Deep Mine 41
Pinnacle Mine
Illinois
The American Coal Company New Era Mine
The American Coal Company New Future Mine
Gibson Mine
Gibson South
Hamilton County Coal Mine #1
Mach #1 Mine
MC #1 Mine
Oaktown Fuels Mine No. 1
Oaktown Fuels Mine No. 2
Pattiki Mine
Northern Appalachian
Bailey Mine
Cumberland Mine
Enlow Fork Mine
Federal No. 2
Harrison County Mine
Harvey Mine
Leer Mine
Marion County Mine
Marshall County Mine
Monongalia County Mine
Ohio County Mine
Sentinel Mine
Tunnel Ridge Mine
Western
San Juan Mine 1
West Elk Mine
Western Interior
P8 North

Table 3-4: Mines Listed by Company

Owner/Parent	Operator	Mine Name
Arch Coal Inc.	ACI Tygart Valley	Leer Mine
	ICG Beckley LLC	Beckley Pocahontas Mine
	Mountain Coal Company, LLC	West Elk Mine
	Wolf Run Mining LLC	Sentinel Mine
Westmoreland Coal Company	San Juan Coal Company	San Juan Mine 1
Seneca Coal Resources LLC	Oak Grove Resources LLC	Oak Grove Mine
	Pinnacle Mining Company LLC	Pinnacle Mine
CONSOL Energy Inc.	CONSOL Pennsylvania Coal Company	Bailey Mine
	CONSOL Pennsylvania Coal Company	Enlow Fork Mine
	CONSOL Pennsylvania Coal Company	Harvey Mine
Coronado IV, LLC	Buchanan Minerals, LLC	Buchanan Mine #1
Drummond Company Inc.	Drummond Company Inc.	Shoal Creek
Contura Energy, Inc.	Cumberland Coal Resources LP	Cumberland Mine
	Paramount Contura, LLC	Deep Mine 41
Murray Energy Corp	The American Coal Company	The American Coal Company New Era Mine
	The American Coal Company	The American Coal Company New Future Mine
	Marion County Coal Company	Marion County Mine
	Harrison County Coal Company	Harrison County Mine
	Ohio County Coal Company	Ohio County Mine
	Marshall County Coal Company	Marshall County Mine
	Monongalia County Coal Company	Monongalia County Mine
Virginia Conservation Legacy Fund, Inc.	ERP Federal Mining Complex LLC	Federal No. 2
Warrior Met Coal LLC	Warrior Met Coal Mining, LLC	No. 4 Mine
	Warrior Met Coal Mining, LLC	No. 7 Mine
Foresight Energy	M-Class Mining LLC	MC #1 Mine
	Mach Mining LLC	Mach #1 Mine
Hallador Energy Company	Sunrise Coal LLC	Oaktown Fuels Mine No. 1
		Oaktown Fuels Mine No. 2
Alliance Resource Partners LP	Gibson County Coal LLC	Gibson Mine
	Gibson County Coal LLC	Gibson South
	Hamilton County Coal, LLC	Hamilton County Coal Mine #1
	Tunnel Ridge, LLC	Tunnel Ridge Mine
	White County Coal, LLC	Pattiki Mine
L. Keller Smith	Txoma Mining LLC	P8 North
Blackhawk Mining LLC	Panther Creek Mining LLC	American Eagle Mine

Table 3-5: Mines Listed by Mining Method

Mine Name	Method
Beckley Pocahontas Mine	Continuous
American Eagle Mine	Longwall
Bailey Mine	Longwall
Buchanan Mine #1	Longwall
Cumberland Mine	Longwall
Deep Mine 41	Longwall
Enlow Fork Mine	Longwall
Federal No. 2	Longwall
Hamilton County Coal Mine #1	Longwall
Harrison County Mine	Longwall
Harvey Mine	Longwall
Leer Mine	Longwall
Mach #1 Mine	Longwall
Marion County Mine	Longwall
Marshall County Mine	Longwall
MC #1 Mine	Longwall
Monongalia County Mine	Longwall
No. 4 Mine	Longwall
No. 7 Mine	Longwall
Oak Grove	Longwall
Ohio County Mine	Longwall
P8 North	Longwall
Pinnacle Mine	Longwall
San Juan Mine 1	Longwall
Sentinel Mine	Longwall
Shoal Creek	Longwall
The American Coal Company New Era Mine	Longwall
The American Coal Company New Future Mine	Longwall
Tunnel Ridge Mine	Longwall
West Elk Mine	Longwall
Gibson Mine	Room and pillar
Gibson South	Room and pillar
Oaktown Fuels Mine No. 1	Room and pillar
Oaktown Fuels Mine No. 2	Room and pillar
Pattiki Mine	Room and pillar

Table 3-6: Mines Listed by Primary Coal Use

Mine Name	Primary Use
Beckley Pocahontas Mine	Metallurgical
Leer Mine	Metallurgical
No. 4 Mine	Metallurgical
No. 7 Mine	Metallurgical
Pinnacle Mine	Metallurgical
Sentinel Mine	Metallurgical
West Elk Mine	Metallurgical
American Eagle Mine	Steam
Cumberland Mine	Steam
Deep Mine 41	Steam
Enlow Fork Mine	Steam
Federal No. 2	Steam
Gibson Mine	Steam
Gibson South	Steam
Harrison County Mine	Steam
Mach #1 Mine	Steam
Marion County Mine	Steam
Marshall County Mine	Steam
MC #1 Mine	Steam
Monongalia County Mine	Steam
Oaktown Fuels Mine No. 1	Steam
Oaktown Fuels Mine No. 2	Steam
Ohio County Mine	Steam
P8 North	Steam
Pattiki Mine	Steam
San Juan Mine 1	Steam
Shoal Creek	Steam
The American Coal Company New Era Mine	Steam
The American Coal Company New Future Mine	Steam
Tunnel Ridge Mine	Steam
Bailey Mine	Steam, metallurgical
Buchanan Mine #1	Steam, metallurgical
Hamilton County Coal Mine #1	Steam, metallurgical
Harvey Mine	Steam, metallurgical
Oak Grove	Steam, metallurgical

Table 3-7: Mines Listed by 2016 Coal Production

Mine Name	Million Tons
Bailey Mine	12.1
MC #1 Mine	11.4
Marshall County Mine	10.5
Enlow Fork Mine	9.6
Cumberland Mine	7.0
Harrison County Mine	6.6
Tunnel Ridge Mine	6.6
Ohio County Mine	6.3
Mach #1 Mine	5.4
Buchanan Mine #1	5.0
Marion County Mine	4.4
San Juan Mine 1	4.3
West Elk Mine	4.2
Gibson South	3.9
Monongalia County Mine	3.9
Oaktown Fuels Mine No. 1	3.8
Leer Mine	3.6
No. 7 Mine	3.1
Hamilton County Coal Mine #1	3.0
Harvey Mine	3.0
Shoal Creek	2.3
American Eagle Mine	2.0
Oaktown Fuels Mine No. 2	1.9
Pattiki Mine	1.9
The American Coal Company New Era Mine	1.7
Deep Mine 41	1.5
Federal No. 2	1.5
Oak Grove	1.5
The American Coal Company New Future Mine	1.4
Beckley Pocahontas Mine	1.0
Sentinel Mine	1.0
Pinnacle Mine	0.9
P8 North	0.4
No. 4 Mine	0.3
Gibson Mine	-

Table 3-8: Mines Employing Methane Drainage Systems

Mine Name	Type of Drainage System	Estimated Current Drainage Efficiency
Buchanan Mine #1	Vertical Gob Boreholes; Horizontal Pre-Mine Boreholes; Vertical Pre-Mine Boreholes	86%
Shoal Creek	Horizontal Gob Boreholes with Pumps	78%
No. 4 Mine	Vertical Gob Boreholes; Horizontal Pre-Mine Boreholes; Vertical Pre-Mine Boreholes	69%
No. 7 Mine	Vertical Gob Boreholes; Horizontal Pre-Mine Boreholes; Vertical Pre-Mine Boreholes	56%
Oak Grove	Vertical Gob Boreholes; Horizontal Pre-Mine Boreholes; Vertical Pre-Mine Boreholes	44%
Harvey Mine	Vertical Gob Boreholes; In-mine Horizontal Gob Boreholes	39%
West Elk Mine	Horizontal & Vertical Gob Boreholes with Pumps	39%
Cumberland Mine	Vertical Gob Boreholes with Pumps	36%
Monogalia County Mine	Vertical Gob Boreholes with Pumps	33%
Bailey Mine	Vertical Gob Boreholes with Pumps	32%
Harrison County Mine	Horizontal pre-drainage wells	28%
Marshall County Mine	Vertical Gob Boreholes with Pumps	23%
San Juan Mine 1	Vertical Gob Boreholes with Pumps	15%
Oaktown Fuels Mine No. 1	Vertical Gob Boreholes	10%
Marion County Mine	Vertical Gob Boreholes with Pumps & Horizontal Pre-drainage wells	10%
Pinnacle Mine	Horizontal Gob Boreholes with Pumps	6%
Oaktown Fuels Mine No. 2	Vertical Gob Boreholes	4%
Beckley Pocahontas Mine	Horizontal pre-drainage wells	> 1%
Enlow Fork Mine	Horizontal pre-drainage wells	> 1%
Federal No 2	Vertical Gob Boreholes	> 1%

* Mines using methane drainage in 2016 but not represented among the 25-highest emitting mines were Emerald Mine No. 1 (MSHA ID 3605466), Road Fork #51 mine (MSHA ID 4601544), Bowie No. 2 Mine (MSHA ID 0504591), and Carlisle Mine (MSHA ID 1202349).

Table 3-9: Mines Listed by Estimated Total Methane Liberated in 2016

Mine Name	MMCF/D
Buchanan Mine #1	62.7
No. 7 Mine	30.7
Marshall County Mine	15.9
Marion County Mine	13.5
No. 4 Mine	11.7
Cumberland Mine	11.5
Bailey Mine	11.3
Shoal Creek	10.2
Enlow Fork Mine	9.8
Harrison County Mine	9.5
Monogalia County Mine	8.9
Oak Grove	7.5
MC # 1 Mine	7.0
Harvey Mine	6.9
The American Coal Company New Future Mine	6.8
Pinnacle Mine	4.7
San Juan Mine 1	4.6
Leer Mine	4.5
Ohio County Mine	4.5
The American Coal Company New Era Mine	4.5
Deep Mine 41	4.2
Gibson Mine	4.2
Beckley Pocahontas Mine	3.6
Tunnel Ridge Mine	3.4
American Eagle Mine	3.0
Oaktown Fuels Mine No. 1	2.9
Mach #1 Mine	2.7
West Elk Mine	2.5
Oaktown Fuels Mine No. 2	2.5
Gibson South	2.5
Sentinel Mine	2.3
P8 North	2.2
Hamilton County Coal Mine #1	2.2
Federal No 2	2.1
Pattiki Mine	2.1

Table 3-10: Mines Listed by Daily Ventilation Emissions in 2016

Mine Name	MMCF/D
No. 7 Mine	13.7
Marshall County Mine	12.2
Marion County Mine	12.1
Enlow Fork Mine	9.8
Buchanan Mine #1	8.9
Bailey Mine	7.8
Cumberland Mine	7.4
MC #1 Mine	7.0
Harrison County Mine	6.8
The American Coal Company New Future Mine	6.8
Monogalia County Mine	6.0
Leer Mine	4.5
Ohio County Mine	4.5
Pinnacle Mine	4.5
The American Coal Company New Era Mine	4.5
Harvey Mine	4.2
Deep Mine 41	4.2
Gibson Mine	4.2
Oak Grove	4.2
San Juan Mine 1	3.9
Beckley Pocahontas Mine	3.7
No. 4 Mine	3.6
Tunnel Ridge Mine	3.4
American Eagle Mine	3.0
Mach #1 Mine	2.7
Oaktown Fuels Mine No. 1	2.6
Gibson South	2.5
Oaktown Fuels Mine No. 2	2.4
Sentinel Mine	2.3
P8 North	2.2
Shoal Creek	2.2
Hamilton County Coal Mine #1	2.2
Federal No 2	2.1
Pattiki Mine	2.1
West Elk Mine	1.6

Table 3-11: Mines Listed by Estimated Daily Methane Drained in 2016

Mine Name	MMCF/D
Buchanan Mine #1	53.8
No. 7 Mine	17.1
No. 4 Mine	8.0
Shoal Creek	8.0
Cumberland Mine	4.2
Marshall County Mine	3.7
Bailey Mine	3.6
Oak Grove	3.3
Monogalia County Mine	2.8
Harvey Mine	2.7
Harrison County Mine	2.7
Marion County Mine	1.4
West Elk Mine	1.0
San Juan Mine 1	0.7
Oaktown Fuels Mine No. 1	0.3
Pinnacle Mine	0.2
Oaktown Fuels Mine No. 2	0.1
Enlow Fork Mine	0.0
MC #1 Mine	-
The American Coal Company New Future Mine	-
Leer Mine	-
Ohio County Mine	-
The American Coal Company New Era Mine	-
Deep Mine 41	-
Gibson Mine	-
Beckley Pocahontas Mine	-
Tunnel Ridge Mine	-
American Eagle Mine	-
Mach #1 Mine	-
Gibson South	-
Sentinel Mine	-
P8 North	-
Hamilton County Coal Mine #1	-
Federal No 2	-
Pattiki Mine	-

Table 3-12: Mines Listed by Estimated Specific Emissions in 2016

Mine Name	CF/Ton
No. 4 Mine	12,389
Buchanan Mine #1	4,626
No. 7 Mine	3,657
P8 North	2,008
Pinnacle Mine	1,870
Oak Grove	1,853
The American Coal Company New Future Mine	1,755
Shoal Creek	1,594
Beckley Pocahontas Mine	1,355
Marion County Mine	1,127
Deep Mine 41	1,022
The American Coal Company New Era Mine	941
Harvey Mine	852
Sentinel Mine	840
Monongalia County Mine	832
Cumberland Mine	605
Marshall County Mine	553
American Eagle Mine	548
Harrison County Mine	526
Federal No 2	505
Oaktown Fuels No. 2	480
Leer Mine	463
Pattiki Mine	403
San Juan Mine 1	389
Enlow Fork Mine	372
Bailey Mine	343
Oaktown Fuels No. 1	278
Hamilton County Coal Mine #1	268
Ohio County Mine	262
Gibson South	234
MC #1 Mine	222
Tunnel Ridge Mine	188
Mach #1 Mine	183
West Elk Mine	182
Gibson Mine	0

Table 3-13: Mines with CMM Recovery and Use Projects

Mine Name	Type of Use Project	Estimated Current Market Penetration
Buchanan Mine #1	Pipeline/Power	100%
Oak Grove	Pipeline	99%
No. 4 Mine	Pipeline	91%
No. 7 Mine	Pipeline	90%
Shoal Creek	Pipeline	85%
Pinnacle Mine	Pipeline	81%
Marshall County Mine	VAM Destruction	64%
Cumberland Mine	Pipeline	24%
West Elk Mine	Heaters	21%
Harrison County Mine	Pipeline	11%
Marion County Mine	Pipeline	7%
Monongalia County Mine	Pipeline	4%
Bailey Mine	Pipeline	3%

4. Profiled Mines

Chapter 4 profiles individual underground coal mines that appear to be good candidates for the development of methane recovery projects. At least 13 of these mines already sell recovered methane, and at least 3 mines consume methane onsite for power generation, to heat mine ventilation air, flare CMM, or use produced gas as fuel in onsite vacuum pumps.

Alabama Mines

No. 4 Mine

No. 7 Mine

Oak Grove Mine

Shoal Creek Mine

Mine Status: Active
 Use Project: Pipeline

Drainage System: Yes
 MSHA ID: 0101247

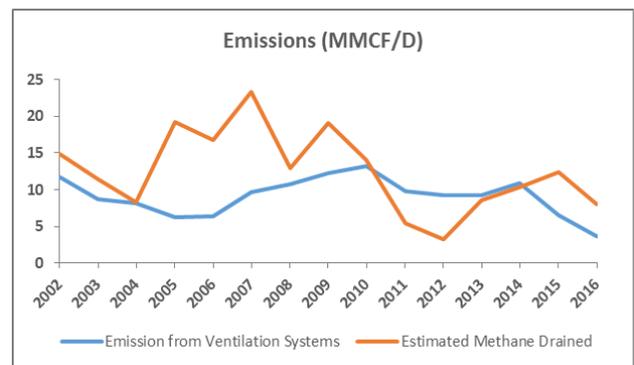
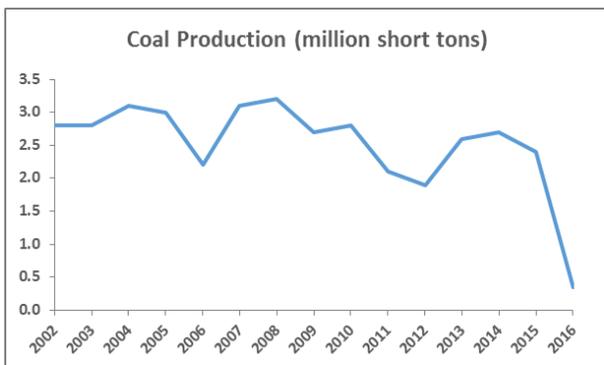
NO. 4 MINE

Basin: Black Warrior
 State: AL
 Coalbed: Blue Creek / Mary Lee
 County: Tuscaloosa
 Current Operator: Warrior Met Coal Mining, LLC
 Owner/Parent Company: Warrior Met Coal Mining, LLC
 Parent Company Website: <http://www.warriormetcoal.com/>
 Previous Owner(s): Jim Walter Resources Inc.
 Previous or Alternate Name of Mine: Blue Creek No. 4
 Description of Surrounding Terrain: Open Hills/Open High Hills
 Utility Electric Supplier: Alabama Power Co
 Parent Corporation of Utility: Southern Co

Mailing Address: 14730 Lock 17 Rd, Brookwood, AL 35444
 Latitude/Longitude: 33.2615, -87.3115
 Number of Employees at Mine: 143
 Mining Method: Longwall
 Year of Initial Production: 1976
 Primary Coal Use: Metallurgical
 Depth to Seam (ft.): 1,900
 Seam Thickness (ft.): 5.0
 Transmission Pipeline in County?: Yes
 Owner of Nearest Pipeline: Kinder Morgan
 Distance to Pipeline (miles): 5.3

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	2.8	2.8	3.1	3	2.2	3.1	3.2	2.7	2.8	2.1	1.9	2.6	2.7	2.4	0.3
Emission from Ventilation Systems (MMCF/D)	11.7	8.7	8.2	6.3	6.4	9.7	10.7	12.2	13.2	9.8	9.2	9.3	10.9	6.5	3.6
Estimated Methane Drained (MMCF/D)	14.8	11.4	8.3	19.2	16.8	23.3	12.9	19.1	14	5.4	3.2	8.6	10.4	12.4	8.0
Estimated Specific Emissions (CF/T)	3,455	2,620	1,943	3,103	3,849	3,886	2,692	4,231	3,546	2,642	2,382	2,513	2,879	2,874	12,389*
Methane Used (MMCF/D)	14.8	11.4	8.3	19.2	16.8	23.3	12.9	19.5	14.5	5.8	3.4	8.6	10.4	12.5	7.3
Estimated Current Drainage Efficiency	56%	57%	50%	75%	73%	71%	55%	61%	51%	36%	26%	48%	49%	66%	69%
Estimated Current Market Penetration	100%	100%	100%	100%	100%	100%	100%	102%	104%	107%	106%	100%	100%	101%	91%

*2016 estimated specific emissions were higher than usual because the No. 4 Mine was idled for most of 2016 (Warrior, 2017).



Mine Status: Active
 Use Project: Pipeline

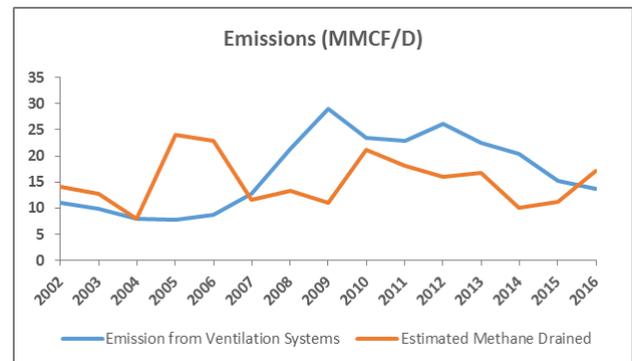
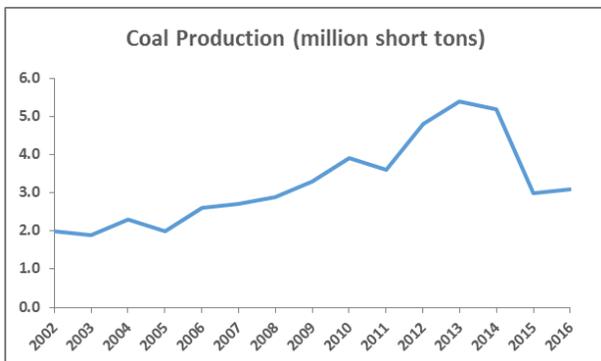
Drainage System: Yes
 MSHA ID: 0101401

NO. 7 MINE

Basin: Black Warrior
State: AL
Coalbed: Blue Creek / Mary Lee
County: Tuscaloosa
Current Operator: Warrior Met Coal Mining, LLC
Owner/Parent Company: Warrior Met Coal Mining, LLC
Parent Company Website: <http://www.warriormetcoal.com/>
Previous Owner(s): Jim Walter Resources Inc.
Previous or Alternate Name of Mine: Blue Creek No. 7
Description of Surrounding Terrain: Open Hills/Open High Hills
Utility Electric Supplier: Alabama Power Co
Parent Corporation of Utility: Southern Co

Mailing Address: 18069 Hannah Creek Rd, Brookwood, AL 35444
Latitude/Longitude: 33.2615, -87.3115
Number of Employees at Mine: 539
Mining Method: Longwall
Year of Initial Production: 1978
Primary Coal Use: Metallurgical
Depth to Seam (ft.): 1,900
Seam Thickness (ft.): 6.4
Transmission Pipeline in County?: Yes
Owner of Nearest Pipeline: Kinder Morgan
Distance to Pipeline (miles): 5.1

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	2	1.9	2.3	2	2.6	2.7	2.9	3.3	3.9	3.6	4.8	5.4	5.2	3.0	3.1
Emission from Ventilation Systems (MMCF/D)	11	9.8	7.9	7.8	8.7	12.7	21.3	29	23.5	22.9	26.2	22.5	20.4	15.2	13.7
Estimated Methane Drained (MMCF/D)	14	12.8	8	24	22.9	11.5	13.4	11	21.2	18.1	15.9	16.8	10.1	11.3	17.1
Estimated Specific Emissions (CF/T)	4,563	4,342	2,523	5,804	4,436	3,273	4,367	4,424	4,184	4,157	3,201	2,656	2,141	3,224	3,657
Methane Used (MMCF/D)	14	12.8	8	24	22.9	11.5	13.4	11	21.2	18.1	15.9	16.8	10.1	11.3	15.3
Estimated Current Drainage Efficiency	56%	57%	50%	75%	73%	48%	39%	28%	47%	44%	38%	43%	33%	43%	56%
Estimated Current Market Penetration	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	90%



Mine Status: Active
 Use Project: Pipeline

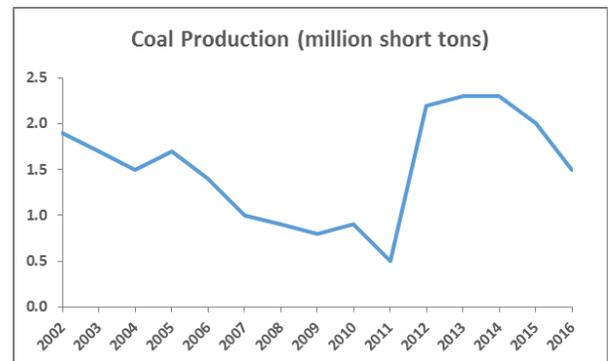
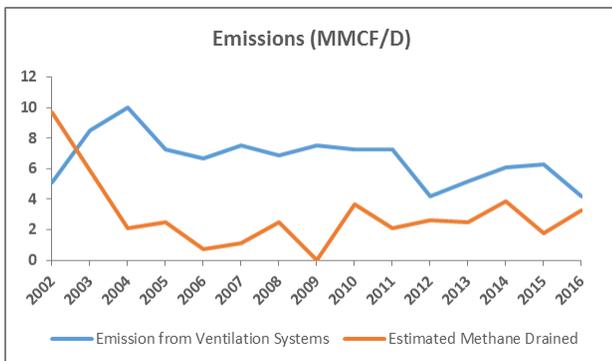
Drainage System: Yes
 MSHA ID: 0100851

OAK GROVE MINE

Basin: Black Warrior
 State: AL
 Coalbed: Blue Creek
 County: Jefferson
 Current Operator: Oak Grove Resources LLC
 Owner/Parent Company: Seneca Coal Resources
 Parent Company Website: <http://www.erpfuels.com/>
 Previous Owner(s): Cliffs Natural Resources, US Steel Mining Co LLC
 Previous or Alternate Name of Mine: None
 Description of Surrounding Terrain: Open Hills/Open High Hills
 Utility Electric Supplier: Alabama Power Co
 Parent Corporation of Utility: Southern Co

Mailing Address: 8800 Oak Grove Mine Rd, Adger, AL 35006
 Latitude/Longitude: 33.45075, -87.03723
 Number of Employees at Mine: 303
 Mining Method: Longwall
 Year of Initial Production: 1981
 Primary Coal Use: Steam, Metallurgical
 Depth to Seam (ft.): 1,000
 Seam Thickness (ft.): 5.2
 Transmission Pipeline in County?: Yes
 Owner of Nearest Pipeline: Kinder Morgan
 Distance to Pipeline (miles): 3.7

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	1.9	1.7	1.5	1.7	1.4	1	0.9	0.8	0.9	0.5	2.2	2.3	2.3	2.0	1.5
Emission from Ventilation Systems (MMCF/D)	5.1	8.5	10	7.3	6.7	7.5	6.9	7.5	7.3	7.3	4.2	5.2	6.1	6.3	4.2
Estimated Methane Drained (MMCF/D)	9.7	5.9	2.1	2.5	0.7	1.1	2.5	0	3.7	2.1	2.6	2.5	3.9	1.8	3.3
Estimated Specific Emissions (CF/T)	2,843	3,092	2,944	2,104	1,929	3,139	3,812	3,423	4,461	6,862	1,128	1,222	1,571	1,478	1,853
Methane Used (MMCF/D)	9.7	5.9	2.1	1.7	0.7	0.8	1	2.9	2.2	2.1	2.3	2.2	3.9	1.8	3.3
Estimated Current Drainage Efficiency	66%	41%	17%	26%	10%	13%	27%	0%	33%	22%	38%	32%	39%	22%	44%
Estimated Current Market Penetration	100%	100%	100%	68%	100%	72%	40%	-	59%	100%	88%	88%	100%	100%	99%



Mine Status: Active
 Use Project: Pipeline

Drainage System: Yes
 MSHA ID: 0102901

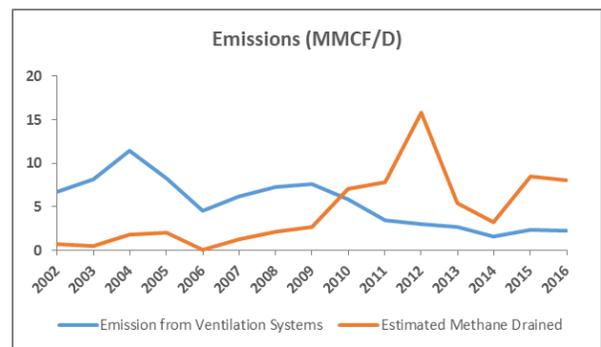
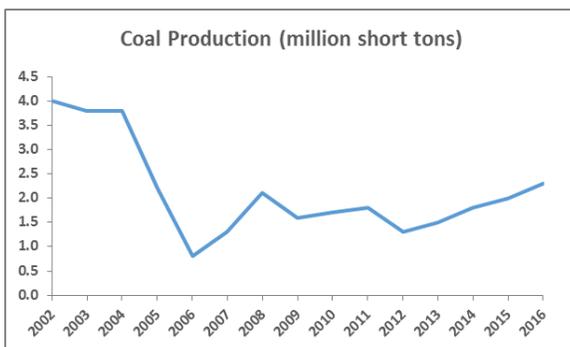
SHOAL CREEK MINE

Basin: Black Warrior
 State: AL
 Coalbed: Blue Creek / Mary Lee
 County: Walker
 Current Operator: Drummond Company Inc.
 Former Owner/Parent Company: Drummond Company Inc.;
 Current Owner/Parent Company: Peabody Energy, Inc.
 Parent Company Website: www.drummondco.com
 Previous Owner(s): None in last 10 years
 Previous or Alternate Name of Mine: None
 Description of Surrounding Terrain: Open Hills/High Hills
 Utility Electric Supplier: Alabama Power Co
 Parent Corporation of Utility: Southern Co

Mailing Address: 8488 Nancy Ann Bend Road Adger,
 AL 35006
 Latitude/Longitude: 33.51314, -87.27675
 Number of Employees at Mine: 419
 Mining Method: Longwall
 Year of Initial Production: 1994

Primary Coal Use: Steam
 Depth to Seam (ft.): 1,150
 Seam Thickness (ft.): 7.0-11.0
 Transmission Pipeline in County?: Yes
 Owner of Nearest Pipeline: El Paso Corp/Kinder Morgan
 Distance to Pipeline (miles): 1.3

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	4	3.8	3.8	2.2	0.8	1.3	2.1	1.6	1.7	1.8	1.3	1.5	1.8	2.0	2.3
Emission from Ventilation Systems (MMCF/D)	6.7	8.2	11.4	8.3	4.5	6.2	7.3	7.6	5.9	3.5	3	2.7	1.6	2.4	2.2
Estimated Methane Drained (MMCF/D)	0.7	0.5	1.8	2	0.1	1.3	2.1	2.7	7.1	7.8	15.8	5.4	3.2	8.5	8.0
Estimated Specific Emissions (CF/T)	675	836	1,268	1,709	2,090	2,106	1,634	2,350	2,791	2,291	5,279	1,971	973	1,989	1,594
Methane Used (MMCF/D)	0.7	0.5	0.6	0.1	0.1	0.6	1.4	2.7	7.1	7.4	15.4	3.4	1.1	3.2	6.8
Estimated Current Drainage Efficiency	9%	6%	14%	19%	2%	17%	22%	26%	55%	69%	84%	67%	67%	78%	78%
Estimated Current Market Penetration	100%	100%	33%	5%	100%	46%	67%	100%	100%	95%	97%	63%	34%	38%	85%



Colorado Mine

West Elk Mine

Mine Status: Active
Use Project: Heaters

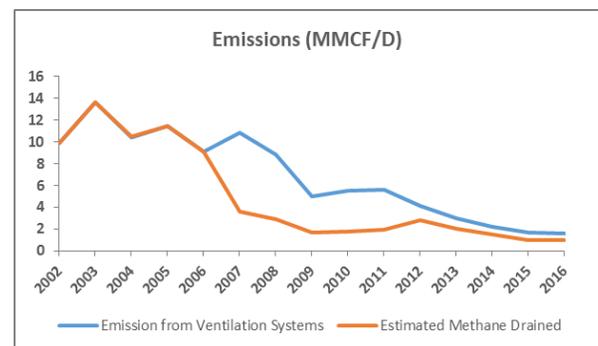
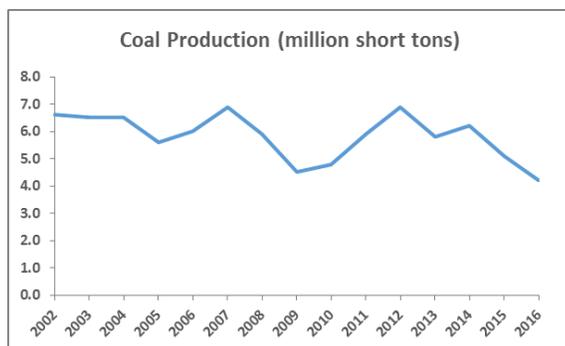
Drainage System: Yes
MSHA ID: 0503672

WEST ELK MINE

Basin: Western
State: CO
Coalbed: B Seam
County: Gunnison
Current Operator: Mountain Coal Company, LLC
Owner/Parent Company: Arch Coal Inc.
Parent Company Website: <http://www.archcoal.com/>
Previous Owner(s): None
Previous or Alternate Name of Mine: None
Description of Surrounding Terrain: Hilly/Mountainous
Utility Electric Supplier: Delta-Montrose Electric Association
Parent Corporation of Utility: Touchstone Energy Cooperatives

Mailing Address: 5174 Highway 133 Somerset, CO 81434
Latitude/Longitude: 38.927032,-107.463917
Number of Employees at Mine: 261
Mining Method: Longwall
Year of Initial Production: 1983
Primary Coal Use: Metallurgical
Depth to Seam (ft.): 1,000-2,000
Seam Thickness (ft.): 12
Transmission Pipeline in County?: Yes
Owner of Nearest Pipeline: Kinder Morgan Inc
Distance to Pipeline (miles): 26

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	6.6	6.5	6.5	5.6	6.0	6.9	5.9	4.5	4.8	5.9	6.9	5.8	6.2	5.1	4.2
Emission from Ventilation Systems (MMCF/D)	9.9	13.6	10.4	11.4	9.1	10.8	8.8	5.0	5.5	5.6	4.1	3.0	2.2	1.7	1.6
Estimated Methane Drained (MMCF/D)	9.9	13.6	10.5	11.4	9.1	3.6	2.9	1.7	1.8	1.9	2.8	2.0	1.5	1.0	1.0
Estimated Specific Emissions (CF/T)	1,095	1,527	1,174	1,486	1,107	762	724	543	555	464	365	315	219	193	182
Methane Used (MMCF/D)	-	0.1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	-	0.1	0.2	0.2	0.2	0.2
Estimated Current Drainage Efficiency	60%	50%	50%	50%	5-%	25%	25%	25%	25%	25%	41%	40%	41%	37%	38%
Estimated Current Market Penetration	-	1%	5%	4%	5%	14%	17%	29%	28%	0%	4%	10%	13%	20%	21%



Illinois Mines

The American Coal Company New Era Mine

The American Coal Company New Future Mine

Hamilton County Coal Mine #1

Mach #1 Mine

MC #1 Mine

Pattiki Mine

Mine Status: Active
 Use Project: NA

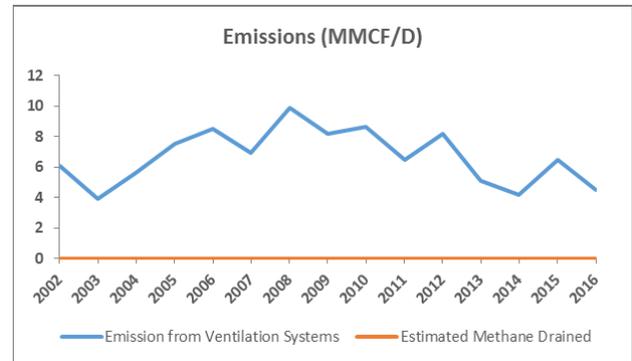
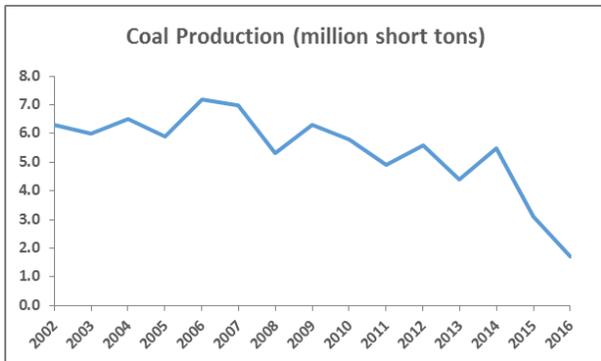
Drainage System: No
 MSHA ID: 1102752

THE AMERICAN COAL COMPANY NEW ERA MINE

Basin: Illinois
 State: IL
 Coalbed: Springfield No. 5
 County: Saline
 Current Operator: The American Coal Company
 Owner/Parent Company: Murray Energy Corp
 Parent Company Website: www.murrayenergycorp.com
 Previous Owner(s): Kerr-McGee Coal Corp
 Previous or Alternate Name of Mine: Galatia No. 56, Galatia
 Description of Surrounding Terrain: Open Hills/Irregular Plains
 Utility Electric Supplier: AmrenCIPS
 Parent Corporation of Utility: Ameren Corp.

Mailing Address: 9085 Highway 34 North Galatia, IL 62935
 Latitude/Longitude: 37.86433, -88.6145
 Number of Employees at Mine: 202
 Mining Method: Longwall
 Year of Initial Production: 1983
 Primary Coal Use: Steam
 Depth to Seam (ft.): 600-830
 Seam Thickness (ft.): 5.0-6.5
 Transmission Pipeline in County?: Yes
 Owner of Nearest Pipeline: Atmos Energy
 Distance to Pipeline (miles): 0.1

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	6.3	6	6.5	5.9	7.2	7	5.3	6.3	5.8	4.9	5.6	4.4	5.5	3.1	1.7
Emission from Ventilation Systems (MMCF/D)	6.1	3.9	5.6	7.5	8.5	6.9	9.9	8.2	8.6	6.5	8.2	5.1	4.2	6.5	4.5
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Specific Emissions (CF/T)	353	237	315	464	431	360	682	475	541	484	535	423	279	765	941
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Mine Status: Active
 Use Project: NA

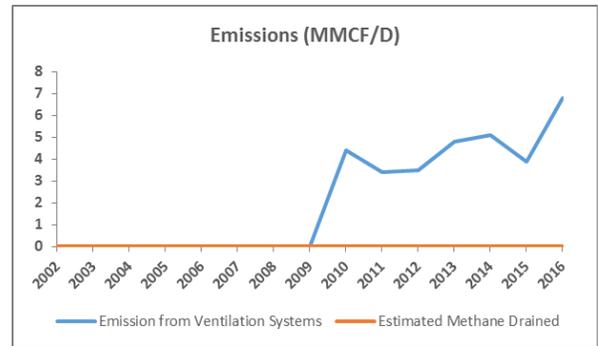
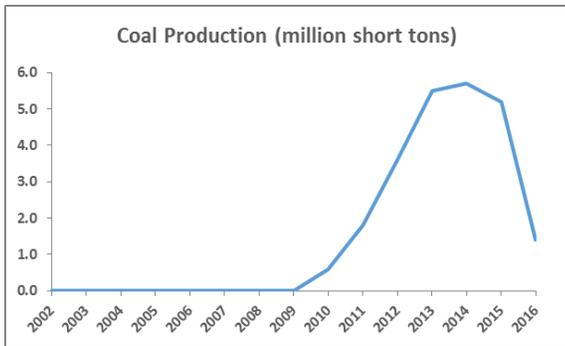
Drainage System: No
 MSHA ID: 1103232

THE AMERICAN COAL COMPANY NEW FUTURE MINE

Basin: Illinois
 State: IL
 Coalbed: Herrin No. 6
 County: Saline
 Current Operator: The American Coal Company
 Owner/Parent Company: Murray Energy Corp
 Parent Company Website: www.murrayenergycorp.com
 Previous Owner(s): None
 Previous or Alternate Name of Mine: None
 Description of Surrounding Terrain: Open Hills/Irregular
 Utility Electric Supplier: AmrenCIPS
 Parent Corporation of Utility: Ameren Corp.

Mailing Address: 9085 Highway 34 North Galatia, IL 62935
 Latitude/Longitude: 37.82967, -88.63985
 Number of Employees at Mine: 132
 Mining Method: Longwall
 Year of Initial Production: 2010
 Primary Coal Use: Steam
 Depth to Seam (ft.): 600-900
 Seam Thickness (ft.): NA
 Transmission Pipeline in County?: Yes
 Owner of Nearest Pipeline: Atmos Energy
 Distance to Pipeline (miles): NA

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	-	-	-	-	-	-	-	-	0.6	1.8	3.6	5.5	5.7	5.2	1.4
Emission from Ventilation Systems (MMCF/D)	-	-	-	-	-	-	-	-	4.4	3.4	3.5	4.8	5.1	3.9	6.8
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	0	0	0	0	0	-	-
Estimated Specific Emissions (CF/T)	-	-	-	-	-	-	-	-	2,677	689	355	319	327	274	1,755
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	-	-
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Mine Status: Active
 Use Project: NA

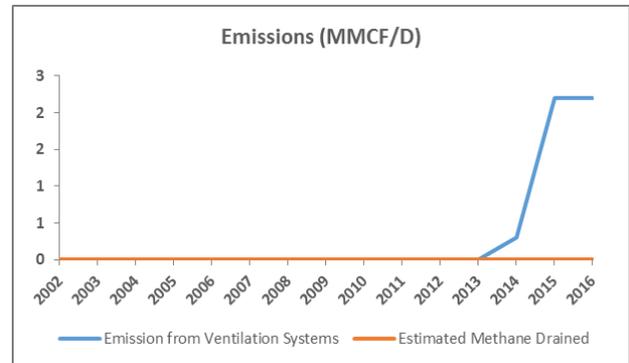
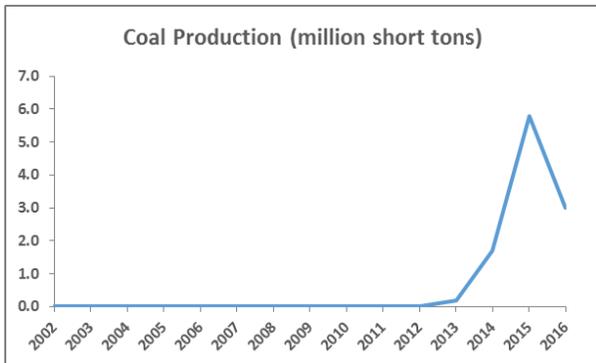
Drainage System: No
 MSHA ID: 1103203

HAMILTON COUNTY COAL MINE #1

Basin: Illinois
State: IL
Coalbed: Herrin No. 6
County: Hamilton
Current Operator: Hamilton County Coal, LLC
Owner/Parent Company: Alliance Resource Partners LP
Parent Company Website: <http://www.arlp.com/>
Previous Owner(s): White Oak LLC
Previous or Alternate Name of Mine: White Oak Mine No. 1
Description of Surrounding Terrain: Flat
Utility Electric Supplier: NA
Parent Corporation of Utility: NA

Mailing Address: 18033 County Rd. 500 East
 Dahlgreen, IL 62828
Latitude/Longitude: 37.170524, -88.614144
Number of Employees at Mine: 214
Mining Method: Longwall
Year of Initial Production: 2013
Primary Coal Use: Steam, Metallurgical
Depth to Seam (ft.): 1,000
Seam Thickness (ft.): 6
Transmission Pipeline in County?: NA
Owner of Nearest Pipeline: NA
Distance to Pipeline (miles): NA

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	-	-	-	-	-	-	-	-	-	-	-	0.19	1.7	5.8	3.0
Emission from Ventilation Systems (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	0.0	0.3	2.2	2.2
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Specific Emissions (CF/T)	-	-	-	-	-	-	-	-	-	-	-	19	64	138	268
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Mine Status: Active
 Use Project: NA

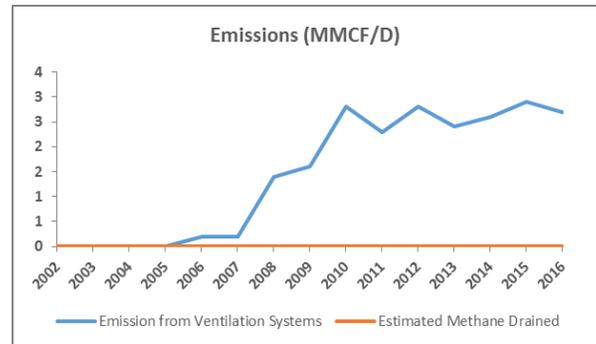
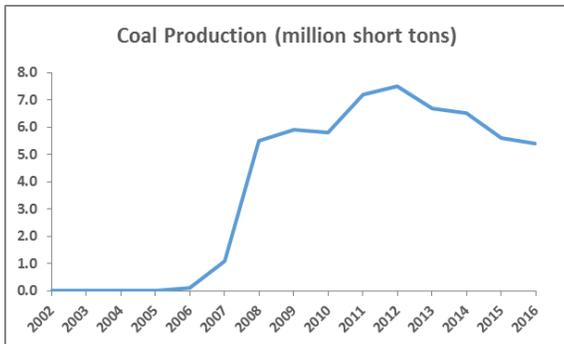
Drainage System: No
 MSHA ID: 1103141

MACH #1 MINE

Basin: Illinois
 State: IL
 Coalbed: Herrin No. 6
 County: Williamson
 Current Operator: Mach Mining LLC
 Owner/Parent Company: Foresight Energy Labor LLC
 Parent Company Website: <http://www.foresight.com/>
 Previous Owner(s): None
 Previous or Alternate Name of Mine: Pond Creek Mine
 Description of Surrounding Terrain: Flat
 Utility Electric Supplier: NA
 Parent Corporation of Utility: NA

Mailing Address: 11525 N. Thompsonville Road
 Macedonia, IL 62860
 Latitude/Longitude: 37.84, -88.8300018311
 Number of Employees at Mine: 216
 Mining Method: Longwall
 Year of Initial Production: 2006
 Primary Coal Use: Steam
 Depth to Seam (ft.): 6
 Seam Thickness (ft.): 500
 Transmission Pipeline in County?: NA
 Owner of Nearest Pipeline: NA
 Distance to Pipeline (miles): NA

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	-	-	-	-	0.1	1.1	5.5	5.9	5.8	7.2	7.5	6.7	6.5	5.6	5.4
Emission from Ventilation Systems (MMCF/D)	-	-	-	-	0.2	0.2	1.4	1.6	2.8	2.3	2.8	2.4	2.6	2.9	2.7
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Specific Emissions (CF/T)	-	-	-	-	730	730	93	99	176	117	136	131	146	189	183
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Mine Status: Active
 Use Project: NA

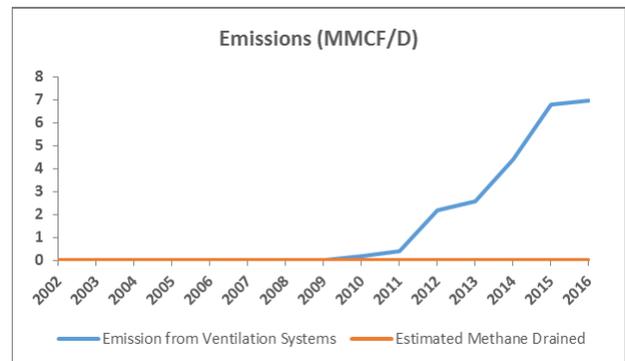
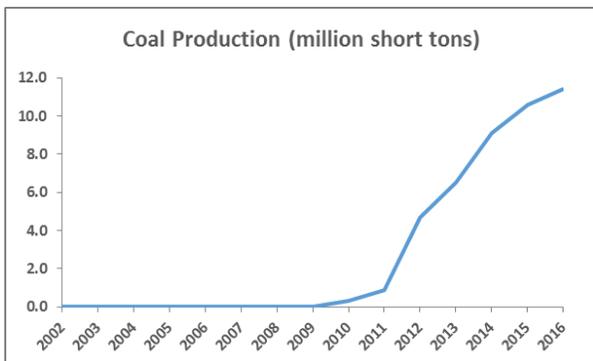
Drainage System: No
 MSHA ID: 1103189

MC #1 MINE

Basin: Illinois
State: IL
Coalbed: Herrin No. 6
County: Franklin
Current Operator: M-Class Mining LLC
Owner/Parent Company: Foresight Energy
Parent Company Website: www.foresight.com
Previous Owner(s): None
Previous or Alternate Name of Mine: Sugar Camp
Description of Surrounding Terrain: Open Hills/Irregular
Utility Electric Supplier: Central Illinois Public Services Co
Parent Corporation of Utility: Ameren Corp.

Mailing Address: 11525 N. Thompsonville Road
 Macedonia, IL 62860
Latitude/Longitude: 39.9705, -80.4141
Number of Employees at Mine: 410
Mining Method: Longwall
Year of Initial Production: 2008
Primary Coal Use: Steam
Depth to Seam (ft.): 600–900
Seam Thickness (ft.): NA
Transmission Pipeline in County?: NA
Owner of Nearest Pipeline: NA
Distance to Pipeline (miles): NA

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	-	-	-	-	-	-	-	-	0.3	0.9	4.7	6.5	9.1	10.6	11.4
Emission from Ventilation Systems (MMCF/D)	-	-	-	-	-	-	-	-	0.2	0.4	2.2	2.6	4.4	6.8	7.0
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Specific Emissions (CF/T)	-	-	-	-	-	-	-	-	243	162	171	146	177	234	222
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Mine Status: Non-Producing
 Use Project: NA

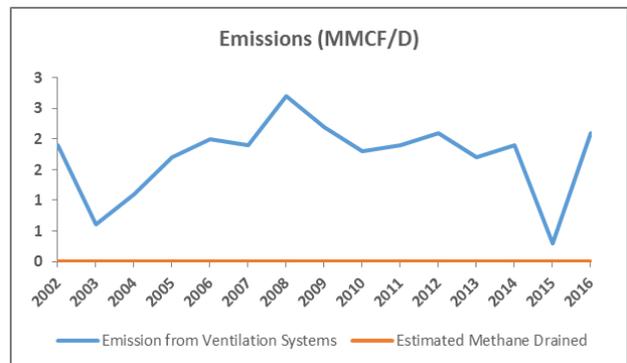
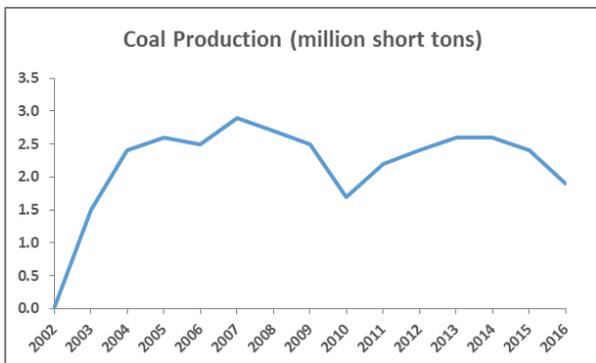
Drainage System: No
 MSHA ID: 1103058

PATTIKI MINE

Basin: Illinois
State: IL
Coalbed: Herrin No. 6
County: White
Current Operator: White County Coal, LLC
Owner/Parent Company: Alliance Resource Partners LP
Parent Company Website: <http://www.arlp.com/>
Previous Owner(s): MAPCO Coal Inc
Previous or Alternate Name of Mine: Galatia Mine No. 56-1
Description of Surrounding Terrain: Irregular Plains
Utility Electric Supplier: Wayne-White Counties Electric Coop
Parent Corporation of Utility: NA

Mailing Address: 1525 County Rd 1300 N
 Carmi, IL 62835
Latitude/Longitude: 38.064818, -88.089559
Number of Employees at Mine: 219
Mining Method: Room and Pillar
Year of Initial Production: 1980
Primary Coal Use: Steam
Depth to Seam (ft.): NA
Seam Thickness (ft.): NA
Transmission Pipeline in County?: Yes
Owner of Nearest Pipeline: Texas Eastern Transmission Co.
Distance to Pipeline (miles): 3.3

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	1.8	0.3	2.4	2.6	2.5	2.9	2.7	2.5	1.7	2.2	2.4	2.6	2.6	2.4	1.9
Emission from Ventilation Systems (MMCF/D)	1.9	0.6	1.1	1.7	2.0	1.9	2.7	2.2	1.8	1.9	2.1	1.7	1.9	0.3	2.1
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Specific Emissions (CF/T)	371	704	167	238	297	239	365	321	387	315	319	239	267	46	403
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Indiana Mines

Gibson Mine

Gibson South

Oaktown Fuels No. 1

Oaktown Fuels No. 2

Mine Status: Active
 Use Project: NA

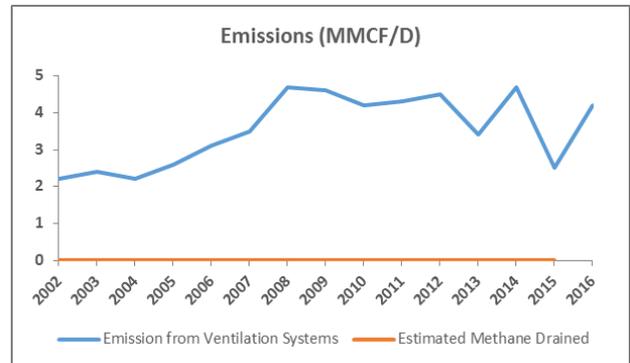
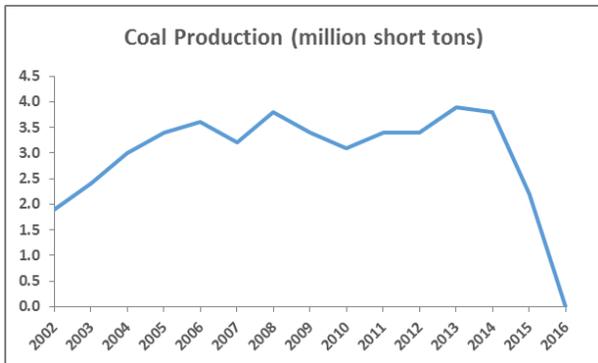
Drainage System: No
 MSHA ID: 1202215

GIBSON MINE

Basin: Illinois
 State: IN
 Coalbed: Springfield No. 5
 County: Gibson
 Current Operator: Gibson County Coal LLC
 Owner/Parent Company: Alliance Resource Partners LP
 Parent Company Website: <http://www.arlp.com/>
 Previous Owner(s): Alliance Resources Holdings
 Previous or Alternate Name of Mine: None
 Description of Surrounding Terrain: Flat
 Utility Electric Supplier: Duke Energy Indiana Inc.
 Parent Corporation of Utility: Duke Energy Corp

Mailing Address: RR #3
 Princeton, IN 47670
 Latitude/Longitude: 38.362943,-87.582192
 Number of Employees at Mine: 43
 Mining Method: Room and Pillar
 Year of Initial Production: 2000
 Primary Coal Use: Steam
 Depth to Seam (ft.): NA
 Seam Thickness (ft.): 0.5
 Transmission Pipeline in County?: Yes
 Owner of Nearest Pipeline: Vectren Corporation
 Distance to Pipeline (miles): 0.7

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	1.9	2.4	3.0	3.4	3.6	3.2	3.8	3.4	3.1	3.4	3.4	3.9	3.8	2.2	-
Emission from Ventilation Systems (MMCF/D)	2.2	2.4	2.2	2.6	3.1	3.5	4.7	4.6	4.2	4.3	4.5	3.4	4.7	2.5	4.2
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Specific Emissions (CF/T)	423	365	268	279	314	399	451	494	495	462	483	318	451	415	-
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Mine Status: Active
 Use Project: NA

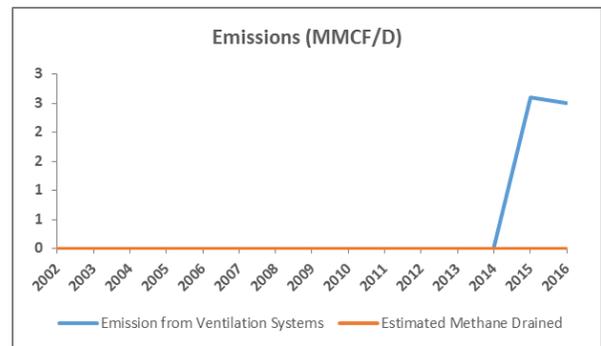
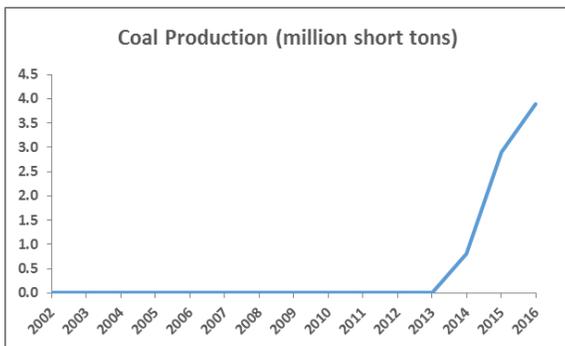
Drainage System: No
 MSHA ID: 1202388

GIBSON SOUTH

Basin: Illinois
 State: IN
 Coalbed: Springfield No. 5
 County: Gibson
 Current Operator: Gibson County Coal LLC
 Owner/Parent Company: Alliance Resource Partners LP
 Parent Company Website: <http://www.arlp.com/>
 Previous Owner(s): Alliance Resources Holdings
 Previous or Alternate Name of Mine: None
 Description of Surrounding Terrain: Flat
 Utility Electric Supplier: Duke Energy Indiana
 Parent Corporation of Utility: Duke Energy Corp

Mailing Address: RR #3
 Princeton, IN 47670
 Latitude/Longitude: 38.362943,-87.582192
 Number of Employees at Mine: 278
 Mining Method: Room and Pillar
 Year of Initial Production: 2014
 Primary Coal Use: Steam
 Depth to Seam (ft.): NA
 Seam Thickness (ft.): 0.5
 Transmission Pipeline in County?: Yes
 Owner of Nearest Pipeline: Vectren Corporation
 Distance to Pipeline (miles): 0.7

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	-	-	-	-	-	-	-	-	-	-	-	-	0.8	2.9	3.9
Emission from Ventilation Systems (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	2.6	2.5
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Specific Emissions (CF/T)	-	-	-	-	-	-	-	-	-	-	-	-	-	327	234
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Mine Status: Active
 Use Project: NA

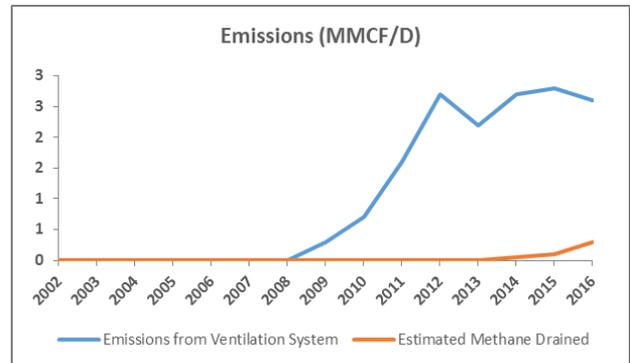
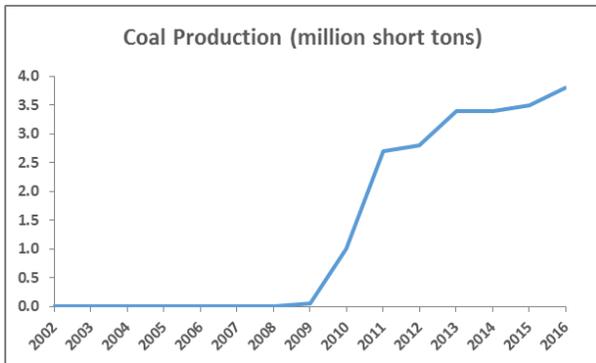
Drainage System: Yes
 MSHA ID: 1202394

OAKTOWN FUELS NO. 1

Basin: Illinois
 State: IN
 Coalbed: Springfield No. 5
 County: Knox
 Current Operator: Sunrise Coal LLC
 Owner/Parent Company: Hallador Energy Company
 Parent Company Website: www.halladorenergy.com
 Previous Owner(s): Black Panther Mining LLC
 Previous or Alternate Name of Mine: None
 Description of Surrounding Terrain: Flat farmland
 Utility Electric Supplier: Duke Energy Indiana Inc.
 Parent Corporation of Utility: Duke Energy Corp

Mailing Address: 12661 North Agri Care Road
 Oaktown, IN 47561
 Latitude/Longitude: 38.94575, -87.38421
 Number of Employees at Mine: 367
 Mining Method: Room and Pillar
 Year of Initial Production: 2007
 Primary Coal Use: Steam
 Depth to Seam (ft.): 350-450
 Seam Thickness (ft.): 0.5
 Transmission Pipeline in County?: NA
 Owner of Nearest Pipeline: NA
 Distance to Pipeline (miles): NA

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons/year)	-	-	-	-	-	-	0.0	0.05	1.0	2.7	2.8	3.4	3.4	3.5	3.8
Emission from Ventilation Systems (MMCF/D)	-	-	-	-	-	-	-	0.3	0.7	1.6	2.7	2.2	2.7	2.8	2.6
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	0.05	0.1	0.3
Estimated Specific Emissions (CF/T)	-	-	-	-	-	-	-	1,190	256	216	352	236	295	302	278
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	2%	3%	10%
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Mine Status: Active
 Use Project: NA

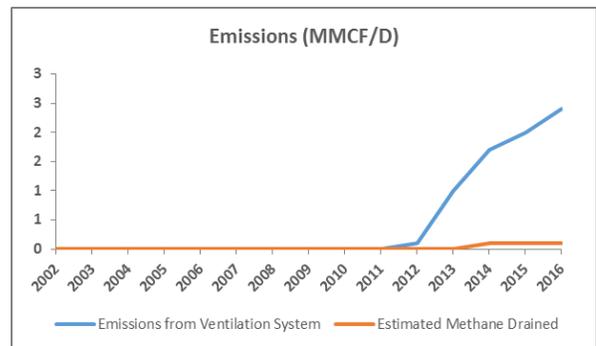
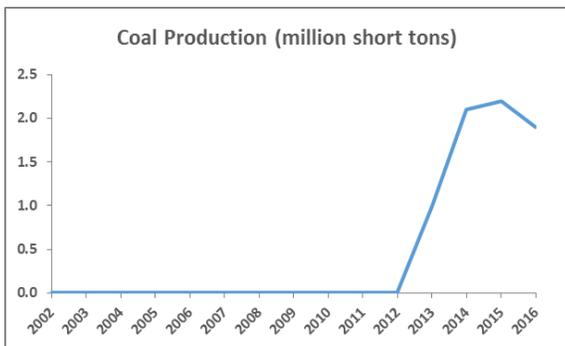
Drainage System: Yes
 MSHA ID: 1202418

OAKTOWN FUELS NO. 2

Basin: Illinois
State: IN
Coalbed: Springfield No. 5
County: Knox
Current Operator: Sunrise Coal LLC
Owner/Parent Company: Hallador Energy Company
Parent Company Website: www.halladoreenergy.com
Previous Owner(s): Black Panther Mining LLC
Previous or Alternate Name of Mine: None
Description of Surrounding Terrain: Flat farmland
Utility Electric Supplier: Duke Energy Indiana Inc.
Parent Corporation of Utility: Duke Energy Corp

Mailing Address: 12661 North Agri Care Road
 Oaktown, IN 47561
Latitude/Longitude: 38.862499, -87.428433
Number of Employees at Mine: 240
Mining Method: Room and Pillar
Year of Initial Production: 2013
Primary Coal Use: Steam
Depth to Seam (ft.): 350-450
Seam Thickness (ft.): 0.5
Transmission Pipeline in County?: NA
Owner of Nearest Pipeline: NA
Distance to Pipeline (miles): NA

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons/year)	-	-	-	-	-	-	-	-	-	-	-	1.0	2.1	2.2	1.9
Emission from Ventilation Systems (MMCF/D)	-	-	-	-	-	-	-	-	-	-	0.1	1.0	1.7	2.0	2.4
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1	0.1
Estimated Specific Emissions (CF/T)	-	-	-	-	-	-	-	-	-	-	-	183	313	348	480
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	6%	5%	4%
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



New Mexico Mine

San Juan Mine 1

Mine Status: Active
Use Project: NA

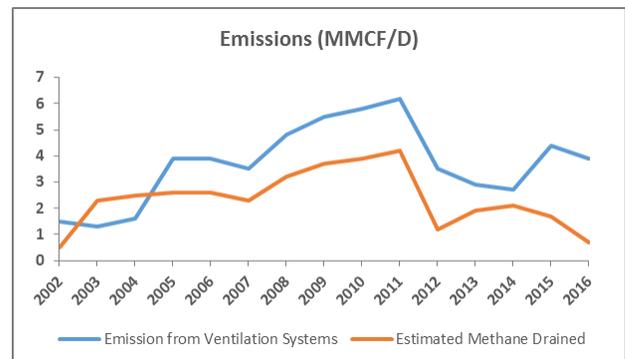
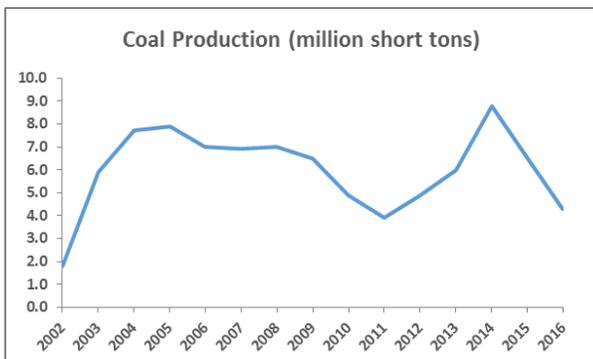
Drainage System: Yes
MSHA ID: 2902170

SAN JUAN MINE 1

Basin: San Juan
State: NM
Coalbed: No. 9 / No. 8
County: San Juan
Current Operator: San Juan Coal Company
Owner/Parent Company: Westmoreland Coal Company
Parent Company Website: www.westmoreland.com
Previous Owner(s): BHP Billiton
Previous or Alternate Name of Mine: San Juan South
Description of Surrounding Terrain: Flat arid terrain
Utility Electric Supplier: Jemez Mountains Electric Coop Inc.
Parent Corporation of Utility: NA

Mailing Address: PO Box 561, Waterflow, NM 87421
Latitude/Longitude: 39.919613, -80.471824
Number of Employees at Mine: 404
Mining Method: Longwall
Year of Initial Production: 1997
Primary Coal Use: Steam
Depth to Seam (ft.): 400-900
Seam Thickness (ft.): 10.0-13.0
Transmission Pipeline in County?: Yes
Owner of Nearest Pipeline: Western Gas Resources Inc.
Distance to Pipeline (miles): NA

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	1.8	5.9	7.7	7.9	7	6.9	7	6.5	4.9	3.9	4.9	6	8.8	6.5	4.3
Emission from Ventilation Systems (MMCF/D)	1.5	1.3	1.6	3.9	3.9	3.5	4.8	5.5	5.8	6.2	3.5	2.9	2.7	4.4	3.9
Estimated Methane Drained (MMCF/D)	0.5	2.3	2.5	2.6	2.6	2.3	3.2	3.7	3.9	4.2	1.2	1.9	2.1	1.7	0.7
Estimated Specific Emissions (CF/T)	406	223	194	300	339	307	417	517	723	973	350	292	199	343	389
Methane Used (MMCF/D)	-	0	0.2	0	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	25%	64%	61%	40%	40%	40%	40%	40%	40%	40%	26%	40%	44%	28%	15%
Estimated Current Market Penetration	-	>1%	8%	>1%	-	-	-	-	-	-	-	-	-	-	-



Oklahoma Mine

P8 North

Mine Status: Active
Use Project: NA

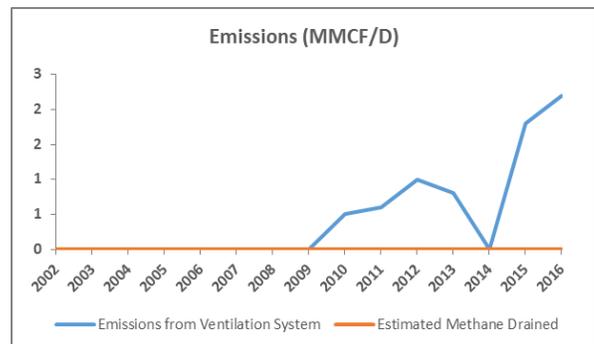
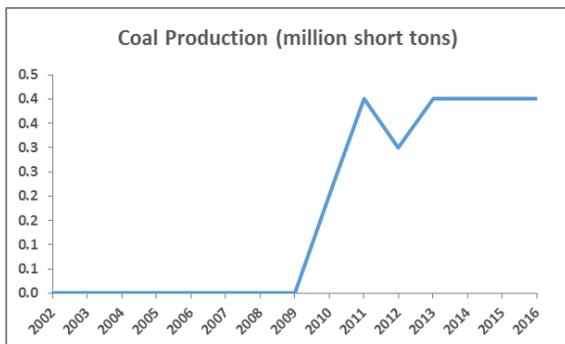
Drainage System: No
MSHA ID: 3402080

P8 NORTH

Basin: Western Interior
State: OK
Coalbed: NA
County: Le Flore
Current Operator: Txoma Mining LLC
Owner/Parent Company: L. Keller Smith
Parent Company Website: NA
Previous Owner(s): South Central Coal Company, Inc.
Previous or Alternate Name of Mine: None
Description of Surrounding Terrain: Hilly
Utility Electric Supplier: NA
Parent Corporation of Utility: NA

Mailing Address: 22279 US Highway 271
Spiro, OK 74959
Latitude/Longitude: 35.238143, -94.642531
Number of Employees at Mine: 76
Mining Method: Longwall
Year of Initial Production: 2010
Primary Coal Use: Steam
Depth to Seam (ft.): NA
Seam Thickness (ft.): NA
Transmission Pipeline in County?: NA
Owner of Nearest Pipeline: NA
Distance to Pipeline (miles): NA

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	-	-	-	-	-	-	-	-	0.2	0.4	0.3	0.4	0.4	0.4	0.4
Emission from Ventilation Systems (MMCF/D)	-	-	-	-	-	-	-	-	0.5	0.6	1.0	0.8	-	1.8	2.2
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Specific Emissions (CF/T)	-	-	-	-	-	-	-	-	913	548	1,217	730	-	1,643	2,008
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Pennsylvania Mines

Bailey Mine

Cumberland Mine

Enlow Fork Mine

Harvey Mine

Mine Status: Active
 Use Project: Pipeline

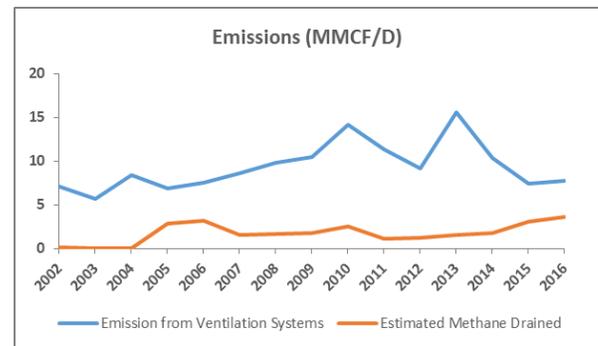
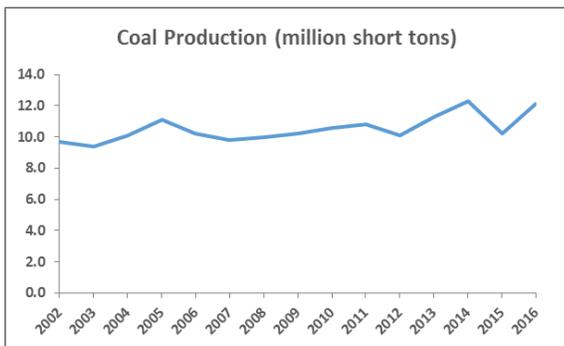
Drainage System: Yes
 MSHA ID: 3607230

BAILEY MINE

Basin: Northern Appalachian
State: PA
Coalbed: Pittsburgh No. 8
County: Greene
Current Operator: Consol Pennsylvania Coal Company LLC
Owner/Parent Company: CONSOL Energy Inc.
Parent Company Website: www.consolenergy.com
Previous Owner(s): None
Previous or Alternate Name of Mine: None
Description of Surrounding Terrain: High Hills/Open High Hills
Utility Electric Supplier: West Penn Power Co
Parent Corporation of Utility: FirstEnergy

Mailing Address: 192 Crabapple Road Wind Ridge, PA 15380
Latitude/Longitude: 39.919613, -80.471824
Number of Employees at Mine: 683
Mining Method: Longwall
Year of Initial Production: 1984
Primary Coal Use: Steam, Metallurgical
Depth to Seam (ft.): 600–1000
Seam Thickness (ft.): 5.2-6.0
Transmission Pipeline in County?: Yes
Owner of Nearest Pipeline: National Fuel Gas Supply Corp
Distance to Pipeline (miles): < 0.1

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	9.7	9.4	10.1	11.1	10.2	9.8	10	10.2	10.6	10.8	10.1	11.3	12.3	10.2	12.1
Emission from Ventilation Systems (MMCF/D)	7.1	5.7	8.4	6.9	7.5	8.6	9.8	10.5	14.2	11.3	9.2	15.6	10.4	7.4	7.8
Estimated Methane Drained (MMCF/D)	0.1	-	-	2.9	3.2	1.5	1.7	1.8	2.5	1.1	1.2	1.5	1.8	3.1	3.6
Estimated Specific Emissions (CF/T)	271	221	304	322	383	376	420	440	575	419	376	552	362	376	343
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	1.8	-	0.1
Estimated Current Drainage Efficiency	1%	-	-	30%	30%	15%	15%	15%	15%	9%	12%	9%	15%	30%	32%
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	100%	>1%	3%



Mine Status: Active
 Use Project: Pipeline

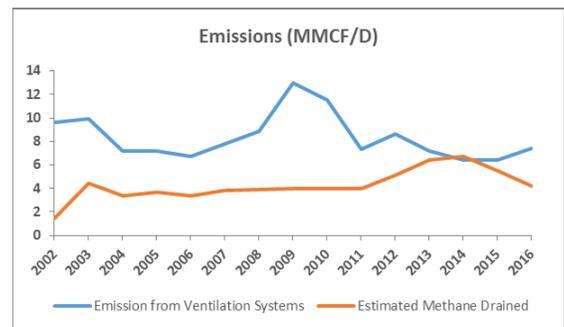
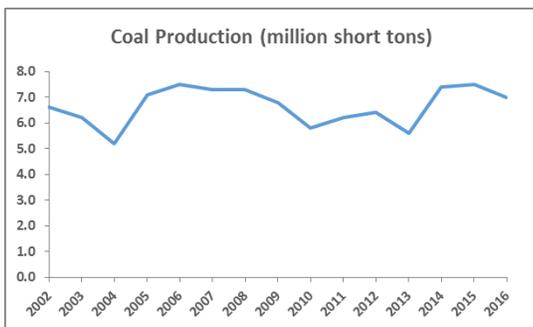
Drainage System: Yes
 MSHA ID: 3605018

CUMBERLAND MINE

Basin: Northern Appalachian
 State: PA
 Coalbed: Pittsburgh No. 8
 County: Greene
 Current Operator: Cumberland Coal Resources LP
 Owner/Parent Company: Contura Energy, Inc.
 Parent Company Website: www.conturaenergy.com
 Previous Owner(s): Alpha Natural Resources
 Previous or Alternate Name of Mine: RAG Cumberland
 Description of Surrounding Terrain: High Hills
 Utility Electric Supplier: West Penn Power Co
 Parent Corporation of Utility: FirstEnergy

Mailing Address: 576 Maple Run Rd, Waynesburg, PA 15370
 Latitude/Longitude: 39.79547, -80.16442
 Number of Employees at Mine: 709
 Mining Method: Longwall
 Year of Initial Production: 1972
 Primary Coal Use: Steam
 Depth to Seam (ft.): 400-1000
 Seam Thickness (ft.): 6.5-7.0
 Transmission Pipeline in County?: Yes
 Owner of Nearest Pipeline: EQT
 Distance to Pipeline (miles): 0.4

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	6.6	6.2	5.2	7.1	7.5	7.3	7.3	6.8	5.8	6.2	6.4	5.6	7.4	7.5	7.0
Emission from Ventilation Systems (MMCF/D)	9.6	9.9	7.2	7.2	6.7	7.8	8.9	13	11.5	7.3	8.6	7.2	6.4	6.4	7.4
Estimated Methane Drained (MMCF/D)	1.5	4.4	3.4	3.7	3.4	3.8	3.9	4	4	4	5.1	6.4	6.7	5.5	4.2
Estimated Specific Emissions (CF/T)	614	842	744	560	492	580	640	913	975	665	781	886	646	579	605
Methane Used (MMCF/D)	-	-	-	3.2	3.4	2.6	3.2	3.7	3.7	3.7	1.7	1.7	1.4	1.2	1.0
Estimated Current Drainage Efficiency	14%	31%	32%	34%	34%	33%	30%	24%	26%	35%	37%	47%	51%	46%	36%
Estimated Current Market Penetration	-	-	-	86%	100%	68%	82%	93%	93%	93%	33%	27%	20%	22%	24%



Mine Status: Active
 Use Project: NA

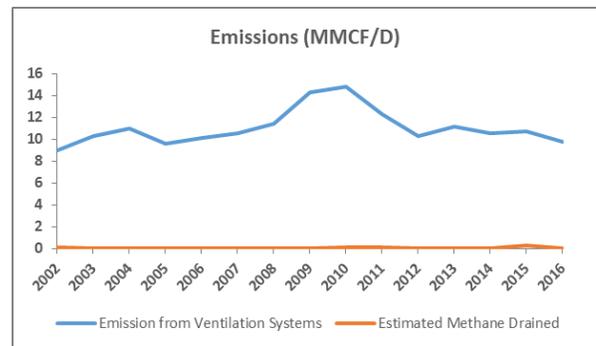
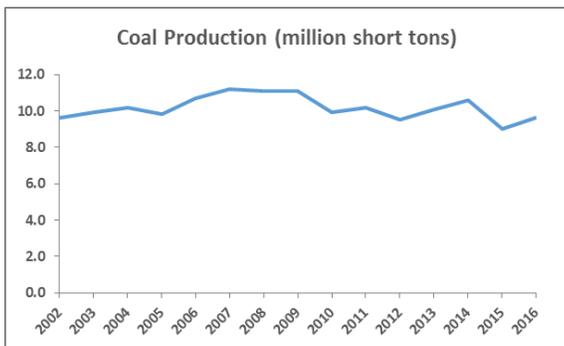
Drainage System: Yes
 MSHA ID: 3607416

ENLOW FORK MINE

Basin: Northern Appalachian
State: PA
Coalbed: Pittsburgh No. 8
County: Washington
Current Operator: Consol Pennsylvania Coal Company
Owner/Parent Company: CONSOL Energy Inc.
Parent Company Website: www.consolenergy.com
Previous Owner(s): None
Previous or Alternate Name of Mine: None
Description of Surrounding Terrain: Open Hills/Open High Hills
Utility Electric Supplier: West Penn Power Co
Parent Corporation of Utility: FirstEnergy

Mailing Address: 2041 Pleasant Grove Road, Claysville, PA 15323
Latitude/Longitude: 40.076034, -80.35271
Number of Employees at Mine: 606
Mining Method: Longwall
Year of Initial Production: 1990
Primary Coal Use: Steam
Depth to Seam (ft.): 600–1,000
Seam Thickness (ft.): 5.2–6.0
Transmission Pipeline in County?: Yes
Owner of Nearest Pipeline: National Fuel Gas Supply Corp
Distance to Pipeline (miles): 1.2

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	9.6	9.9	10.2	9.8	10.7	11.2	11.1	11.1	9.9	10.2	9.5	10.1	10.6	9.0	9.6
Emission from Ventilation Systems (MMCF/D)	9	10.3	11	9.6	10.1	10.6	11.4	14.3	14.8	12.3	10.3	11.2	10.6	10.7	9.8
Estimated Methane Drained (MMCF/D)	0.1	-	-	-	-	-	-	-	0.1	0.1	-	-	-	0.3	0.0
Estimated Specific Emissions (CF/T)	346	380	394	358	345	345	375	470	549	444	396	405	365	446	372
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	1%	-	-	-	-	-	-	-	0%	0%	-	-	-	3%	0%
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Mine Status: Active
 Use Project: NA

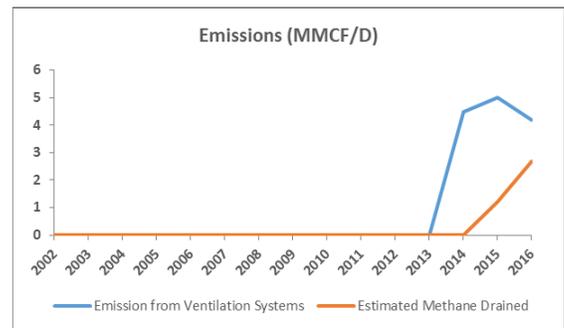
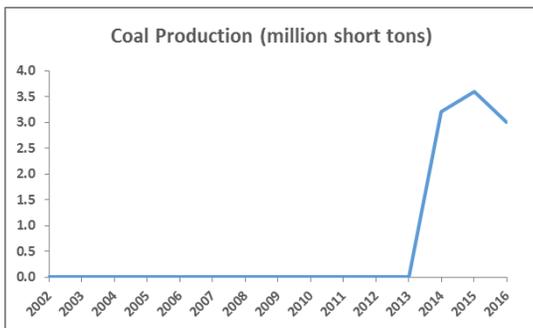
Drainage System: Yes
 MSHA ID: 3610045

HARVEY MINE

Basin: Northern Appalachian
 State: PA
 Coalbed: Pittsburgh No. 8
 County: Greene
 Current Operator: Consol Pennsylvania Coal Company
 Owner/Parent Company: CONSOL Energy Inc.
 Parent Company Website: www.consolenergy.com
 Previous Owner(s): None
 Previous or Alternate Name of Mine: None
 Description of Surrounding Terrain: Open Hills/Open High Hills
 Utility Electric Supplier: West Penn Power Co
 Parent Corporation of Utility: FirstEnergy

Mailing Address: 685 Patterson Creek Road Sycamore, PA 15364
 Latitude/Longitude: 39.9705, -80.4141
 Number of Employees at Mine: 178
 Mining Method: Longwall
 Year of Initial Production: 2015
 Primary Coal Use: Steam, Metallurgical
 Depth to Seam (ft.): 600-1,000
 Seam Thickness (ft.): 5.2-6.0
 Transmission Pipeline in County?: Yes
 Owner of Nearest Pipeline: NA
 Distance to Pipeline (miles): NA

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	-	-	-	-	-	-	-	-	-	-	-	-	3.2	3.6	3.0
Emission from Ventilation Systems (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	4.5	5	4.2
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	1.2	2.7
Estimated Specific Emissions (CF/T)	-	-	-	-	-	-	-	-	-	-	-	-	513	629	852
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	19%	39%
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Virginia Mines

Buchanan Mine #1

Deep Mine 41

Mine Status: Active
 Use Project: Pipeline, Power

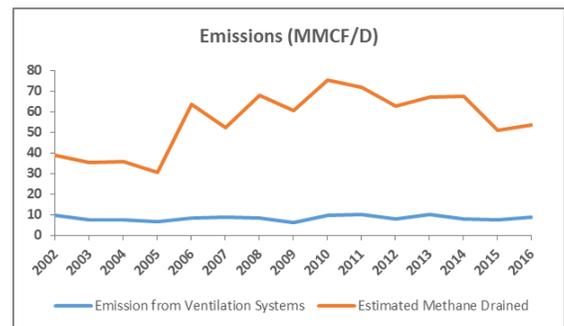
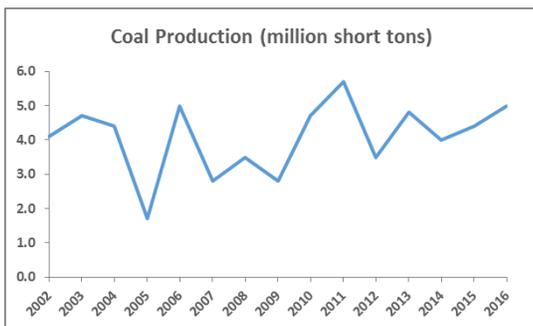
Drainage System: Yes
 MSHA ID: 4404856

BUCHANAN MINE #1

Basin: Central Appalachian
State: VA
Coalbed: Pocahontas No. 3
County: Buchanan
Current Operator: Buchanan Minerals, LLC
Owner/Parent Company: Coronado IV LLC
Parent Company Website: www.coronadocoal.com
Previous Owner(s): CONSOL Buchanan Mining Company LLC and Consolidation Coal Company
Previous or Alternate Name of Mine: None
Description of Surrounding Terrain: Open Low Mountains/Low Mountains
Utility Electric Supplier: Appalachian Power Co
Parent Corporation of Utility: American Electric Power Co Inc.

Mailing Address: Rte 680, Keen Mountain, VA 24624
Latitude/Longitude: 37.207886, -81.916612
Number of Employees at Mine: 469
Mining Method: Longwall
Year of Initial Production: 1983
Primary Coal Use: Steam, Metallurgical
Depth to Seam (ft.): 1,400–2,000
Seam Thickness (ft.): 5.4
Transmission Pipeline in County?: Yes
Owner of Nearest Pipeline: Dominion
Distance to Pipeline (miles): 4.2

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	4.1	4.7	4.4	1.7	5	2.8	3.5	2.8	4.7	5.7	3.5	4.8	4.0	4.4	5.0
Emission from Ventilation Systems (MMCF/D)	9.5	7.3	7.5	6.4	8.4	9	8.5	6.2	9.7	10.2	8	10.3	7.9	7.3	8.9
Estimated Methane Drained (MMCF/D)	38.7	35.3	35.8	30.6	63.9	52.3	67.9	60.8	75.4	72.2	62.7	67.4	67.7	51.2	53.8
Estimated Specific Emissions (CF/T)	4,291	3,308	3,592	7,944	5,278	7,991	7,967	8,734	6,609	5,277	7,373	5,908	6,899	4,853	4,626
Methane Used (MMCF/D)	38.7	34	35.7	30.6	51.3	52.3	67.9	60.8	75.4	72.2	62.7	67.4	52.1	51.2	53.8
Estimated Current Drainage Efficiency	80%	83%	83%	83%	88%	85%	89%	90%	89%	88%	89%	87%	90%	88%	86%
Estimated Current Market Penetration	100%	96%	99%	100%	80%	100%	100%	100%	100%	100%	100%	100%	77%	100%	100%



Mine Status: Active
 Use Project: NA

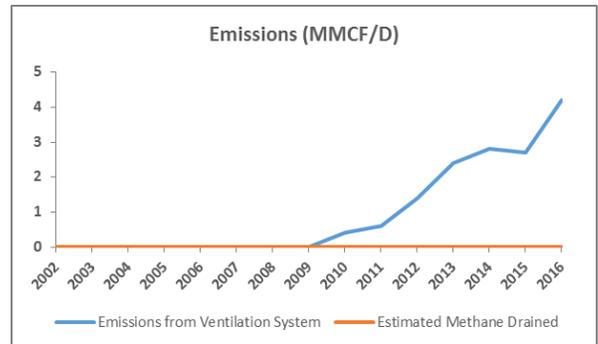
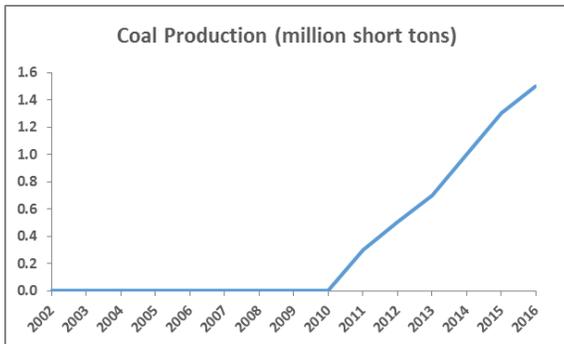
Drainage System: No
 MSHA ID: 4407223

DEEP MINE 41

Basin: Central Appalachian
 State: VA
 Coalbed: NA
 County: Dickenson
 Current Operator: Paramount Contura, LLC
 Owner/Parent Company: Contura Energy Inc
 Parent Company Website: <http://conturaenergy.com/>
 Previous Owner(s): Alpha Natural Resources Inc.
 Previous or Alternate Name of Mine: None
 Description of Surrounding Terrain: Mountainous
 Utility Electric Supplier: NA
 Parent Corporation of Utility: NA

Mailing Address: 5703 Crutchfield Drive
 Norton, VA 24273
 Latitude/Longitude: 36.971027, -82.604644
 Number of Employees at Mine: 325
 Mining Method: NA
 Year of Initial Production: 2010
 Primary Coal Use: Steam
 Depth to Seam (ft.): NA
 Seam Thickness (ft.): NA
 Transmission Pipeline in County?: NA
 Owner of Nearest Pipeline: NA
 Distance to Pipeline (miles): NA

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	-	-	-	-	-	-	-	-	0.2	0.3	0.5	0.7	1.0	1.3	1.5
Emission from Ventilation Systems (MMCF/D)	-	-	-	-	-	-	-	-	0.4	0.6	1.4	2.4	2.8	2.7	4.2
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Specific Emissions (CF/T)	-	-	-	-	-	-	-	-	730	730	1,022	1,251	1,022	758	1,022
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



West Virginia Mines

American Eagle Mine

Beckley Pocahontas Mine

Federal No. 2

Harrison County Mine

Leer Mine

Marion County Mine

Marshall County Mine

Monongalia County Mine

Ohio County Mine

Pinnacle Mine

Sentinel Mine

Tunnel Ridge Mine

Mine Status: Active
 Use Project: NA

Drainage System: No
 MSHA ID: 4605437

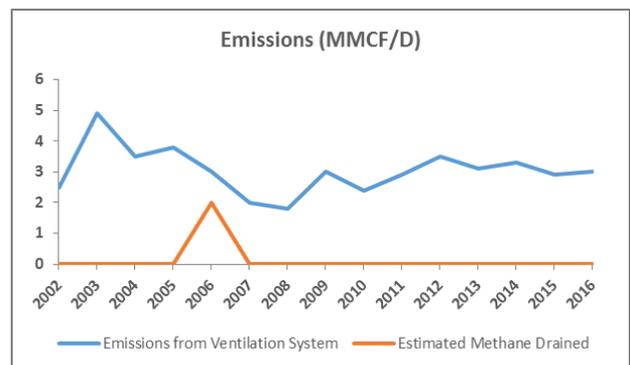
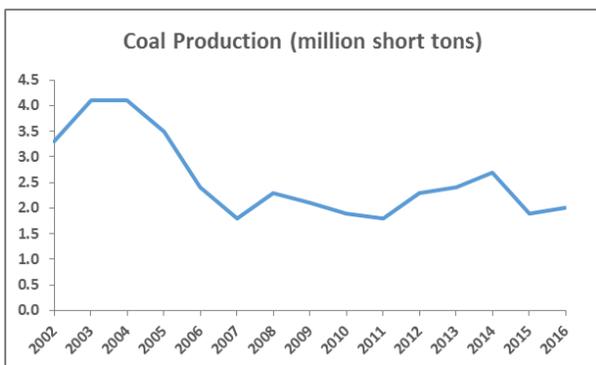
AMERICAN EAGLE MINE

Basin: Central Appalachian
State: WV
Coalbed: Eagle/Big Eagle
County: Kanawha
Current Operator: Panther Creek Mining LLC
Owner/Parent Company: Blackhawk Mining LLC
Parent Company Website: <http://www.blackhawkmining.com/>
Previous Owner(s): Patriot Coal Corporation, Speed Mining Inc, Appalachian Eagle Inc
Previous or Alternate Name of Mine: None
Description of Surrounding Terrain: Mountainous
Utility Electric Supplier: Appalachian Power Co
Parent Corporation of Utility: American Electric Power Co Inc

Mailing Address: 903 Dawes Hollow
 Dawes, WV 25054
Latitude/Longitude: 38.136332, -81.466969
Number of Employees at Mine: 252
Mining Method: Longwall
Year of Initial Production: 1977
Primary Coal Use: Steam
Depth to Seam (ft.): 600–1,000

Seam Thickness (ft.): 4.2
Transmission Pipeline in County?: Yes
Owner of Nearest Pipeline: NA
Distance to Pipeline (miles): 0.93

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	3.3	4.1	4.1	3.5	2.4	1.8	2.3	2.1	1.9	1.8	2.3	2.4	2.7	1.9	2.0
Emission from Ventilation Systems (MMCF/D)	2.5	4.9	3.5	3.8	3.0	2.0	1.8	3.0	2.4	2.9	3.5	3.1	3.3	2.9	3.0
Estimated Methane Drained (MMCF/D)	-	-	-	-	2.0	-	-	-	-	-	-	-	-	-	-
Estimated Specific Emissions (CF/T)	277	436	312	396	760	406	286	521	461	588	555	472	446	557	548
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Mine Status: Active
 Use Project: NA

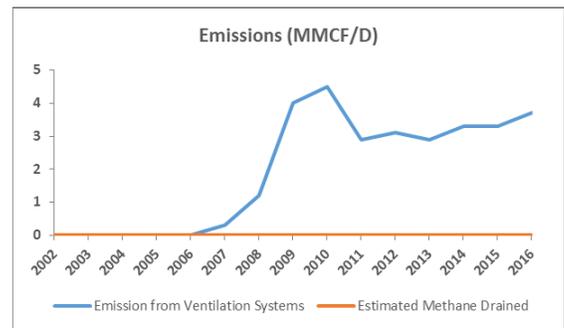
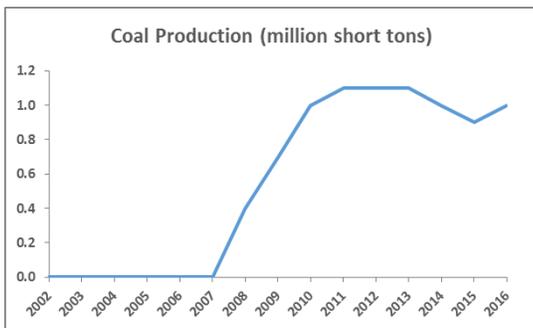
Drainage System: Yes
 MSHA ID: 4605252

BECKLEY POCAHONTAS MINE

Basin: Central Appalachian Basin
 State: WV
 Coalbed: Pocahontas No. 3
 County: Raleigh
 Current Operator: ICG Beckley LLC
 Owner/Parent Company: Arch Coal Inc
 Parent Company Website: www.archcoal.com
 Previous Owner(s): International Coal Group and Westmoreland Coal Company
 Previous or Alternate Name of Mine: None
 Description of Surrounding Terrain: High Hills/Hills
 Utility Electric Supplier: Appalachian Power Co
 Parent Corporation of Utility: American Electric Power Co Inc.

Mailing Address: 279 Wolf Run Road Eccles, WV 25836
 Latitude/Longitude: 37.7795, -81.2678
 Number of Employees at Mine: 233
 Mining Method: Continuous
 Year of Initial Production: 2006
 Primary Coal Use: Metallurgical
 Depth to Seam (ft.): 600-1,300
 Seam Thickness (ft.): 4.2
 Transmission Pipeline in County?: NA
 Owner of Nearest Pipeline: NA
 Distance to Pipeline (miles): NA

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	-	-	-	-	-	0	0.4	0.7	1	1.1	1.1	1.1	1	0.9	1.0
Emission from Ventilation Systems (MMCF/D)	-	-	-	-	-	0.3	1.2	4	4.5	2.9	3.1	2.9	3.3	3.3	3.7
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Specific Emissions (CF/T)	-	-	-	-	-	-	1,095	2,086	1,643	962	1,029	962	1,205	1,338	1,355
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Mine Status: Active
 Use Project: NA

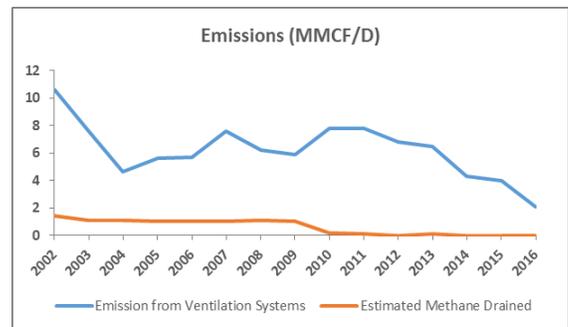
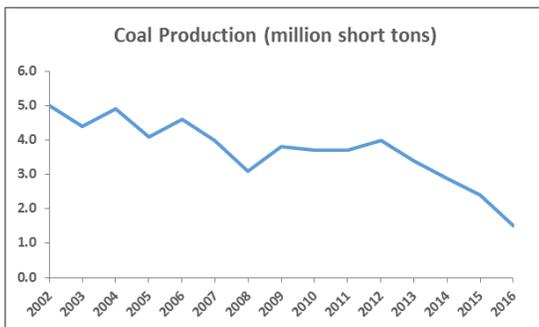
Drainage System: Yes
 MSHA ID: 4601456

FEDERAL NO. 2

Basin: Northern Appalachian
State: WV
Coalbed: Pittsburgh No. 8
County: Monongalia
Current Operator: ERP Federal Mining Complex, LLC
Owner/Parent Company: Virginia Conservation Energy Fund, Inc.
Parent Company Website: <http://virginiaconservationlegacyfund.org/>
Previous Owner(s): Peabody Energy Corp, Patriot Coal Corporation
Previous or Alternate Name of Mine: None
Description of Surrounding Terrain: Open Low Mountains/High Hills
Utility Electric Supplier: Monongahela Power Co
Parent Corporation of Utility: FirstEnergy

Mailing Address: 1044 Miracle Run Road Fairview, WV 26570
Latitude/Longitude: 39.67, -80.25
Number of Employees at Mine: 312
Mining Method: Longwall
Year of Initial Production: 1983
Primary Coal Use: Steam
Depth to Seam (ft.): 800–1,250
Seam Thickness (ft.): 7.0
Transmission Pipeline in County?: Yes
Owner of Nearest Pipeline: EQT
Distance to Pipeline (miles): 0.7

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	5	4.4	4.9	4.1	4.6	4	3.1	3.8	3.7	3.7	4	3.4	2.9	2.4	1.5
Emission from Ventilation Systems (MMCF/D)	10.6	7.6	4.6	5.6	5.7	7.6	6.2	5.9	7.8	7.8	6.8	6.5	4.3	4	2.1
Estimated Methane Drained (MMCF/D)	1.4	1.1	1.1	1	1	1	1.1	1	0.2	0.1	0	0.1	0	0	-
Estimated Specific Emissions (CF/T)	876	722	425	588	532	785	860	663	789	779	621	709	541	608	505
Methane Used (MMCF/D)	0.4	0.1	0	0.2	0.2	0.4	0.6	0.5	0.2	0.1	-	-	-	-	-
Estimated Current Drainage Efficiency	12%	13%	19%	15%	15%	12%	15%	14%	3%	1%	0%	2%	0%	0%	-
Estimated Current Market Penetration	29%	9%	0%	20%	23%	40%	55%	50%	100%	100%	-	-	-	-	-



Mine Status: Active
 Use Project: Pipeline

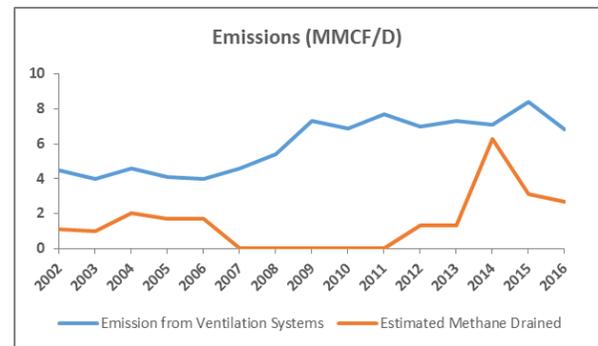
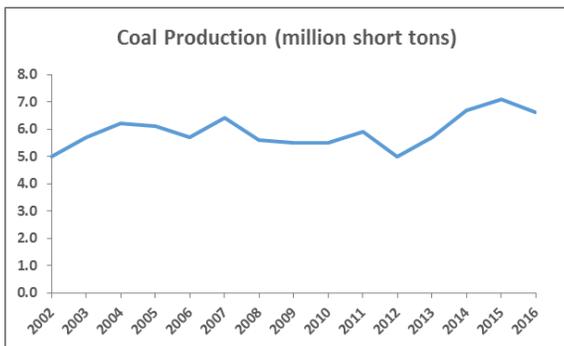
Drainage System: Yes
 MSHA ID: 4601318

HARRISON COUNTY MINE

Basin: Northern Appalachian
 State: WV
 Coalbed: Pittsburgh No. 8
 County: Harrison
 Current Operator: The Harrison County Coal Company
 Owner/Parent Company: Murray Energy
 Parent Company Website: www.murrayenergycorp.com
 Previous Owner(s): CONSOL Energy Inc.
 Previous or Alternate Name of Mine: Robinson Run No. 95
 Description of Surrounding Terrain: Open Low Mountains
 Utility Electric Supplier: Monongahela Power Co
 Parent Corporation of Utility: FirstEnergy

Mailing Address: 79 Camp Run Rd, Mannington, WV 26582
 Latitude/Longitude: 39.5158, -80.444
 Number of Employees at Mine: 397
 Mining Method: Longwall
 Year of Initial Production: 1968
 Primary Coal Use: Steam
 Depth to Seam (ft.): 700
 Seam Thickness (ft.): 6.5
 Transmission Pipeline in County?: Yes
 Owner of Nearest Pipeline: Dominion
 Distance to Pipeline (miles): 0.6

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	5	5.7	6.2	6.1	5.7	6.4	5.6	5.5	5.5	5.9	5	5.7	6.7	7.1	6.6
Emission from Ventilation Systems (MMCF/D)	4.5	4	4.6	4.1	4	4.6	5.4	7.3	6.9	7.7	7	7.3	7.1	8.4	6.8
Estimated Methane Drained (MMCF/D)	1.1	1	2	1.7	1.7	0	0	0	0	0	1.3	1.3	6.3	3.1	2.7
Estimated Specific Emissions (CF/T)	409	320	389	347	365	262	352	485	458	476	606	551	730	591	526
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	3.4	0.3	0.3
Estimated Current Drainage Efficiency	20%	20%	30%	29%	30%	0%	0%	0%	0%	0%	16%	15%	47%	27%	28%
Estimated Current Market Penetration	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%	11%



Mine Status: Active
 Use Project: NA

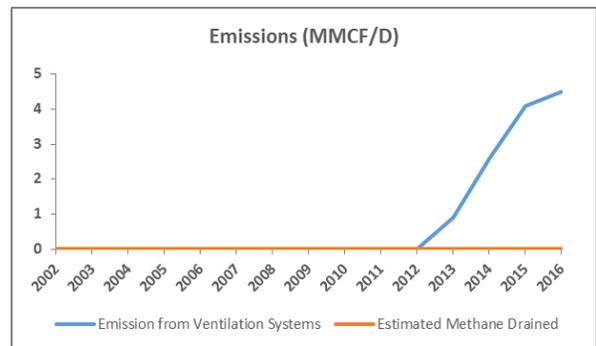
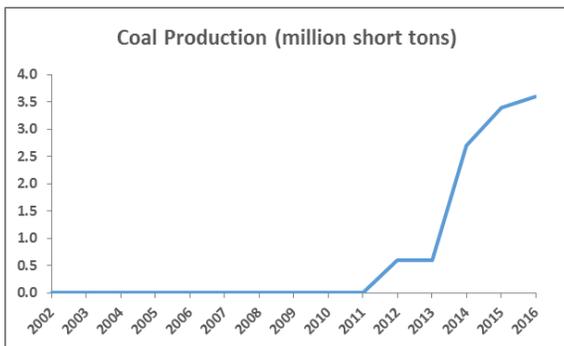
Drainage System: No
 MSHA ID: 4609192

LEER MINE

Basin: Northern Appalachian
State: WV
Coalbed: Lower Kittanning
County: Taylor
Current Operator: ACI Tygart Valley
Owner/Parent Company: Arch Coal Inc.
Parent Company Website: www.archcoal.com
Previous Owner(s): None
Previous or Alternate Name of Mine: None
Description of Surrounding Terrain: Open Low Mountains
Utility Electric Supplier: MonPower Co.
Parent Corporation of Utility: FirstEnergy

Mailing Address: 1200 Tygart Dr., Grafton, WV 26354
Latitude/Longitude: 39.3417, -79.9759
Number of Employees at Mine: 426
Mining Method: Longwall
Year of Initial Production: 2011
Primary Coal Use: Metallurgical
Depth to Seam (ft.): 700
Seam Thickness (ft.): 6.5
Transmission Pipeline in County?: Yes
Owner of Nearest Pipeline: NA
Distance to Pipeline (miles): 12.5

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	-	-	-	-	-	-	-	-	-	0.01	0.6	0.6	2.7	3.4	3.6
Emission from Ventilation Systems (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	0.9	2.6	4.1	4.5
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Specific Emissions (CF/T)	-	-	-	-	-	-	-	-	-	-	-	548	351	440	463
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Mine Status: Active
 Use Project: Pipeline

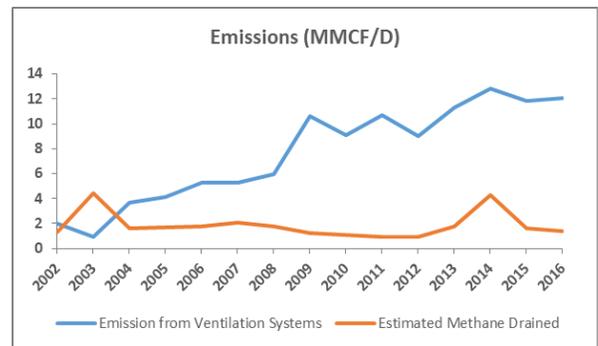
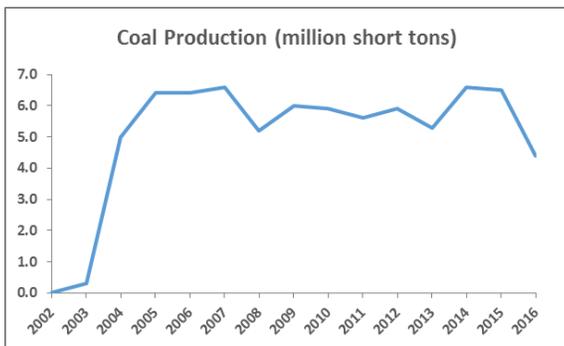
Drainage System: Yes
 MSHA ID: 4601433

MARION COUNTY MINE

Basin: Northern Appalachian
 State: WV
 Coalbed: Pittsburgh No. 8
 County: Marion
 Current Operator: The Marion County Coal Company
 Owner/Parent Company: Murray Energy
 Parent Company Website: www.murrayenergycorp.com
 Previous Owner(s): CONSOL Energy Inc.
 Previous or Alternate Name of Mine: Loveridge #22
 Description of Surrounding Terrain: Open Low Mountains/High Hills
 Utility Electric Supplier: Monongahela Power Co
 Parent Corporation of Utility: FirstEnergy

Mailing Address: PO Box 40, Fairview, WV, 26570
 Latitude/Longitude: 39.58567, -80.36233
 Number of Employees at Mine: 446
 Mining Method: Longwall
 Year of Initial Production: 1953
 Primary Coal Use: Steam
 Depth to Seam (ft.): 800-1,250
 Seam Thickness (ft.): 7.0
 Transmission Pipeline in County?: Yes
 Owner of Nearest Pipeline: EQT
 Distance to Pipeline (miles): 1.4

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	-	0.3	5	6.4	6.4	6.6	5.2	6	5.9	5.6	5.9	5.3	6.6	6.5	4.4
Emission from Ventilation Systems (MMCF/D)	2	0.9	3.7	4.1	5.3	5.3	6	10.6	9.1	10.7	9	11.3	12.8	11.8	12.1
Estimated Methane Drained (MMCF/D)	1.3	4.4	1.6	1.7	1.8	2.1	1.8	1.2	1.1	0.9	0.9	1.8	4.3	1.6	1.4
Estimated Specific Emissions (CF/T)	-	6,448	387	331	405	409	548	718	631	756	613	902	946	752	1,127
Methane Used (MMCF/D)	-	-	-	1.7	1.8	2.1	1.8	1.2	1.1	0.9	0.9	0.9	3.1	0.1	0.1
Estimated Current Drainage Efficiency	39%	83%	30%	29%	25%	28%	23%	10%	11%	8%	9%	14%	25%	12%	10%
Estimated Current Market Penetration	-	-	-	100%	100%	100%	100%	100%	100%	100%	100%	50%	72%	6%	7%



Mine Status: Active
 Use Project: VAM Destruction

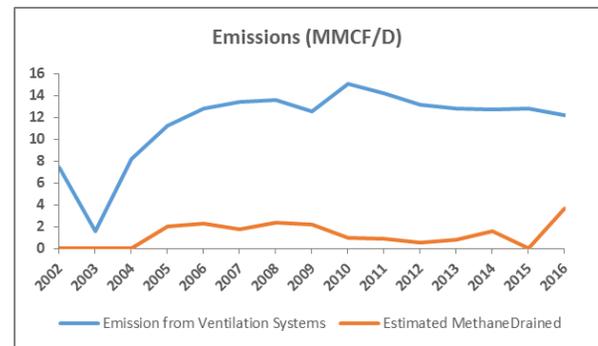
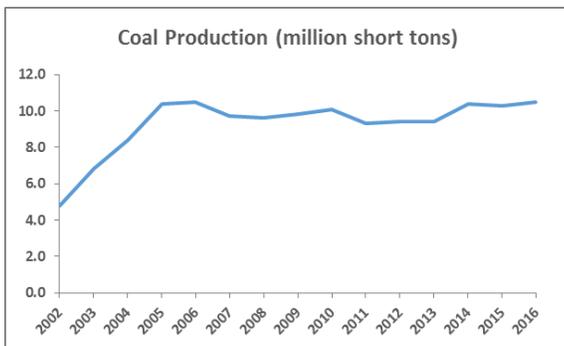
Drainage System: Yes
 MSHA ID: 4601437

MARSHALL COUNTY MINE

Basin: Northern Appalachian
 State: WV
 Coalbed: Pittsburgh No. 8
 County: Marshall
 Current Operator: The Marshall County Coal Company
 Owner/Parent Company: Murray Energy
 Parent Company Website: www.murrayenergycorp.com
 Previous Owner(s): CONSOL Energy Inc.
 Previous or Alternate Name of Mine: McElroy Mine
 Description of Surrounding Terrain: High Hills/Hills
 Utility Electric Supplier: Wheeling Power Co
 Parent Corporation of Utility: American Electric Power Co Inc.

Mailing Address: 57 Goshorn Woods Road, Cameron, WV 26033
 Latitude/Longitude: 39.8038, -80.5883
 Number of Employees at Mine: 724
 Mining Method: Longwall
 Year of Initial Production: 1968
 Primary Coal Use: Steam
 Depth to Seam (ft.): 600-1,200
 Seam Thickness (ft.): 5.0-5.4
 Transmission Pipeline in County?: Yes
 Owner of Nearest Pipeline: Spectra Energy Corp
 Distance to Pipeline (miles): 1.5

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	4.8	6.8	8.4	10.4	10.5	9.7	9.6	9.8	10.1	9.3	9.4	9.4	10.4	10.3	10.5
Emission from Ventilation Systems (MMCF/D)	7.4	1.6	8.2	11.3	12.8	13.4	13.6	12.6	15.1	14.2	13.2	12.8	12.7	12.8	12.2
Estimated Methane Drained (MMCF/D)	-	-	-	2.0	2.3	1.8	2.4	2.2	1	0.9	0.5	0.8	1.6	-	3.7
Estimated Specific Emissions (CF/T)	563	86	356	467	525	572	608	551	582	593	532	528	502	454	553
Methane Used (MMCF/D)	-	-	-	-	-	-	-	0.1	0.1	0.1	0.7	1.9	1.8	1.5	2.4
Estimated Current Drainage Efficiency	-	-	-	15%	15%	12%	15%	15%	6%	6%	4%	6%	11%	-	23%
Estimated Current Market Penetration	0%	0%	0%	0%	0%	0%	0%	5%	10%	11%	140%	226%	113%	12%	64%



Mine Status: Active
 Use Project: Pipeline

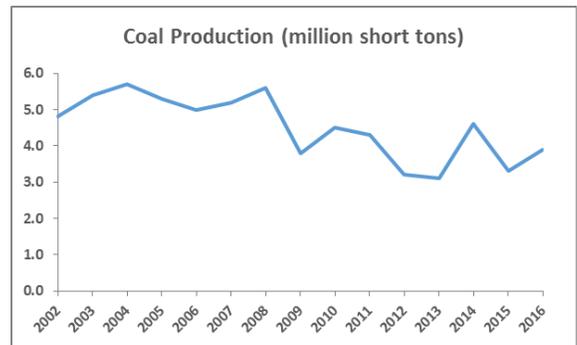
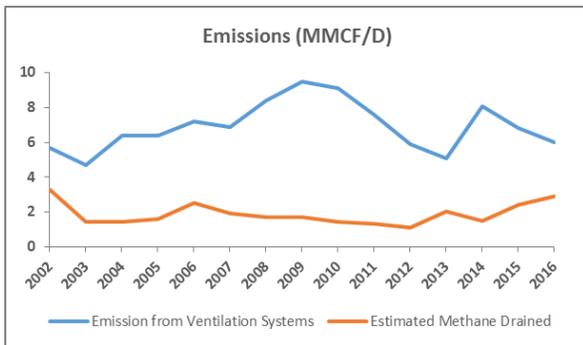
Drainage System: Yes
 MSHA ID: 4601968

MONONGALIA COUNTY MINE

Basin: Northern Appalachian
State: WV
Coalbed: Pittsburgh No. 8
County: Monongalia
Current Operator: The Monongalia County Coal Company
Owner/Parent Company: Murray Energy
Parent Company Website: www.murrayenergycorp.com
Previous Owner(s): CONSOL Energy Inc.
Previous or Alternate Name of Mine: Blacksville No. 2
Description of Surrounding Terrain: Open Low Mountains/High Hills
Utility Electric Supplier: Monongahela Power Co
Parent Corporation of Utility: FirstEnergy

Mailing Address: 701 Oak Forest Road
 Holbrook, PA 15341
Latitude/Longitude: 39.7634, -80.2822
Number of Employees at Mine: 279
Mining Method: Longwall
Year of Initial Production: 1971
Primary Coal Use: Steam
Depth to Seam (ft.): 800-1,150
Seam Thickness (ft.): 7.5
Transmission Pipeline in County?: Yes
Owner of Nearest Pipeline: EQT
Distance to Pipeline (miles): 1.2

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	4.8	5.4	5.7	5.3	5	5.2	5.6	3.8	4.5	4.3	3.2	3.1	4.6	3.3	3.9
Emission from Ventilation Systems (MMCF/D)	5.7	4.7	6.4	6.4	7.2	6.9	8.4	9.5	9.1	7.6	5.9	5.1	8.1	6.8	6.0
Estimated Methane Drained (MMCF/D)	3.3	1.4	1.4	1.6	2.5	1.9	1.7	1.7	1.4	1.3	1.1	2	1.5	2.4	2.9
Estimated Specific Emissions (CF/T)	684	412	500	551	708	618	658	1,076	852	756	798	836	762	1,018	832
Methane Used (MMCF/D)	3.3	1.4	1.4	1.6	2.5	1.9	1.7	1.7	1.4	1.3	1.1	1.5	0.2	0.1	0.1
Estimated Current Drainage Efficiency	37%	23%	18%	20%	25%	22%	17%	15%	13%	15%	16%	28%	16%	4%	33%
Estimated Current Market Penetration	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	75%	13%	26%	4%



Mine Status: Active
 Use Project: NA

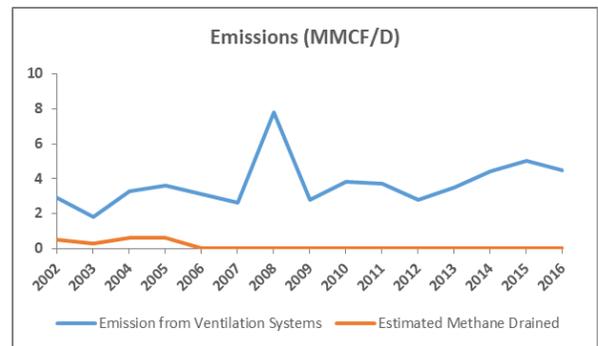
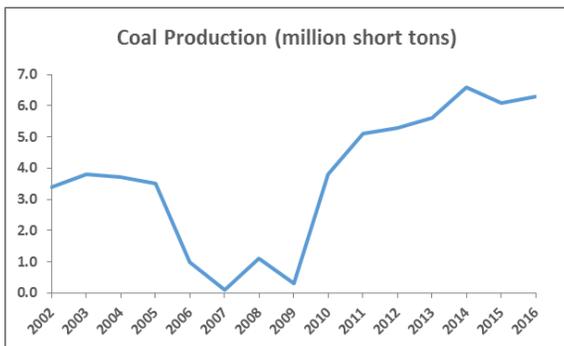
Drainage System: No
 MSHA ID: 4601436

OHIO COUNTY MINE

Basin: Northern Appalachian
State: WV
Coalbed: Pittsburgh No. 8
County: Marshall
Current Operator: The Ohio County Coal Company
Owner/Parent Company: Murray Energy
Parent Company Website: www.murrayenergycorp.com
Previous Owner(s): CONSOL Energy Inc.
Previous or Alternate Name of Mine: Shoemaker Mine
Description of Surrounding Terrain: High Hills/Hills
Utility Electric Supplier: Wheeling Power Co
Parent Corporation of Utility: American Electric Power Co Inc.

Mailing Address: 1107 Golden Ridge Road
 Dallas, WV 26036
Latitude/Longitude: 39.9705, -80.4141
Number of Employees at Mine: 457
Mining Method: Longwall
Year of Initial Production: 1983
Primary Coal Use: Steam
Depth to Seam (ft.): 650
Seam Thickness (ft.): 5.0-5.5
Transmission Pipeline in County?: Yes
Owner of Nearest Pipeline: NA
Distance to Pipeline (miles): 1.4

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	3.4	3.8	3.7	3.5	1	0.1	1.1	0.3	3.8	5.1	5.3	5.6	6.6	6.1	6.3
Emission from Ventilation Systems (MMCF/D)	2.9	1.8	3.3	3.6	3.1	2.6	7.8	2.8	3.8	3.7	2.8	3.49	4.4	5.0	4.5
Estimated Methane Drained (MMCF/D)	0.5	0.3	0.6	0.6	-	-	-	-	-	-	-	-	-	-	-
Estimated Specific Emissions (CF/T)	365	202	385	438	1,132	9,490	2,588	3,407	365	265	193	228	243	299	262
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	15%	14%	15%	14%	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Mine Status: Active
 Use Project: Pipeline

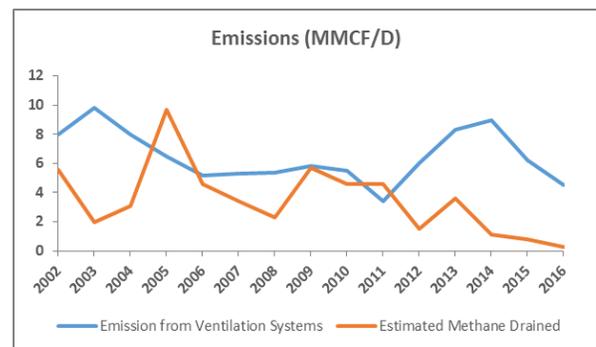
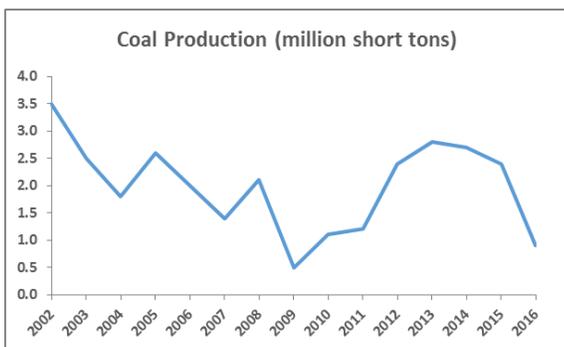
Drainage System: Yes
 MSHA ID: 4601816

PINNACLE MINE

Basin: Central Appalachian
State: WV
Coalbed: Pocahontas No. 3
County: Wyoming
Current Operator: Pinnacle Mining Company
Owner/Parent Company: Seneca Coal Resources LLC
Parent Company Website: <http://www.erpfuels.com/>
Previous Owner(s): Cliffs Natural Resources, U.S. Steel Mining Company
Previous or Alternate Name of Mine: Pinnacle No. 50, Gary No. 50, US Steel No. 50
Description of Surrounding Terrain: Low Mountains
Utility Electric Supplier: Appalachian Power Co
Parent Corporation of Utility: American Electric Power Co Inc.

Mailing Address: Route 16 South, Welch Pineville Road 229, Welch, WV 24801
Latitude/Longitude: 37.54722, -81.49917
Number of Employees at Mine: 263
Mining Method: Longwall
Year of Initial Production: 1969
Primary Coal Use: Metallurgical
Depth to Seam (ft.): 600–1,300
Seam Thickness (ft.): 4.2
Transmission Pipeline in County?: Yes
Owner of Nearest Pipeline: NA
Distance to Pipeline (miles): 0.3

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	3.5	2.5	1.8	2.6	2	1.4	2.1	0.5	1.1	1.2	2.4	2.8	2.7	2.4	0.9
Emission from Ventilation Systems (MMCF/D)	8	9.8	8	6.5	5.2	5.3	5.4	5.8	5.5	3.4	6	8.3	9	6.2	4.5
Estimated Methane Drained (MMCF/D)	5.6	2	3.1	9.7	4.6	3.4	2.3	5.7	4.6	4.6	1.5	3.6	1.1	0.8	0.2
Estimated Specific Emissions (CF/T)	1,418	1,723	2,251	2,274	1,789	2,268	1,338	8,395	3,351	2,433	1,141	1,551	1,365	1,065	1,870
Methane Used (MMCF/D)	5.6	2	3.1	9.7	4.6	2.4	1.3	4.7	4.6	4.3	-	2.9	0.4	-	0.2
Estimated Current Drainage Efficiency	41%	17%	28%	60%	47%	40%	30%	50%	46%	58%	20%	30%	11%	12%	6%
Estimated Current Market Penetration	100%	100%	100%	100%	100%	71%	57%	82%	100%	93%	-	81%	36%	100%	81%



Mine Status: Active
 Use Project: NA

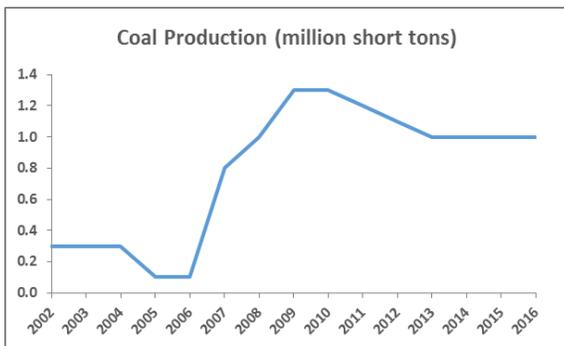
Drainage System: No
 MSHA ID: 4604168

SENTINEL MINE

Basin: Northern Appalachian
 State: WV
 Coalbed: NA
 County: Barbour
 Current Operator: Wolf Run Mining LLC
 Owner/Parent Company: Arch Coal Inc
 Parent Company Website: <http://www.archcoal.com/>
 Previous Owner(s): International Coal Group
 Previous or Alternate Name of Mine: None
 Description of Surrounding Terrain: Mountainous
 Utility Electric Supplier: NA
 Parent Corporation of Utility: NA

Mailing Address: 21550 Barbour County Highway
 Philippi, WV 26416
 Latitude/Longitude: 39.199293, -80.052064
 Number of Employees at Mine: 239
 Mining Method: Longwall
 Year of Initial Production: 1973
 Primary Coal Use: Metallurgical
 Depth to Seam (ft.): NA
 Seam Thickness (ft.): NA
 Transmission Pipeline in County?: NA
 Owner of Nearest Pipeline: NA
 Distance to Pipeline (miles): NA

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	0.3	0.3	0.3	0.1	0.1	0.8	1.0	1.3	1.3	1.2	1.1	1.0	1.0	1.0	1.0
Emission from Ventilation Systems (MMCF/D)						0.6	2.0	2.8	4.0	3.7	2.7	2.5	2.1	1.9	2.3
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Specific Emissions (CF/T)						274	730	787	1,123	1,125	896	913	767	694	840
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Mine Status: Active
 Use Project: NA

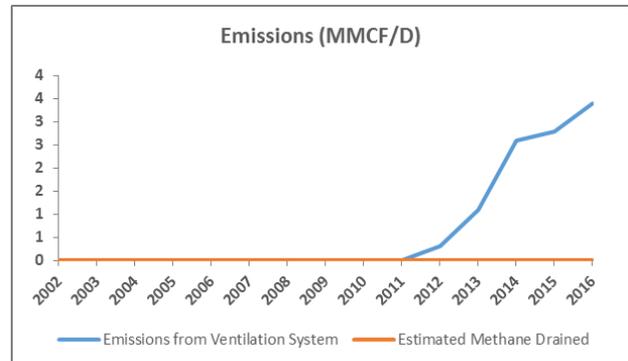
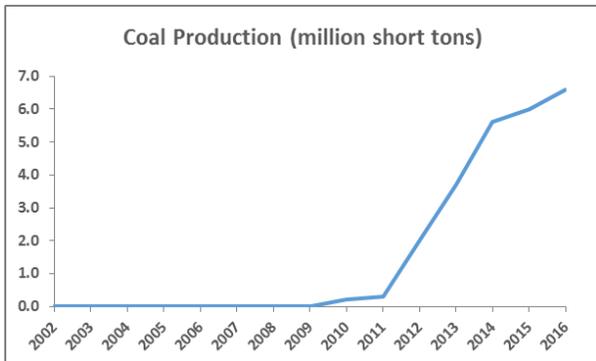
Drainage System: No
 MSHA ID: 4608864

TUNNEL RIDGE MINE

Basin: Northern Appalachian
 State: WV
 Coalbed: Pittsburgh No. 8
 County: Ohio
 Current Operator: Tunnel Ridge, LLC
 Owner/Parent Company: Alliance Resource Partners
 Parent Company Website: <http://www.arlp.com/>
 Previous Owner(s): None
 Previous or Alternate Name of Mine: None
 Description of Surrounding Terrain: Mountainous
 Utility Electric Supplier: NA
 Parent Corporation of Utility: NA

Mailing Address:
 Latitude/Longitude: 40.1500716, -80.7031356
 Number of Employees at Mine: 436
 Mining Method: Longwall
 Year of Initial Production: 2010
 Primary Coal Use: Steam
 Depth to Seam (ft.): 400
 Seam Thickness (ft.): 5.2-6.0
 Transmission Pipeline in County?: NA
 Owner of Nearest Pipeline: NA
 Distance to Pipeline (miles): NA

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal Production (million short tons)	-	-	-	-	-	-	-	-	0.2	0.3	2.0	3.7	5.6	6.0	6.6
Emission from Ventilation Systems (MMCF/D)	-	-	-	-	-	-	-	-	-	-	0.3	1.1	2.6	2.8	3.4
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Specific Emissions (CF/T)	-	-	-	-	-	-	-	-	-	-	55	109	170	170	188
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



5. References

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