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Identifying Opportunities for Methane Recovery at U.S. Coal Mines

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Mine Profiles (profiles appear in alphabetical order by state)

Alabama Mines

No. 4 Mine
No. 7 Mine
Oak Grove
Shoal Creek

Illinois Mines

MC #1 Mine
New Future Mine
The American Coal Company New Era Mine

Indiana Mines

Oaktown Fuels #1

New Mexico Mines

San Juan Mine 1

Pennsylvania Mines

Bailey
Cumberland
Emerald Mine No 1
Enlow Fork
Harvey

Utah Mines

West Ridge Mine

Virginia Mines

Buchanan Mine #1

West Virginia Mines

Beckley Pocahontas	Ohio County Mine
Federal No. 2	Pinnacle
Harrison County Mine	
Leer Mine	
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Frequently Used Terms

Coalbed methane (CBM): 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 unavoidable leakage of air into the 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 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**. It is also referred to as mine degasification. A drainage system may consist of only one well or borehole or multiple wells or boreholes.

Greenhouse Gas Reporting Program (GHGRP): The EPA's GHGRP collects and verifies annual reports of greenhouse gas (GHG) data and other relevant information from large sources and suppliers in the United States including underground coal mines that liberate at least 36.5 million cubic feet per year of methane from ventilation and degasification systems. The purpose of the program is to collect accurate and timely GHG data to inform future policy decisions; it does not require GHG emission controls. Data for underground coal mines, including volumetric flow and CH₄ concentration at all ventilation and degasification monitoring points has been collected since 2011.

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, etc.) 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.

Frequently Used Abbreviations

b (or B)	Billion (10^9)
Bcf	Billion cubic feet
Btu	British Thermal Unit
CBM	Coalbed Methane
cf	Cubic Feet
CH ₄	Methane
CO ₂	Carbon Dioxide
CMM	Coal Mine Methane
DOE	Department of Energy
EIA	Energy Information Administration
EPA	Environmental Protection Agency
IC	Internal Combustion
m (or M)	Thousand (10^3)
mm (or MM)	Million (10^6)
MMTCO ₂ e	Million metric tonnes CO ₂ equivalent
MSHA	Mine Safety and Health Administration
MW	Megawatt
NA	Not Available (as opposed to Not Applicable)
t (or T)	ton (short tons are used throughout this report when referring to coal Production)
VAM	Ventilation air methane

1. Executive Summary

1. Executive Summary

The purpose of this report is to provide information about specific opportunities to develop methane recovery and use projects at large, underground coal mines in the United States. This report contains profiles of 25 U.S. coal mines that may be potential candidates for methane recovery and use projects, and provides details about ongoing recovery and use projects at 13 of these mines. The United States 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 in order to determine whether the development of a specific methane recovery and use project is both technically and economically feasible.

Since the last version of this report was published in January 2009, total coal mine methane (CMM) produced from gas drainage systems peaked at 59 Bcf in 2010, and has since declined to 41 Bcf in 2015. The amount of CMM recovered and used peaked at 49 Bcf in 2010, and has since declined to 33 Bcf in 2015. The decline in utilization is due to several factors including natural fluctuations in methane production, a continued reduction in underground coal production, closure of mines, low natural gas prices and low carbon prices for CMM projects before 2015.

Methane Emissions and Recovery Opportunities

Methane is a greenhouse gas with an atmospheric lifespan of approximately 9-15 years, that is 25¹ times more effective in trapping heat in the atmosphere than carbon dioxide over a 100-year period. Methane is emitted from a variety of natural and human-influenced sources, including 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 also an important, relatively clean-burning energy source. As a result, efforts to prevent or utilize methane emissions can provide significant energy, economic, and environmental benefits.

U.S. EPA

U.S. industries, along with state and local governments, collaborate with the U.S. Environmental Protection Agency (EPA) to implement several voluntary programs that promote profitable opportunities for reducing methane emissions. These programs are designed to overcome a wide range of informational, technical, and institutional barriers to reducing methane emissions, while creating profitable activities for the coal, natural gas, petroleum, landfill, and agricultural industries. 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 into and emitted from mines.

Coal Mine Methane (CMM) Recovery Opportunities

In the U.S., coal mines account for approximately 9% of all man-made methane emissions (EPA, 2017). Today, there are methane recovery and use projects at mines in Alabama, Colorado,

¹ From IPCC, 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp. Used as the GWP for the EPA Greenhouse Gas Reporting Program and *Inventory of U.S. Greenhouse Gas Emissions & Sinks*.

Pennsylvania, Utah, 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 sale of gas to pipelines or use in applications ranging from electric power generation to industrial uses. In addition, indirect financial and economic benefits may also be realized. Because of the large environmental benefits that may be achieved, coal mine methane projects could serve as cost-effective alternatives for companies or facilities seeking to offset their own emissions. For example, certain CMM projects may produce emission offsets that can be sold via the California Cap-and-Trade program, generating a source of revenue for the project in addition to gas sales into energy and industrial markets.

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

Opportunities for Methane Recovery Projects

This report profiles 25 mines that are potential candidates for the development of CMM projects based on 2015 emissions. The number of mines with gas drainage systems increased from 23 in 2006 to 26 in 2015. Twenty of these mines are profiled in this document. The number of mines with active methane recovery and use projects increased from 14 in 2006 to 17² in 2015. At least 13 of these mines sell recovered methane, and at least five mines consume methane onsite for power generation, to heat mine ventilation air, flare CMM, or use produced gas as fuel in on-site vacuum pumps. Mines that have installed drainage systems may be especially good candidates for the development of cost-effective methane recovery and use projects.

For information on methane recovery projects at abandoned (closed) 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. See *U.S. Surface Coal Mine Methane Recovery Project Opportunities*, which is available on the CMOP website at

https://www.epa.gov/sites/production/files/2016-03/documents/cmm_recovery_opps_surface.pdf

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

This report profiles mines located in eight states. West Virginia has the largest number of profiled mines with nine, followed by Pennsylvania with five, Alabama with four, Illinois with three, and Indiana, New Mexico, Utah, and Virginia with one each. In 2015, the 25 mines profiled in this report liberated an estimated 268 mmcf/d of methane, or about 98 Bcf/yr (78% of all methane liberated from underground mines).

As of 2015, 20 of the profiled mines have installed drainage systems (although not all systems were operational that year). West Virginia has the largest number with seven, followed by Pennsylvania with five, Alabama with four, and Indiana, New Mexico, Utah, and Virginia with one each. In 2015, the 17

² This document only profiles 13 out of the 17 mines with use projects. The four mines not included here are: 1) Road Fork #51 Mine in West Virginia has a pipeline utilization project; 2) West Elk Mine in Colorado uses CMM for shaft heating, 3) Elk Creek Mine in Colorado has a CMM power plant and flare, and 4) Bowie No. 2 mine in Colorado uses CMM in on-site vacuum pumps.

mines operating drainage systems reported an estimated 109 mmcf/d of methane drained, or about 39.7 Bcf/yr. Table 8 in Chapter 4 shows mines that employ drainage systems, the type of drainage system employed, and estimated drainage efficiency.

Summary of Opportunities for Project Development

Most of the more than 300 active underground coal mines in the U.S. do not recover and use methane. However, the mines profiled in this report appear to be strong candidates for cost-effective recovery projects.

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 3 mmcf/d to over 59 mmcf/d. Similarly, specific emissions range from 235 cf/ton to approximately 4,850 cf/ton. Annual coal production ranges from approximately 1.0 million tons at some mines to over 10 million tons per year at others. These metrics affect each mine's potential as a project opportunity. Furthermore, as shown in the profiles (Chapter 5), 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.

2. Introduction

2. Introduction

Purpose of Report

This report provides information about specific opportunities to develop methane recovery and use projects at large underground mines in the United States. 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 3 contains information that will assist the reader in understanding and evaluating the data presented in Chapters 4 and 5. Chapter 4 contains data summary tables, and finally, Chapter 5 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

The number of mines with gas drainage systems increased from 23 in 2006 to 26 in 2015. The number of mines with active methane recovery and use projects increased from 14 in 2006 to 17 in 2015. However, total methane produced from gas drainage systems declined from 54 Bcf to 41 Bcf following a peak in 2010 at 59 Bcf. The amount of methane recovered and used increased from 45 Bcf in 2006 to 49 Bcf in 2010, but has since decreased to 33 Bcf in 2015. The decline in utilization is due to several factors including natural fluctuations in methane production, a continued reduction in underground coal production, mine closures, low natural gas prices and the lack of a viable carbon market before 2015.

Coal production from underground mines has decreased since 2010 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 drained methane was used, but in 2015 only 80 percent of available drained gas was utilized.

Despite these challenges, many promising developments are expected to encourage greater CMM capture and use in future years. The U.S. saw implementation of the first two commercial VAM projects during this period. The Biothermica VAM project operated at the Warrior Met Coal Blue Creek Number 4 Mine from 2010-2013, and the Verdeo McElroy VAM Project began operation at the Murray Energy Marshall County Mine in 2012, and remains in operation today. The success in demonstrating both the technical and commercial viability of these projects suggests that many more VAM projects could be deployed in coming years.

The second notable development was the California Air Resources Board (CARB) adoption of the Mine Methane Capture (MMC) 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 Compliant Offsets (CCOs) including emission 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 LNG or CNG 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 \$9.00-12.00 per metric ton of CO₂ equivalent³.

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

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

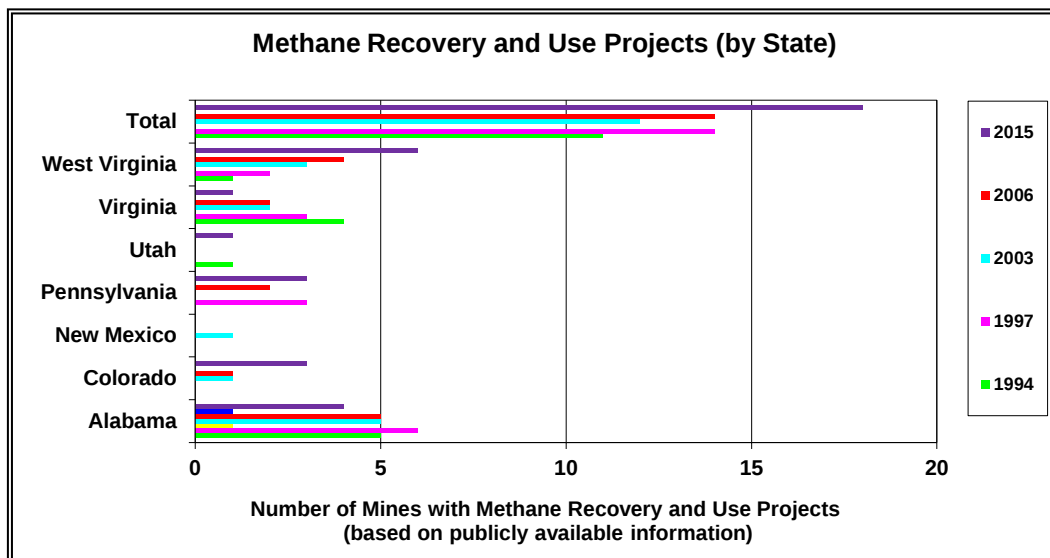
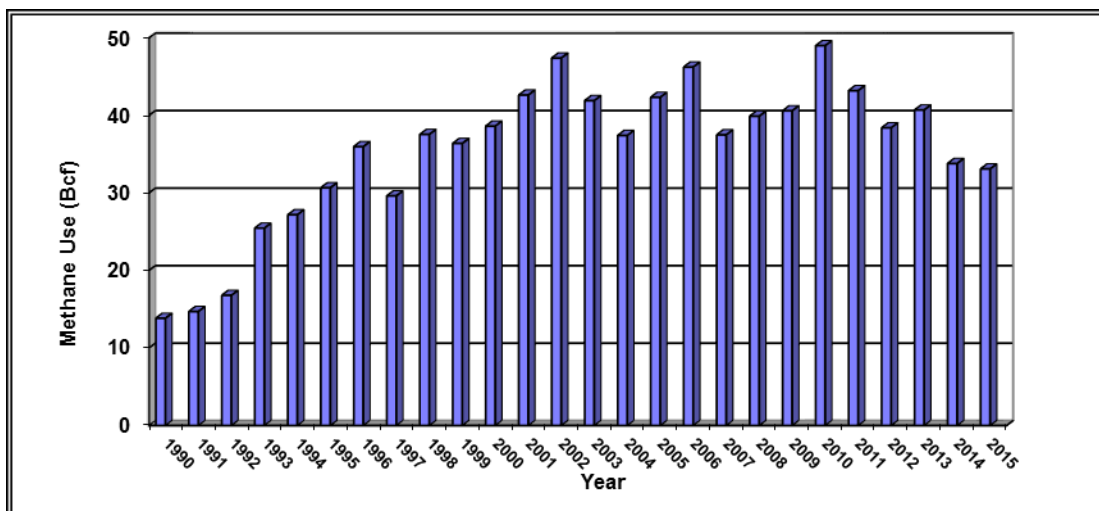


Figure 2-2: Estimated Annual Use of Methane Recovered from U.S. Coal Mines (Based on publicly available information)



³California Carbon Info <http://californiacarbon.info/>

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

Mine Name	Mine Location (State)	Approximate Amount of Gas Used in 2015*	Methane Use Option	Notes	Degasification system
No. 4 Mine No. 7 Mine	Alabama	23.8 mmcf/day	Pipeline Sales	The two mines collectively liberated 45.5 mmcf/d of gas in 2015.	Vertical Gob Boreholes; Horizontal Pre-Mine Boreholes; Vertical Pre-Mine Boreholes
Oak Grove	Alabama	1.8 mmcf/day	Pipeline Sales	Most of the production in the Oak Grove Field is beyond the limits of the mine plan.	Vertical Gob Boreholes; Horizontal Pre-Mine Boreholes; Vertical Pre-Mine Boreholes
Shoal Creek	Alabama	7.2 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
Cumberland Emerald Mine No 1	Pennsylvania	1.9 mmcf/day	Pipeline Sales	Began recovering methane in 2005.	Vertical Gob Boreholes with Pumps
Bailey	Pennsylvania	small volumes	Pipeline sales		Vertical Gob Boreholes with Pumps
Buchanan	Virginia	51.2 mmcf/day	Pipeline Sales On-Site Use Power Generation	This mine produced 58.5 mmcf/day of gas in 2015.	Vertical Gob Boreholes; Horizontal Pre-Mine Boreholes; Vertical Pre-Mine Boreholes

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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	0.2 mmcf/day	Pipeline Sales	The two mines liberated 22.6 mmcf/d in 2015. 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 & Horizontal Pre-drainage wells
Pinnacle	West Virginia	0.8 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	1.5 mmcf/day	Ventilation Air Methane 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, 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.

3. Mine Profiles Guide

3. Mine Profiles Guide

This report contains profiles of the 25 largest emitting coal mines that may be potential candidates for development of methane recovery and use projects. The profiled mines were selected primarily on the basis of 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 1990-2015*.

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

The mine profiles are ordered alphabetically by state, and arranged by mine name. Following this chapter are summary tables that list key data elements shown in the mine profiles. The individual mine profiles follow the summary tables. Below are explanations for each of the data elements included in the mine profiles.

Mine Status

Each mine's operating status as of May 2017 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, “none” 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 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 2017), (Coal Age 2016).

State: Mines included in this report are located in the following states - Alabama, Illinois, Indiana, New Mexico, Pennsylvania, Virginia, and West Virginia. Summary Table 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. Summary Table 2 shows the mines listed by state and by county.

Coal 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. Summary Table 3 lists the mines by basin and 2015 estimated specific emissions per ton of coal mined for each listed mine.

Corporate Information

Current Operator: Current operator refers to the mining company that operates the mine. Summary Table 4 lists mines by mining company. The source for this information was the MSHA database (MSHA, 2017).

Owner/Parent Company: Many coal mines are owned by a parent company. In addition to showing the coal companies, Summary Table 4 also shows the parent corporation of the mining company. This information was taken from MSHA (MSHA, 2017), 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, 2017) and industry knowledge.

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

Mine Address

This section includes the mailing address of the mine. The principal source of this information was MSHA (MSHA, 2017). The information in this section is current as of June 2017.

General Information

Number of Employees: This field shows the number of people employed by the mine, as reported by the MSHA Mine Data Retrieval System (MSHA, 2017). The average number of employees for the most recent quarter was used.

Year of Initial Production: Year of initial production 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, 2017).

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 of, 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. Summary Table 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 SEC filings, parent company annual reports, and industry websites. Summary Table 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 of the years 2002 to 2015.

Coal Production: All of the mines profiled in this report have production exceeding one million tons per year. 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, 2017). Summary Table 7 lists the coal mines by the amount of coal they produced in 2015.

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. The volume of methane liberated is shown for the years 2002-2015. Summary Table 9 shows mines listed by their estimated total daily methane liberation for 2015.

Emissions from Ventilation Systems: Methane released to the atmosphere from ventilation systems is emitted in very low concentrations (typically less than 1% 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. Summary Table 10 lists the mines by their 2015 ventilation emissions, as reported by the EPA's GHG Inventory (EPA, 2017).

Estimated Methane Drained: Mines that employ degasification systems emit large quantities of methane in high concentrations. Summary Table 11 lists mines according to the estimated methane drained. Based on information obtained from EPA'S GHG Inventory (EPA, 2017), EPA has developed a list of 20 U.S. mines that have drainage systems in place and have utilization projects or high potential for implementing a utilization project.

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. Summary Table 12 shows a list of mines ordered according to specific emissions. 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 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, etc.). Methane used does not always equal methane drained as some mines vent the methane liberated from degasification systems to the atmosphere. Table 13 shows a list of mines employing methane 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: Twenty of the mines in this report had drainage systems, but only seventeen had active drainage systems in place in 2015. Three additional mines had previously used methane drainage but did not do so in 2015. 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. Summary Table 8 lists mines by drainage system used.

4. Mine Summary Tables

List of Summary Tables:

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Table 1: Mines Listed Alphabetically

Mine Name	State
Bailey Mine	PA
Beckley Pocahontas	WV
Buchanan Mine	VA
Cumberland	PA
Emerald Mine No 1	PA
Enlow Fork Mine	PA
Federal No. 2	WV
Harrison County Mine	WV
Harvey	PA
Leer Mine	WV
Marion County Mine	WV
Marshall County Mine	WV
MC #1 Mine	IL
Monongalia County Mine	WV
New Future Mine	IL
No. 4 Mine	AL
No. 7 Mine	AL
Oaktown Fuels #1	IN
Ohio County Mine	WV
Oak Grove Mine	AL
Pinnacle Mine	WV
San Juan Mine 1	NM
Shoal Creek	AL
The American Coal Company New Era Mine	IL
West Ridge Mine	UT

Table 2: Mines Listed by State and County

Mine Name	State	County
Oak Grove Mine	AL	Jefferson
Shoal Creek	AL	Jefferson
No. 4 Mine	AL	Tuscaloosa
No. 7 Mine	AL	Tuscaloosa
MC #1 Mine	IL	Franklin
New Future Mine	IL	Saline
The American Coal Company New Era Mine	IL	Saline
Oaktown Fuels #1	IN	Knox
San Juan Mine 1	NM	San Juan
Bailey Mine	PA	Greene
Cumberland	PA	Greene
Enlow Fork Mine	PA	Greene
Emerald Mine No 1	PA	Greene
Harvey	PA	Greene
West Ridge Mine	UT	Carbon
Buchanan Mine	VA	Buchanan
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
Beckley Pocahontas Mine	WV	Raleigh
Leer Mine	WV	Taylor
Pinnacle Mine	WV	Wyoming

Table 3: Mines Listed by Coal Basin

**Coal Basin/
Mine Name**

Black Warrior

No. 4 Mine

No. 7 Mine

Oak Grove Mine

Shoal Creek

Central Appalachian

Beckley Pocahontas Mine

Buchanan Mine

Pinnacle Mine

Illinois

The American Coal Company New Era Mine

MC #1 Mine

New Future Mine

Oaktown Fuels #1

Northern Appalachian

Bailey Mine

Cumberland

Emerald Mine No. 1

Enlow Fork Mine

Federal No. 2

Harrison County Mine

Harvey

Leer Mine

Marion County Mine

Marshall County Mine

Monongalia County Mine

Ohio County Mine

San Juan

San Juan Mine 1

Uinta

West Ridge Mine

Table 4: Mines Listed by Company

Owner/Parent	Operator	Mine Name
Arch Coal Inc.	ACI Tygart Valley	Leer Mine
	ICG Beckley LLC	Beckley Pocahontas Mine
Westmoreland	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
	Emerald Coal Resources LP	Emerald Mine No 1
Murray Energy Corp	The American Coal Company	The American Coal Company New Era 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
	The American Coal Company	New Future Mine
	West Ridge Resources Inc.	West Ridge 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
Hallador Energy Company	Sunrise Coal LLC	Oaktown Fuels #1

Table 5: Mines Listed by Mining Method

Mine Name	Method
Beckley Pocahontas Mine	Continuous
Bailey Mine	Longwall
Buchanan Mine	Longwall
Cumberland	Longwall
Emerald Mine No 1	Longwall
Enlow Fork Mine	Longwall
Federal No. 2	Longwall
Leer Mine	Longwall
Marion County Mine	Longwall
Marshall County Mine	Longwall
Monongalia County Mine	Longwall
No. 4 Mine	Longwall
No. 7 Mine	Longwall
Oak Grove Mine	Longwall
Pinnacle Mine	Longwall
Harrison County Mine	Longwall
San Juan Mine 1	Longwall
Shoal Creek	Longwall
Ohio County Mine	Longwall
The American Coal Company New Era Mine	Longwall
Harvey Mine	Longwall
New Future Mine	Longwall
MC #1 Mine	Longwall
West Ridge Mine	Longwall
Oaktown Fuels #1	Room & Pillar

Table 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
Cumberland	Steam
Enlow Fork Mine	Steam
Federal No. 2	Steam
Harrison County Mine	Steam
Marion County Mine	Steam
Marshall County Mine	Steam
MC #1 Mine	Steam
Monongalia County Mine	Steam
The American Coal Company New Era Mine	Steam
New Future Mine	Steam
Ohio County Mine	Steam
San Juan Mine 1	Steam
Shoal Creek	Steam
West Ridge Mine	Steam
Bailey Mine	Steam, Metallurgical
Buchanan Mine	Steam, Metallurgical
Emerald Mine No 1	Steam, Metallurgical
Oak Grove Mine	Steam, Metallurgical
Harvey Mine	Steam, Metallurgical

Table 7: Mines Listed by 2015 Coal Production

Mine Name	Million Tons
MC #1 Mine	10.6
Marshall County Mine	10.3
Bailey Mine	10.2
Enlow Fork Mine	9.0
Cumberland	7.5
Harrison County Mine	7.1
Marion County Mine	6.5
San Juan Mine 1	6.5
Ohio County Mine	6.1
New Future Mine	5.2
Buchanan Mine	4.4
Harvey Mine	3.6
Oaktown Fuels #1	3.5
Leer Mine	3.4
Monongalia County Mine	3.3
The American Coal Company New Era Mine	3.1
No. 7 Mine	3.0
Federal No. 2	2.4
No. 4 Mine	2.4
Pinnacle Mine	2.4
Oak Grove Mine	2.0
Shoal Creek	2.0
Emerald Mine No 1	1.7
West Ridge Mine	1.6
Beckley Pocahontas Mine	0.9

Table 8: Mines Employing Methane Drainage Systems

Mine Name	Type of Drainage System	Estimated Current Drainage Efficiency
Buchanan Mine	Vertical Gob Boreholes; Horizontal Pre-Mine Boreholes; Vertical Pre-Mine Boreholes	88%
Shoal Creek	Vertical Gob Boreholes with Pumps	77%
No. 4 Mine	Vertical Gob Boreholes; Horizontal Pre-Mine Boreholes; Vertical Pre-Mine Boreholes	66%
Cumberland	Vertical Gob Boreholes with Pumps	46%
West Ridge Mine	Vertical Gob Boreholes	45%
No. 7 Mine	Vertical Gob Boreholes; Horizontal Pre-Mine Boreholes; Vertical Pre-Mine Boreholes	43%
Emerald Mine No 1	Vertical Gob Boreholes with Pumps	42%
Bailey Mine	Vertical Gob Boreholes with Pumps	30%
San Juan Mine 1	Vertical Gob Boreholes with Pumps	28%
Harrison County Mine	Vertical Gob Boreholes with Pumps	27%
Monongalia County Mine	Vertical Gob Boreholes with Pumps	26%
Oak Grove Mine	Vertical Gob Boreholes; Horizontal Pre-Mine Boreholes; Vertical Pre-Mine Boreholes	22%
Harvey Mine	Vertical Gob Boreholes; In-mine Horizontal Gob Boreholes	19%
Marion County Mine	Vertical Gob Boreholes with Pumps	12%
Pinnacle Mine	Vertical Gob Boreholes; Horizontal Pre-Mine Boreholes	12%
Enlow Fork Mine	Horizontal Pre-Drainage Wells	3%
Oaktown Fuels No 1	Vertical Gob Boreholes	3%
Beckley Pocahontas Mine	Horizontal Pre-Drainage Wells	0%
Federal No. 2	Vertical Gob Boreholes	0%
Marshall County Mine	Vertical Gob Boreholes with Pumps	0% ⁴

*Mines using methane drainage in 2015 but not represented among the 25 highest emitting mines were: the Elk Creek Mine (MSHA ID 0504674), Bowie No. 2 Mine (MSHA ID 0504591), West Elk Mine (MSHA ID 0503672), Oaktown Fuels Mine No. 2 (MSHA ID 1202418), and the Carlisle Mine (MSHA ID 1202349).

⁴ Drainage efficiency in 2014 was 11%, but no drainage was recorded in 2015

Table 9: Mines Listed by Estimated Total Methane Liberated in 2015

Mine Name	MMCF/D
Buchanan Mine	58.5
No. 7 Mine	26.5
No. 4 Mine	19.0
Marion County Mine	13.4
Marshall County Mine	12.8
Cumberland	11.9
Harrison County Mine	11.5
Enlow Fork Mine	11.0
Shoal Creek	10.9
Bailey Mine	10.4
Monongalia County Mine	9.2
Oak Grove Mine	8.1
Pinnacle Mine	7.0
MC #1 Mine	6.8
The American Coal Company New Era Mine	6.5
Harvey	6.3
San Juan Mine 1	6.2
Emerald Mine No 1	5.5
Ohio County Mine	5.0
Leer Mine	4.1
Federal No. 2	4.0
New Future Mine	3.9
Beckley Pocahontas Mine	3.3
West Ridge Mine	3.1
Oaktown Fuels No 1	3.0

Table 10: Mines Listed by Daily Ventilation Emissions in 2015

Mine Name	MMCF/D
No. 7 Mine	15.2
Marshall County Mine	12.8
Marion County Mine	11.8
Enlow Fork Mine	10.7
Harrison County Mine	8.4
Bailey Mine	7.4
Buchanan Mine	7.3
Monongalia County Mine	6.8
MC #1 Mine	6.8
No. 4 Mine	6.5
The American Coal Company New Era Mine	6.5
Cumberland	6.4
Oak Grove Mine	6.3
Pinnacle Mine	6.2
Harvey Mine	5.0
Ohio County Mine	5.0
San Juan Mine 1	4.4
Leer Mine	4.1
Federal No. 2	4.0
New Future Mine	3.9
Beckley Pocahontas Mine	3.3
Emerald Mine No 1	3.2
Oaktown Fuels No 1	2.8
Shoal Creek	2.4
West Ridge Mine	1.7

Table 11: Mines Listed by Estimated Daily Methane Drained in 2015

Mine Name	MMCF/D
Buchanan Mine	51.2
No. 4 Mine	12.5
No. 7 Mine	11.3
Shoal Creek	8.5
Cumberland	5.5
Harrison County Mine	3.1
Bailey Mine	3.1
Monongalia County Mine	2.4
Emerald Mine No 1	2.3
Oak Grove Mine	1.8
San Juan Mine 1	1.7
Marion County Mine	1.6
West Ridge Mine	1.4
Harvey Mine	1.2
Pinnacle Mine	0.8
Enlow Fork Mine	0.3
Oaktown Fuels #1	0.1
Federal No.2	0
Marshall County Mine	0
MC #1 Mine	0
New Future Mine	0
Ohio County Mine	0
The American Coal Company New Era Mine	0
Leer Mine	0
Beckley Pocahontas Mine	0

Table 12: Mines Listed by Estimated Specific Emissions in 2015

Mine Name	CF/Ton
Buchanan Mine	4,850
No. 7 Mine	3,223
No. 4 Mine	2,889
Shoal Creek	1,991
Oak Grove Mine	1,484
Beckley Pocahontas Mine	1,356
Emerald Mine No 1	1,180
Pinnacle Mine	1,067
Monongalia County Mine	1,019
The American Coal Company New Era Mine	763
Marion County Mine	754
West Ridge Mine	696
Harvey Mine	634
Federal No. 2	608
Harrison County Mine	593
Cumberland	578
Marshall County Mine	452
Enlow Fork Mine	445
Leer Mine	440
Bailey Mine	374
San Juan Mine 1	346
Oaktown Fuels No. 1	310
Ohio County Mine	300
New Future Mine	271
MC #1 Mine	235

Table 13: Mines with CMM Use Projects

Mine Name	Type of Use Project	Estimated Current Market Penetration
Buchanan Mine	Pipeline, Electricity	100%
No. 4 Mine	Pipeline	100%
No. 7 Mine	Pipeline	100%
Oak Grove Mine	Pipeline	100%
Pinnacle Mine	Pipeline	100%
Shoal Creek	Pipeline	85%
Emerald Mine No 1	Pipeline	30%
Cumberland	Pipeline	22%
Marshall County Mine	VAM Destruction	12%
Harrison County Mine	Pipeline	10%
Marion County Mine	Pipeline	6%
Monongalia Mine	Pipeline	4%
Bailey Mine	Pipeline	0%

5. Profiled Mines

States with Candidate and Utilizing Mines:

Alabama

Illinois

Indiana

New Mexico

Pennsylvania

Utah

Virginia

West Virginia

5. Profiled Mines

Alabama Mines

No. 4 Mine
No. 7 Mine
Oak Grove
Shoal Creek

Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: Pipeline

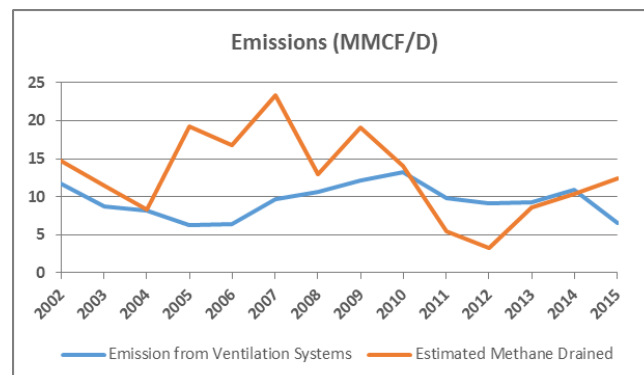
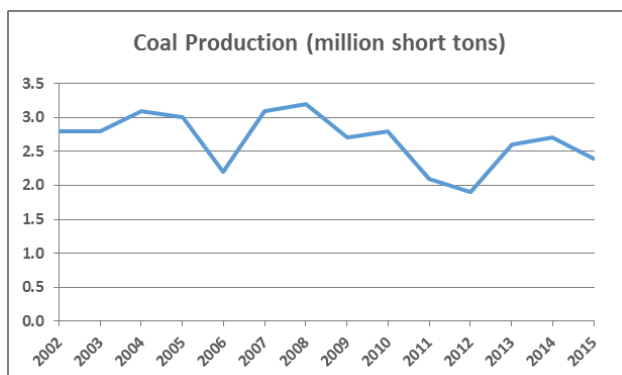
Drainage System: Yes
MSHA ID: 0101247

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: 551
Mining Method: Longwall
Year of Initial Production: 1976
Primary Coal Use: Metallurgical
Depth to Seam (ft.): 1900
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
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
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
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	12.5
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	2,889
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
Estimated Current Drainage Efficiency	56%	57%	50%	75%	73%	71%	55%	61%	51%	36%	26%	48%	49%	66%
Estimated Current Market Penetration	100%	100%	100%	100%	100%	100%	100%	102%	104%	107%	106%	100%	100%	100%



Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: Pipeline

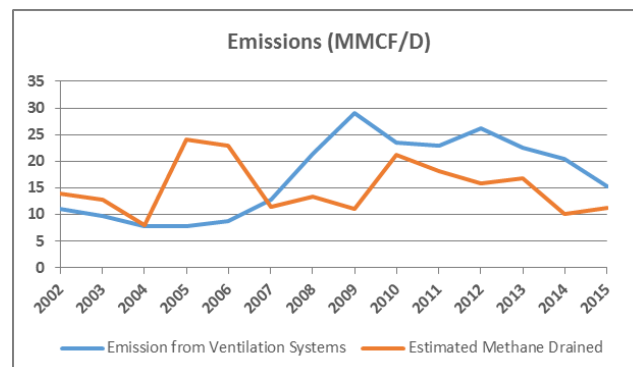
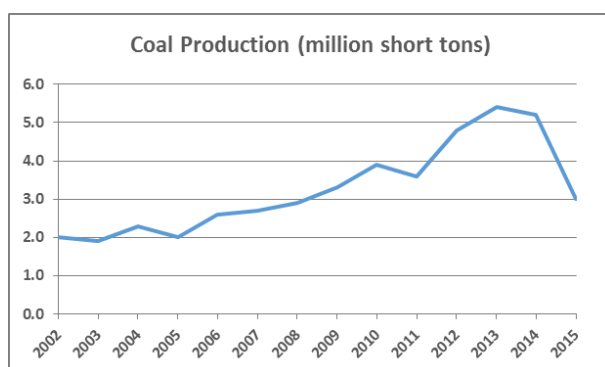
Drainage System: Yes
MSHA ID: 0101401

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: 811
Mining Method: Longwall
Year of Initial Production: 1978
Primary Coal Use: Metallurgical
Depth to Seam (ft.): 1900
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
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
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
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
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	3,223
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
Estimated Current Drainage Efficiency	56%	57%	50%	75%	73%	48%	39%	28%	47%	44%	38%	43%	33%	43%
Estimated Current Market Penetration	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%



Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: Pipeline

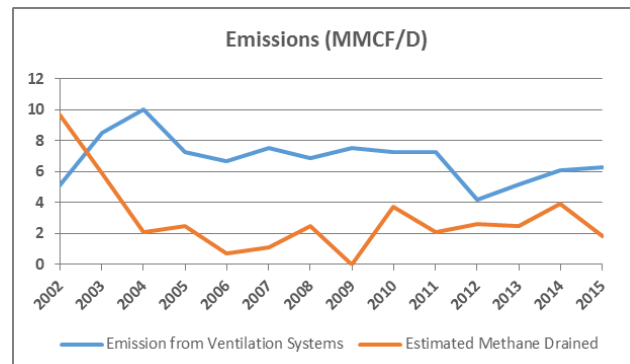
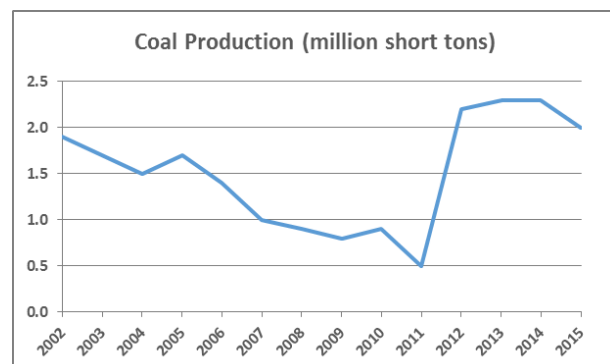
Drainage System: Yes
MSHA ID: 0100851

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: 339
Mining Method: Longwall
Year of Initial Production: 1981
Primary Coal Use: Steam, Metallurgical
Depth to Seam (ft.): 1000
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
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
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
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
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	1,484
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
Estimated Current Drainage Efficiency	66%	41%	17%	26%	10%	13%	27%	0%	33%	22%	38%	32%	39%	22%
Estimated Current Market Penetration	100%	100%	100%	68%	100%	72%	40%	-	59%	100%	88%	88%	100%	100%



Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: Pipeline

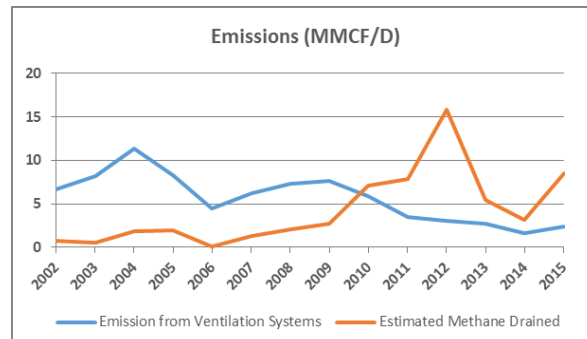
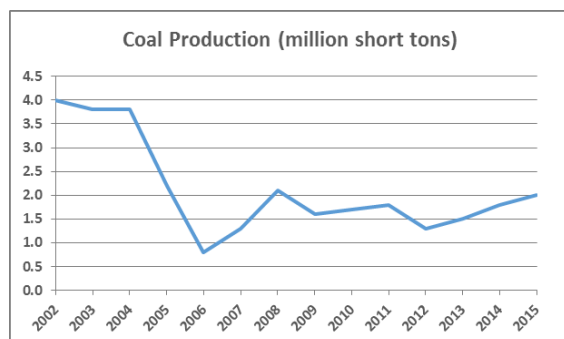
Drainage System: Yes
MSHA ID: 0102901

SHOAL CREEK MINE

Basin: Black Warrior
State: AL
Coalbed: Blue Creek / Mary Lee
County: Jefferson
Current Operator: Drummond Company Inc.
Owner/Parent Company: Drummond Company 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: 455
Mining Method: Longwall
Year of Initial Production: 1994
Primary Coal Use: Steam
Depth to Seam (ft.): 1150
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
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
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
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
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	1,991
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	7.2
Estimated Current Drainage Efficiency	9%	6%	14%	19%	2%	17%	22%	26%	55%	69%	84%	67%	67%	77%
Estimated Current Market Penetration	100%	100%	33%	5%	100%	46%	67%	100%	100%	95%	97%	63%	34%	85%



5. Profiled Mines (continued)

Illinois Mines

The American Coal Company New Era Mine
New Future Mine
MC #1 Mine

Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: NA

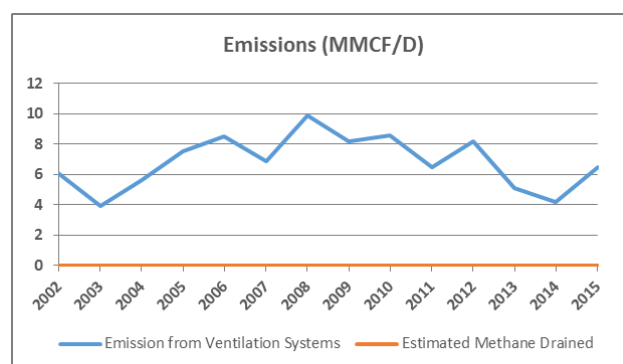
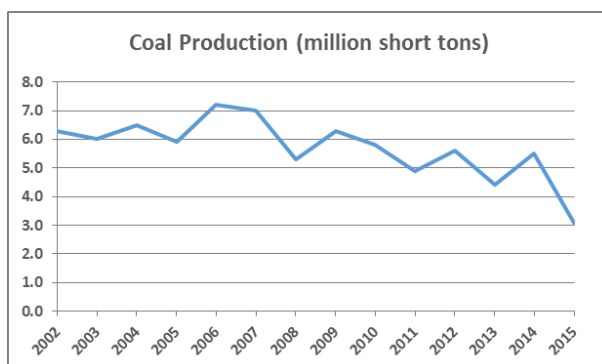
Drainage System: No
MSHA ID: 1102752

THE AMERICAN COAL COMPANY NEW ERA MINE

Basin: Illinois
State: IN
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: 381
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
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
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
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Specific Emissions (CF/T)	353	237	315	464	431	360	682	475	541	484	535	423	279	763
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: NA

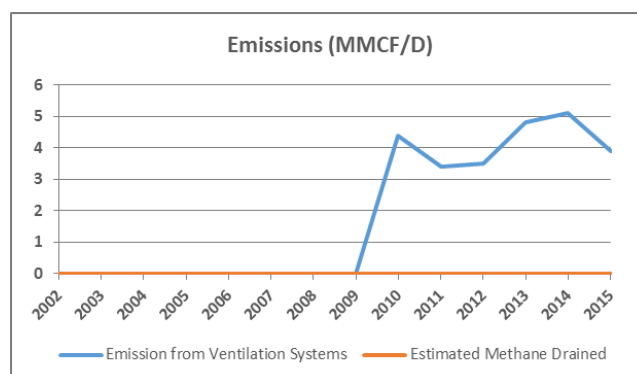
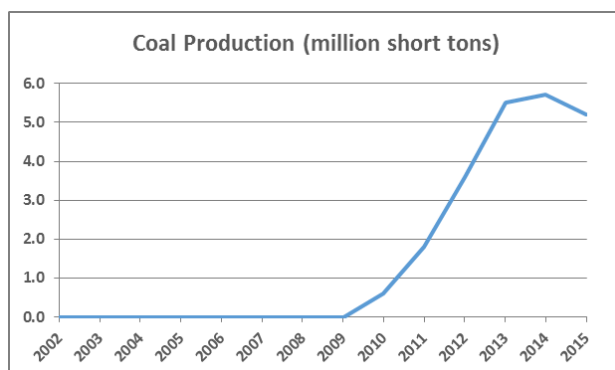
Drainage System: NA
MSHA ID: 1103232

NEW FUTURE MINE

Basin: Illinois
State: IN
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: 318
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
Coal Production (million short tons)	-	-	-	-	-	-	-	-	0.6	1.8	3.6	5.5	5.7	5.2
Emission from Ventilation Systems (MMCF/D)	-	-	-	-	-	-	-	-	4.4	3.4	3.5	4.8	5.1	3.9
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	0	0	0	0	0	-
Estimated Specific Emissions (CF/T)	-	-	-	-	-	-	-	-	2,677	689	355	319	327	271
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	0	0	0	0	0%	-
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: NA

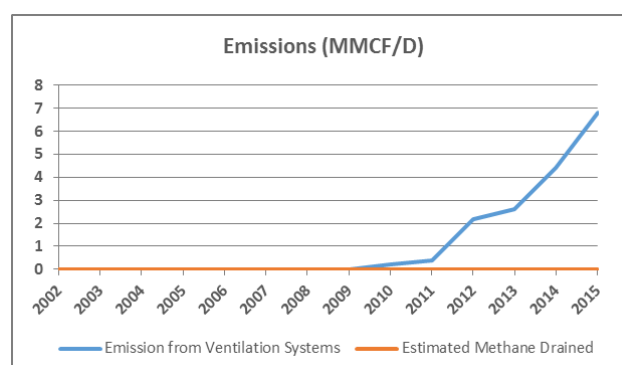
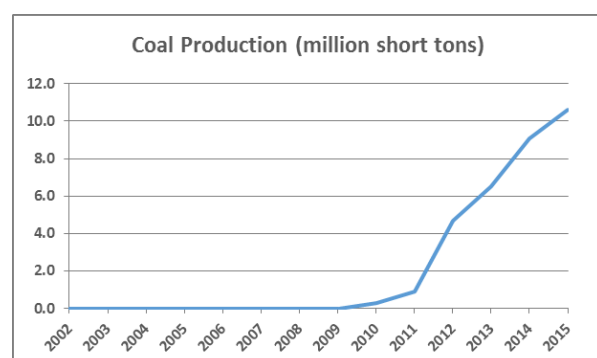
Drainage System: NA
MSHA ID: 1103189

MC #1 MINE

Basin: Illinois
State: IN
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: 404
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
Coal Production (million short tons)	-	-	-	-	-	-	-	-	0.3	0.9	4.7	6.5	9.1	10.6
Emission from Ventilation Systems (MMCF/D)	-	-	-	-	-	-	-	-	0.2	0.4	2.2	2.6	4.4	6.8
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Specific Emissions (CF/T)	-	-	-	-	-	-	-	-	243	162	171	146	177	235
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-



5. Profiled Mines (continued)

Indiana Mines

Oaktown Fuels No. 1

Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: NA

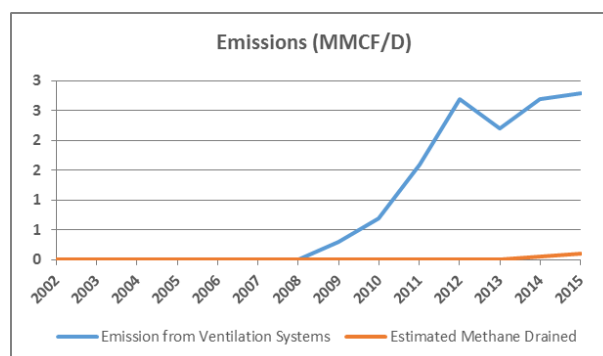
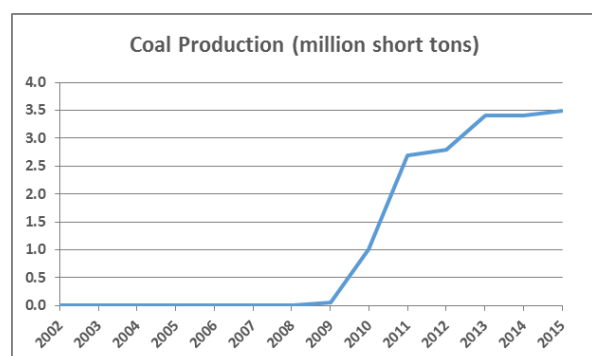
Drainage System: Yes
MSHA ID: 1202394

OAKTOWN FUELS NO. 1

Basin: Illinois
State: IN
Coalbed: Springfield No. 5
County: Sullivan
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: 1183 East Canvasback Drive
Terre Haute, IN 47802
Latitude/Longitude: 38.94575, -87.38421
Number of Employees at Mine: 333
Mining Method: Room and Pillar
Year of Initial Production: 2006
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
Coal Production (million short tons/year)	-	-	-	-	-	-	0.0	0.05	1.0	2.7	2.8	3.4	3.4	3.5
Emission from Ventilation Systems (MMCF/D)	-	-	-	-	-	-	-	0.3	0.7	1.6	2.7	2.2	2.7	2.8
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	0.05	0.1
Estimated Specific Emissions (CF/T)	-	-	-	-	-	-	-	1,190	256	216	352	236	295	310
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	2%	3%
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-



5. Profiled Mines (continued)

New Mexico Mines

San Juan Mine 1

Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: None

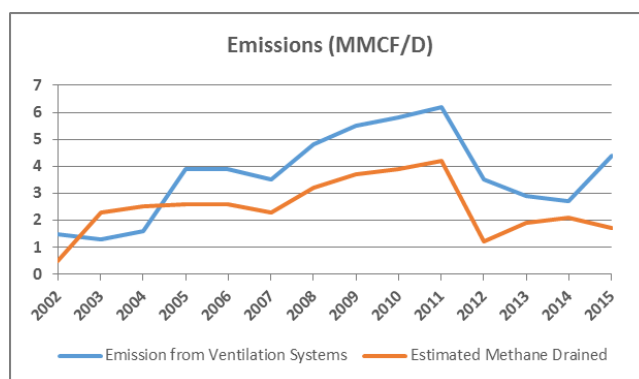
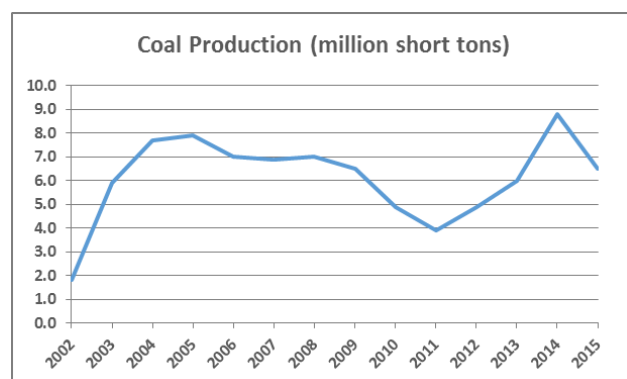
Drainage System: Yes
MSHA ID: 2902170

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: 483
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
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
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
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
Estimated Specific Emissions (CF/T)	406	223	194	300	339	307	417	517	723	973	350	292	199	346
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%
Estimated Current Market Penetration	-	>1%	8%	>1%	-	-	-	-	-	-	-	-	-	-



5. Profiled Mines (continued)

Pennsylvania Mines

Bailey
Cumberland
Emerald Mine No 1
Enlow Fork
Harvey Mine

Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: Power

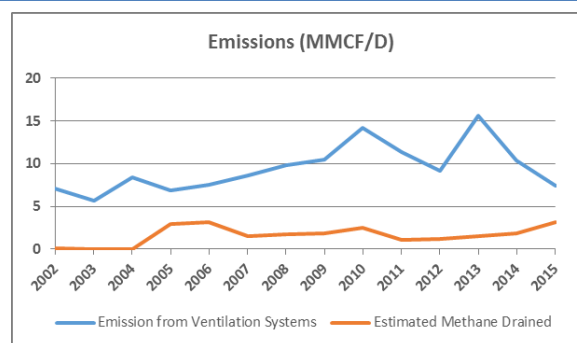
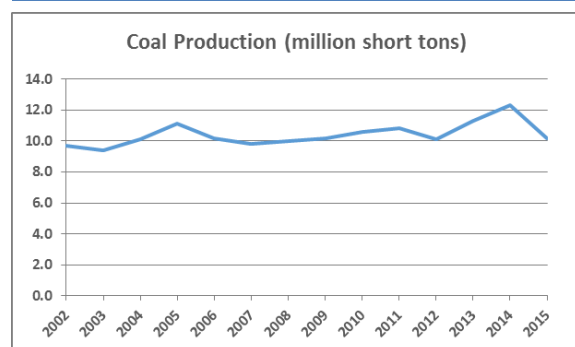
Drainage System: Yes
MSHA ID: 3607230

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: 726
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
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
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
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
Estimated Specific Emissions (CF/T)	271	221	304	322	383	376	420	440	575	419	376	552	362	374
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	1.8	-
Estimated Current Drainage Efficiency	1%	-	-	30%	30%	15%	15%	15%	15%	9%	12%	9%	15%	30%
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	100%	-



Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: Pipeline

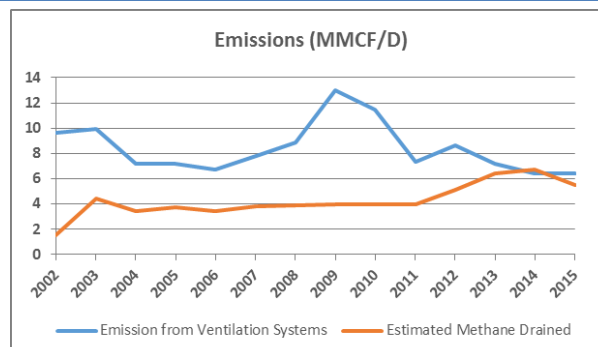
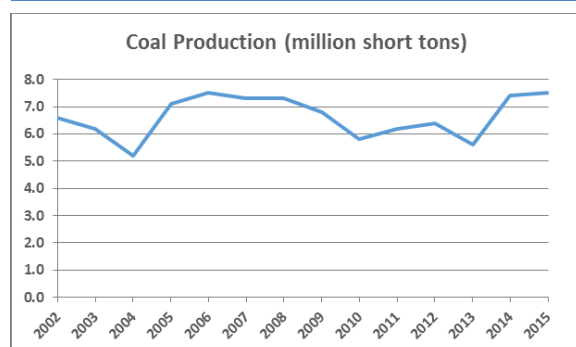
Drainage System: Yes
MSHA ID: 3605018

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: 696
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
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
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
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
Estimated Specific Emissions (CF/T)	614	842	744	560	492	580	640	913	975	665	781	886	646	578
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
Estimated Current Drainage Efficiency	14%	31%	32%	34%	34%	33%	30%	24%	26%	35%	37%	47%	51%	46%
Estimated Current Market Penetration	-	-	-	86%	100%	68%	82%	93%	93%	93%	33%	27%	20%	22%



Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: Pipeline

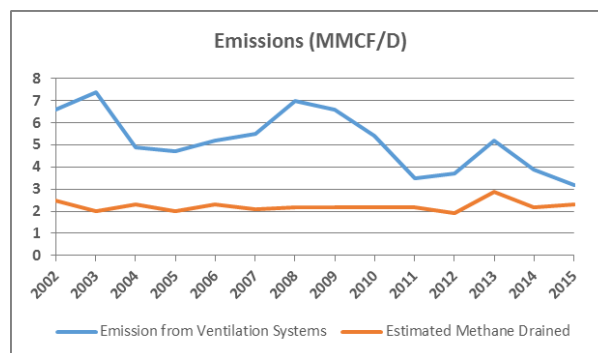
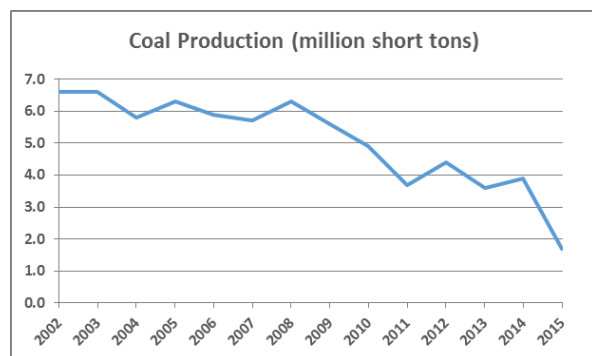
Drainage System: Yes
MSHA ID: 3605466

EMERALD MINE NO 1

Basin: Northern Appalachian
State: PA
Coalbed: Pittsburgh No. 8
County: Greene
Current Operator: Emerald 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 Emerald, Emerald No. 1
Description of Surrounding Terrain: High Hills/Open High Hills
Utility Electric Supplier: West Penn Power Co
Parent Corporation of Utility: FirstEnergy

Mailing Address: 212 Mine Rd. Waynesburg, PA 15370
Latitude/Longitude: 39.8875, -80.1935
Number of Employees at Mine: 275
Mining Method: Longwall
Year of Initial Production: 1977
Primary Coal Use: Steam, Metallurgical
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): 0.23

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Coal Production (million short tons)	6.6	6.6	5.8	6.3	5.9	5.7	6.3	5.6	4.9	3.7	4.4	3.6	3.9	1.7
Emission from Ventilation Systems (MMCF/D)	6.6	7.4	4.9	4.7	5.2	5.5	7	6.6	5.4	3.5	3.7	5.2	3.9	3.2
Estimated Methane Drained (MMCF/D)	2.5	2	2.3	2	2.3	2.1	2.2	2.2	2.2	2.2	1.9	2.9	2.2	2.3
Estimated Specific Emissions (CF/T)	503	520	453	388	464	487	533	574	566	562	465	821	571	1,180
Methane Used (MMCF/D)	-	-	-	1.8	2.3	1.4	1.8	2	2	2	1	2	1.1	0.7
Estimated Current Drainage Efficiency	27%	21%	32%	26%	30%	28%	24%	25%	29%	39%	34%	36%	36%	42%
Estimated Current Market Penetration	-	-	-	90%	100%	67%	82%	91%	91%	91%	53%	69%	50%	30%



Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: None

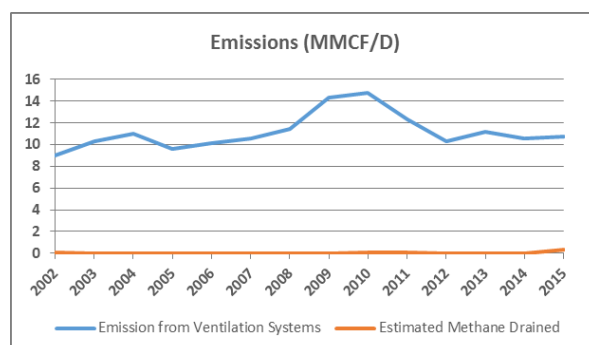
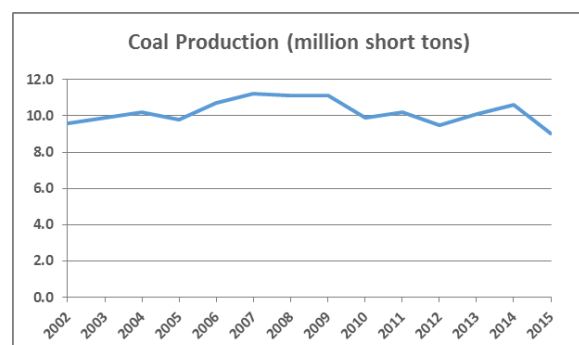
Drainage System: No
MSHA ID: 3607416

Enlow Fork

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: 2041 Pleasant Grove Road, Claysville, PA 15323
Latitude/Longitude: 40.076034, -80.35271
Number of Employees at Mine: 604
Mining Method: Longwall
Year of Initial Production: 1990
Primary Coal Use: Steam
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): 1.2

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
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
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
Estimated Methane Drained (MMCF/D)	0.1	-	-	-	-	-	-	-	0.1	0.1	-	-	-	0.3
Estimated Specific Emissions (CF/T)	346	380	394	358	345	345	375	470	549	444	396	405	365	445
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	1%	-	-	-	-	-	-	-	0%	0%	-	-	-	3%
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: NA

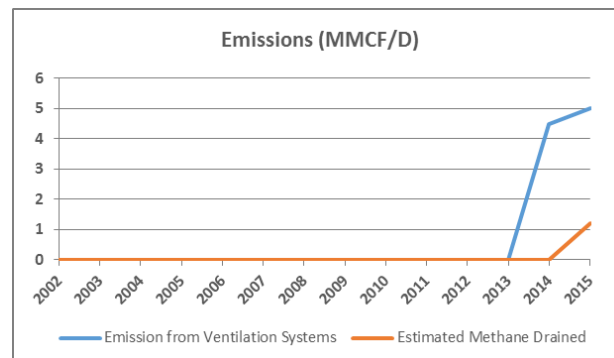
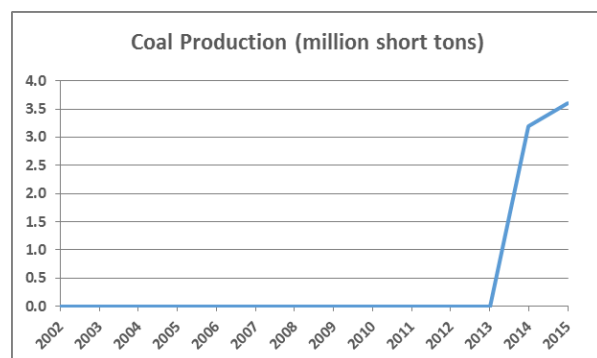
Drainage System: NA
MSHA ID: 3610045

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: 343
Mining Method: Longwall
Year of Initial Production: 2015
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: NA
Distance to Pipeline (miles): NA

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Coal Production (million short tons)	-	-	-	-	-	-	-	-	-	-	-	-	3.2	3.6
Emission from Ventilation Systems (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	4.5	5
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	1.2
Estimated Specific Emissions (CF/T)	-	-	-	-	-	-	-	-	-	-	-	-	513	634
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	19%
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-



5. Profiled Mines (continued)

Utah Mines

West Ridge Mine

Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Non-Producing
Use Project: Power, Flaring, Heating

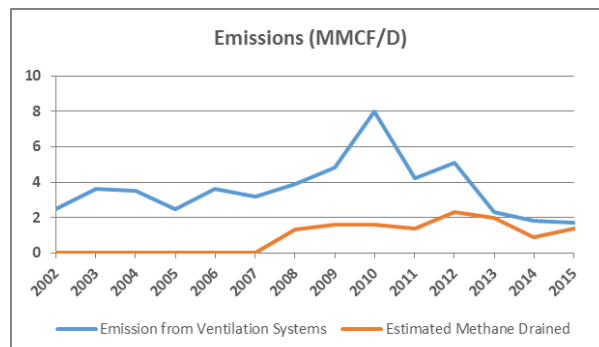
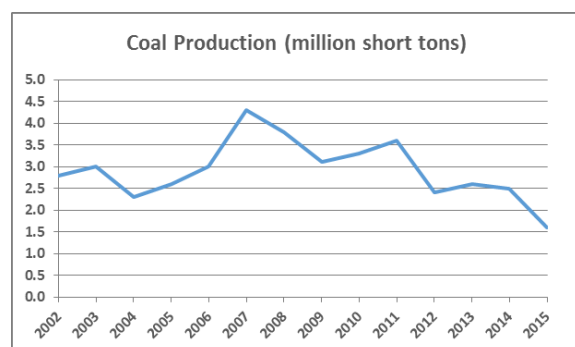
Drainage System: Yes
MSHA ID: 4202233

WEST RIDGE MINE

Basin: Uinta
State: Utah
Coalbed: Lower Sunnyside
County: Carbon
Current Operator: West Ridge Resources Inc.
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: Hilly/Mountainous
Utility Electric Supplier: Rocky Mountain Power
Parent Corporation of Utility: PacifiCorp

Mailing Address: 794 North C Canyon Rd. East Carbon, UT 84520
Latitude/Longitude: 39.62, -110.44
Number of Employees at Mine: 126
Mining Method: Longwall
Year of Initial Production: 1999
Primary Coal Use: Steam
Depth to Seam (ft.): 156
Seam Thickness (ft.): Unknown
Transmission Pipeline in County?: Yes
Owner of Nearest Pipeline: Questar Pipeline Corp.
Distance to Pipeline (miles): < 5

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Coal Production (million short tons/year)	2.8	3.0	2.3	2.6	3.0	4.3	3.8	3.1	3.3	3.6	2.4	2.6	2.5	1.6
Emission from Ventilation Systems (MMCF/D)	2.5	3.6	3.5	2.5	3.6	3.2	3.9	4.8	8.0	4.2	5.1	2.3	1.8	1.7
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	1.3	1.6	1.6	1.4	2.3	2.0	0.9	1.4
Estimated Specific Emissions (CF/T)	326	438	555	351	438	272	499	754	1,062	568	1,125	604	394	796
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	25%	25%	17%	25%	31%	47%	33%	45%
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-



5. Profiled Mines (continued)

Virginia Mines

Buchanan Mine #1

Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: Pipeline, Power

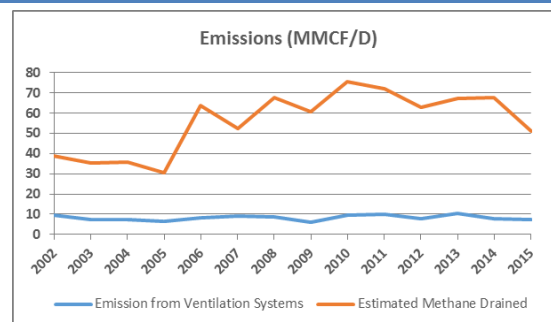
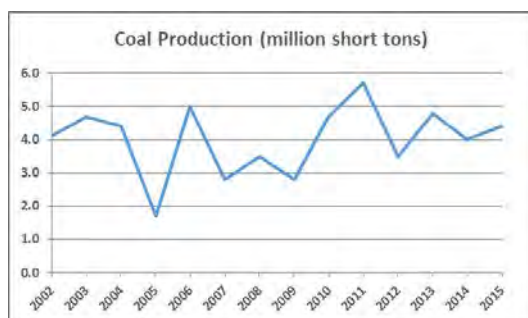
Drainage System: Yes
MSHA ID: 4404856

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: 434
Mining Method: Longwall
Year of Initial Production: 1983
Primary Coal Use: Steam, Metallurgical
Depth to Seam (ft.): 1400 - 2000
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
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
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
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
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	4,850
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
Estimated Current Drainage Efficiency	80%	83%	83%	83%	88%	85%	89%	90%	89%	88%	89%	87%	90%	88%
Estimated Current Market Penetration	100%	96%	99%	100%	80%	100%	100%	100%	100%	100%	100%	100%	77%	100%



5. Profiled Mines (continued)

West Virginia Mines

Beckley Pocahontas Mine
Federal No. 2
Harrison County Mine
Leer Mine
Marion County Mine
Marshall County Mine
Monongalia County Mine
Ohio County Mine
Pinnacle

Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: Pipeline

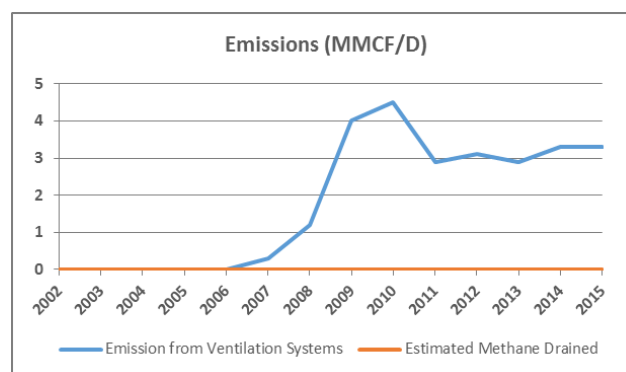
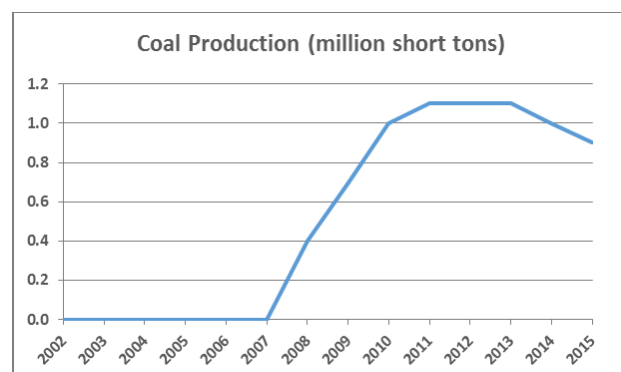
Drainage System: Yes
MSHA ID: 4605252

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
Parent Company Website: www.archcoal.com
Previous Owner(s): International Coal Group
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: 242
Mining Method: Continuous
Year of Initial Production: 2007
Primary Coal Use: Coking
Depth to Seam (ft.): 600-1300
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
Coal Production (million short tons)	-	-	-	-	-	0	0.4	0.7	1	1.1	1.1	1.1	1	0.9
Emission from Ventilation Systems (MMCF/D)	-	-	-	-	-	0.3	1.2	4	4.5	2.9	3.1	2.9	3.3	3.3
Estimated Methane Drained (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Specific Emissions (CF/T)	-	-	-	-	-	-	1,095	2,086	1,643	962	1,029	962	1,205	1,356
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: Pipeline

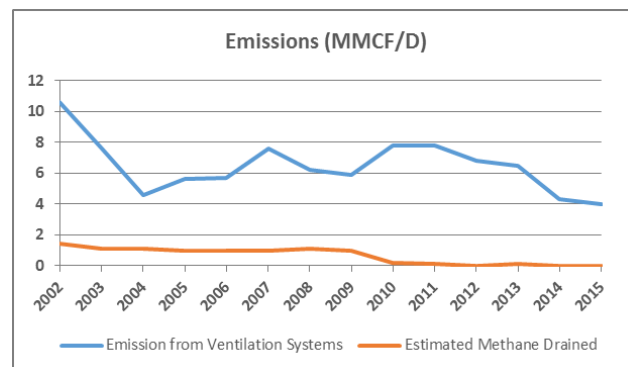
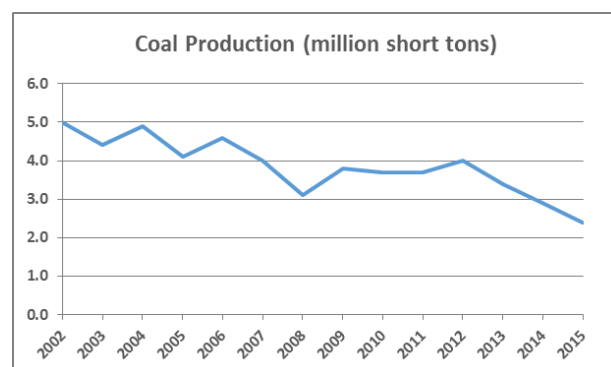
Drainage System: Yes
MSHA ID: 4601456

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: N/A
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: 456
Mining Method: Longwall
Year of Initial Production: 1968
Primary Coal Use: Steam
Depth to Seam (ft.): 800 - 1250
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
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
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
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	-
Estimated Specific Emissions (CF/T)	876	722	425	588	532	785	860	663	789	779	621	709	541	608
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%	-
Estimated Current Market Penetration	29%	9%	0%	20%	23%	40%	55%	50%	100%	100%	-	-	-	-



Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: None

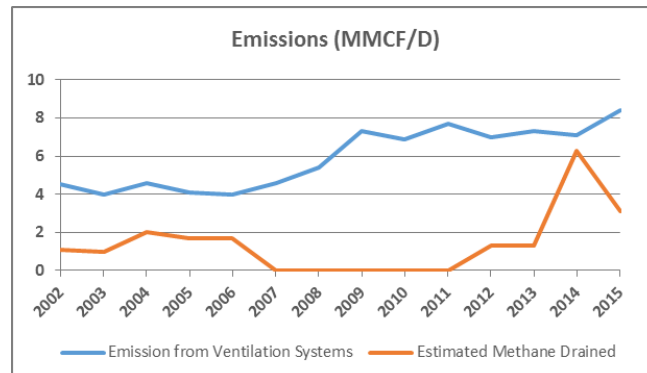
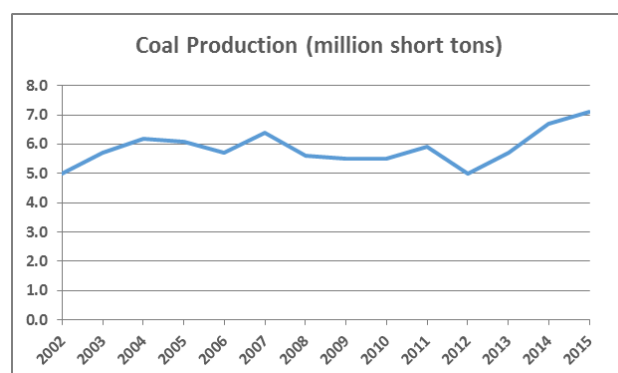
Drainage System: Yes
MSHA ID: 4601318

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: 561
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
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
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
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
Estimated Specific Emissions (CF/T)	409	320	389	347	365	262	352	485	458	476	606	551	730	593
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	3.4	0.3
Estimated Current Drainage Efficiency	20%	20%	30%	29%	30%	0%	0%	0%	0%	0%	16%	15%	47%	27%
Estimated Current Market Penetration	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%



Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: None

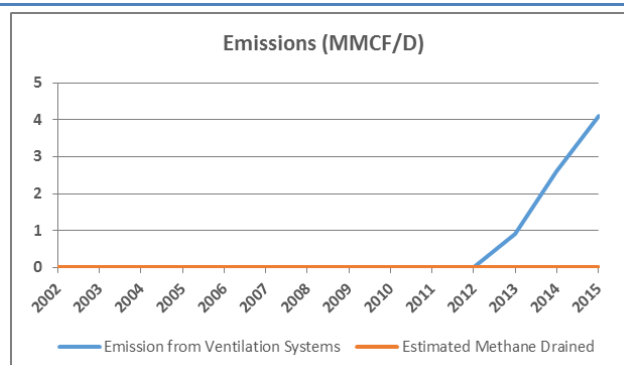
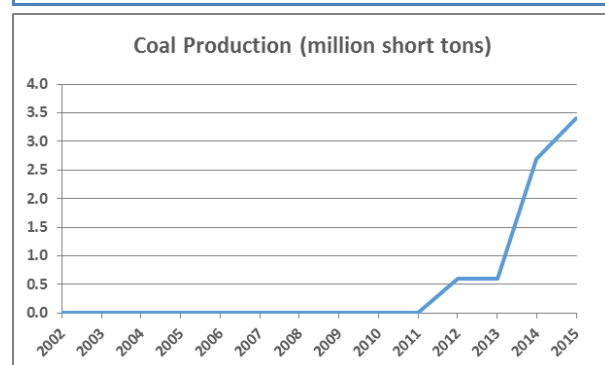
Drainage System: No
MSHA ID: 4609192

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: 561
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: N/A
Distance to Pipeline (miles): 12.5

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



Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: Pipeline

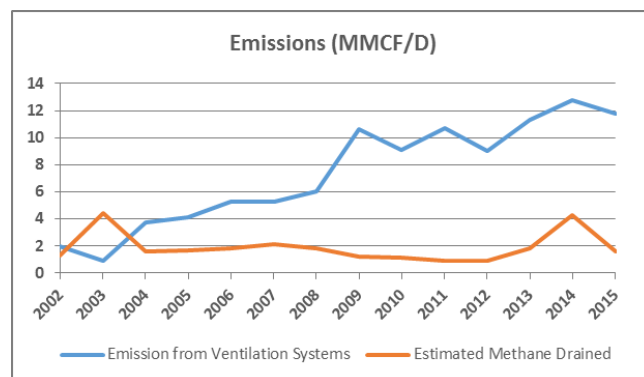
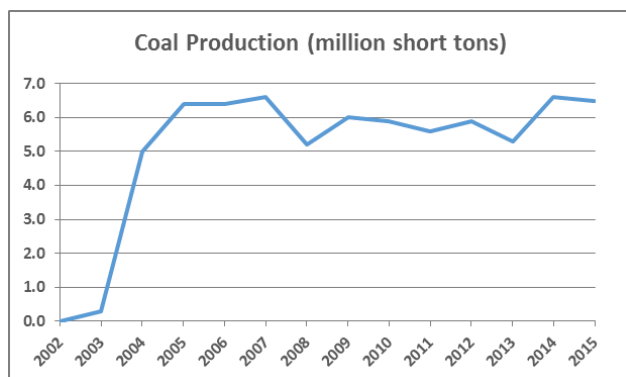
Drainage System: Yes
MSHA ID: 4601433

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: 606
Mining Method: Longwall
Year of Initial Production: 1953
Primary Coal Use: Steam
Depth to Seam (ft.): 800-1250
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
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
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
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
Estimated Specific Emissions (CF/T)	-	6,448	387	331	405	409	548	718	631	756	613	902	946	754
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
Estimated Current Drainage Efficiency	39%	83%	30%	29%	25%	28%	23%	10%	11%	8%	9%	14%	25%	12%
Estimated Current Market Penetration	-	-	-	100%	100%	100%	100%	100%	100%	100%	100%	50%	72%	6%



Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: VAM Destruction

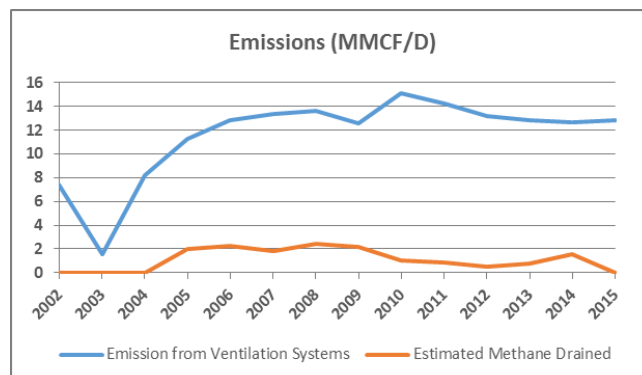
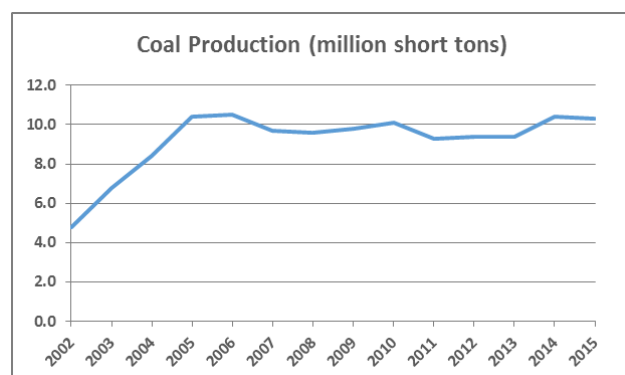
Drainage System: Yes
MSHA ID: 4601437

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: 954
Mining Method: Longwall
Year of Initial Production: 1968
Primary Coal Use: Steam
Depth to Seam (ft.): 600-1200
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
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
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
Estimated Methane Drained (MMCF/D)	-	-	-	2.0	2.3	1.8	2.4	2.2	1	0.9	0.5	0.8	1.6	-
Estimated Specific Emissions (CF/T)	563	86	356	467	525	572	608	551	582	593	532	528	502	452
Methane Used (MMCF/D)	-	-	-	-	-	-	-	0.1	0.1	0.1	0.7	1.9	1.8	1.5
Estimated Current Drainage Efficiency	-	-	-	15%	15%	12%	15%	15%	6%	6%	4%	6%	11%	-
Estimated Current Market Penetration	0%	0%	0%	0%	0%	0%	0%	5%	10%	11%	140%	226%	113%	12%



Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: Pipeline

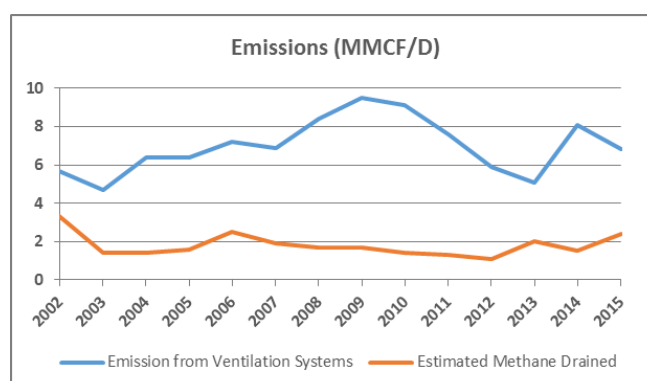
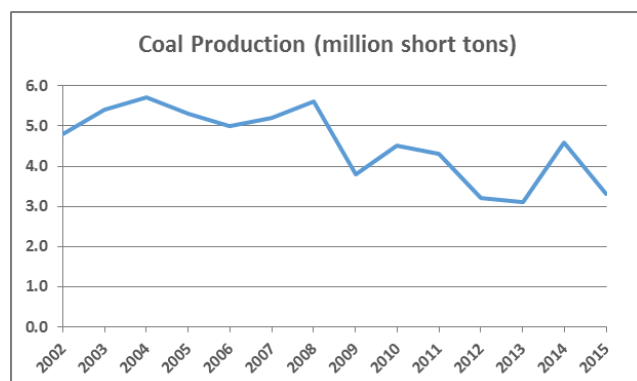
Drainage System: Yes
MSHA ID: 4601968

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: 425
Mining Method: Longwall
Year of Initial Production: 1971
Primary Coal Use: Steam
Depth to Seam (ft.): 800-1150
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
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
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
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
Estimated Specific Emissions (CF/T)	684	412	500	551	708	618	658	1,076	852	756	798	836	762	1,019
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
Estimated Current Drainage Efficiency	37%	23%	18%	20%	25%	22%	17%	15%	13%	15%	16%	28%	16%	26%
Estimated Current Market Penetration	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	75%	13%	4%



Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: None

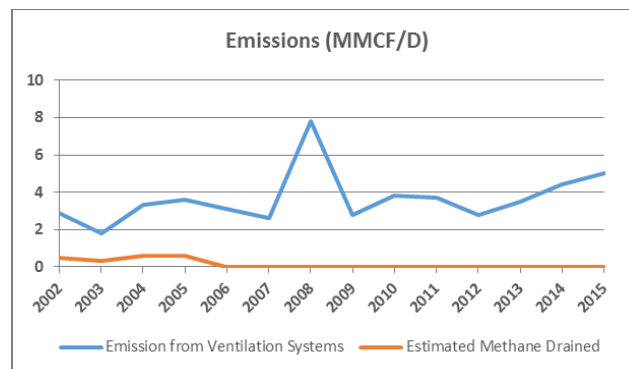
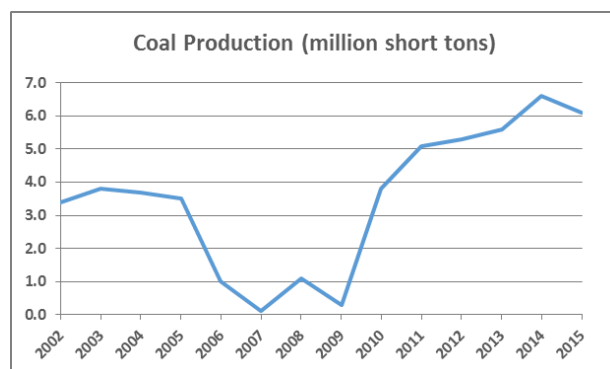
Drainage System: No
MSHA ID: 4601436

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: 614
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: NiSource
Distance to Pipeline (miles): 1.4

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
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
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
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	300
Methane Used (MMCF/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estimated Current Drainage Efficiency	15%	14%	15%	14%	-	-	-	-	-	-	-	-	-	-
Estimated Current Market Penetration	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Identifying Opportunities for Methane Recovery at U.S. Coal Mines – C01-036

Mine Status: Active
Use Project: Pipeline

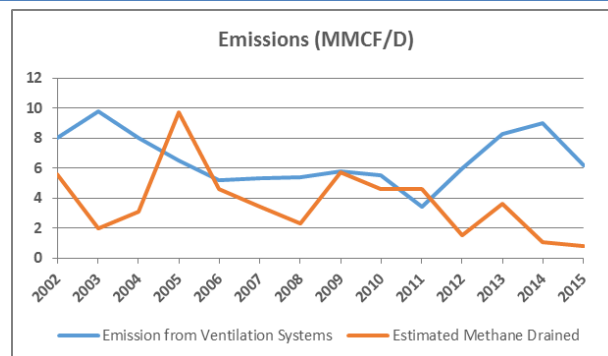
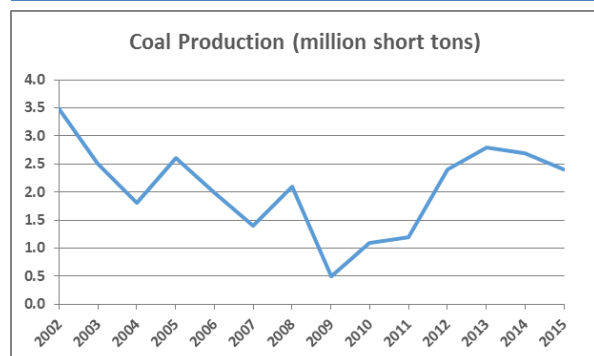
Drainage System: Yes
MSHA ID: 4601816

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: 428
Mining Method: Longwall
Year of Initial Production: 1969
Primary Coal Use: Metallurgical
Depth to Seam (ft.): 600-1300
Seam Thickness (ft.): 4.2
Transmission Pipeline in County?: Yes
Owner of Nearest Pipeline: NiSource
Distance to Pipeline (miles): 0.3

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
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
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
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
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	1,067
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	0.8
Estimated Current Drainage Efficiency	41%	17%	28%	60%	47%	40%	30%	50%	46%	58%	20%	30%	11%	12%
Estimated Current Market Penetration	100%	100%	100%	100%	100%	71%	57%	82%	100%	93%	-	81%	36%	100%



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