

U.S. Abandoned Coal Mine Methane Recovery Project Opportunities

U.S. Environmental Protection Agency
July 10, 2008
EPA430-R-08-002

ACKNOWLEDGEMENT

This draft was prepared under U.S. Environmental Protection Agency Contract EP-W-05-063 by Raven Ridge Resources, Incorporated.

Frequently Used Terms	4
Frequently Used Abbreviations	5
Executive Summary	6
1. Introduction	7
2. Abandoned Mine Projects	10
Grayson Hill Energy Project.....	11
Kings Station Mine Project.....	15
DTE Methane Resources Project.....	17
3. Potential Abandoned Mine Project Sites	20
Piceance Basin Mines.....	22
Sanborn Creek	23
Hawk’s Nest	25
Bowie No. 1.....	28
Uinta Basin Mines	31
Willow Creek.....	32
Kenilworth	34
Illinois Basin Mines.....	37
Jefferson County Group.....	38
Orient 3.....	38
Orient 6.....	40
Nasson 20	42
Macoupin County Group.....	45
Little Dog.....	45
Superior 1	47
Superior 2	49
Superior 3	51
Superior 4	53
Baker	56
References.....	59

Frequently Used Terms

Abandoned mine methane: Methane that continues to be released from the coal bearing strata once a mine is closed and sealed.

Coalbed methane: Methane that resides within coal seams.

Coal mine methane: As coal mining proceeds, methane contained in the coal and surrounding strata may be released. This methane is referred to as coal mine methane since its liberation resulted from mining activity.

Degasification system: A system that facilitates the removal of methane gas from a mine by ventilation and/or by drainage. However, the term is most commonly used to refer to removal of methane by drainage technology.

Drainage system: A system that drains methane from coal seams and/or surrounding rock strata. These systems include vertical pre-mine wells, gob wells and in-mine boreholes.

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.

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

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 and is synonymous with “methane drained.”

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

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 – recovered/used).

Frequently Used Abbreviations

AMM	Abandoned Mine Methane
b	Billion (10^9)
Btu	British Thermal Unit
cf	Cubic Feet
CH ₄	Methane
CBM	Coalbed Methane
CMM	Coal Mine Methane
CO ₂	Carbon Dioxide
EPA	Environmental Protection Agency
GWP	Global Warming Potential
IPCC	International Panel on Climate Change
m (or M)	Thousand (10^3)
mm (or MM)	Million (10^6)
MSHA	Mine Safety and Health Administration
MW	Megawatt
NA	Not Available
t	ton (short tons are used throughout this report)
Tg	Teragrams
Tg CO ₂ Eq.	Teragrams CO ₂ Equivalent

Executive Summary

EPA has been focusing attention on methane emissions from abandoned underground coal mines for several years. For example, in 2004, EPA published an emissions methodology inventory for abandoned mine methane. This publication characterizes abandoned coal mines as a source of methane, presents a technical methodology to estimate methane emissions from abandoned mines in the United States, and lists roughly four hundred, (400) abandoned mines in the United States that were considered "gassy" at the time of closure. This publication has been well-received as a primer on the abandoned mine methane (AMM) sector. CMOP has also engaged in other efforts to better characterize and understand AMM emissions and opportunities, including follow-up work to research potential abandoned mine sites. CMOP also developed a generalized, universal AMM emissions estimation methodology that has been incorporated as part of the 2006 Emissions Inventory Guidelines for the International Panel on Climate Change (IPCC). This report furthers interest in the AMM sector by developing an inventory of current and potential methane recovery projects at abandoned coal mine sites. The report identifies and explores the details of three abandoned mine methane projects in the Illinois Basin as successful examples.

A number of constraints were encountered in collecting data for this report. Due to today's climate related to homeland security in the United States, pipeline maps and information were not available for a public report of this nature. This prohibits specific pipeline data from being published at this time.

For mines abandoned in or after 1972, data are readily available, including comprehensive active mine emissions data, date of abandonment, number of gassy mines, mine status, and even coal production on a state and county basis. In contrast, most of the information needed to calculate emissions from abandoned mines is largely unknown for mines closed before 1972 as data is not available from MSHA. Emissions from the pre-1972 mines are characterized using the methodology described in USEPA (2004) on a regional, not individual mine basis. This prevented reporting on individual production and emissions from mines abandoned before 1972 as part of the profiling done in this report.

In addition to missing emissions and production data for mines abandoned before 1972, coal ownership and mine operators when active for mines abandoned before this time is not always readily available. Coal ownership information can be obtained where it was recorded by the county in which the mine is located for tax purposes. In some instances, coal ownership in more densely populated areas or with mines closed prior to the 1960s was not recorded. It is assumed that the coal rights have been released back to the multiple surface owners and are exempt from taxes, therefore no longer recorded. In order to obtain coal and surface ownership information, visits to county offices in the key counties of interest will be required.

1. Introduction

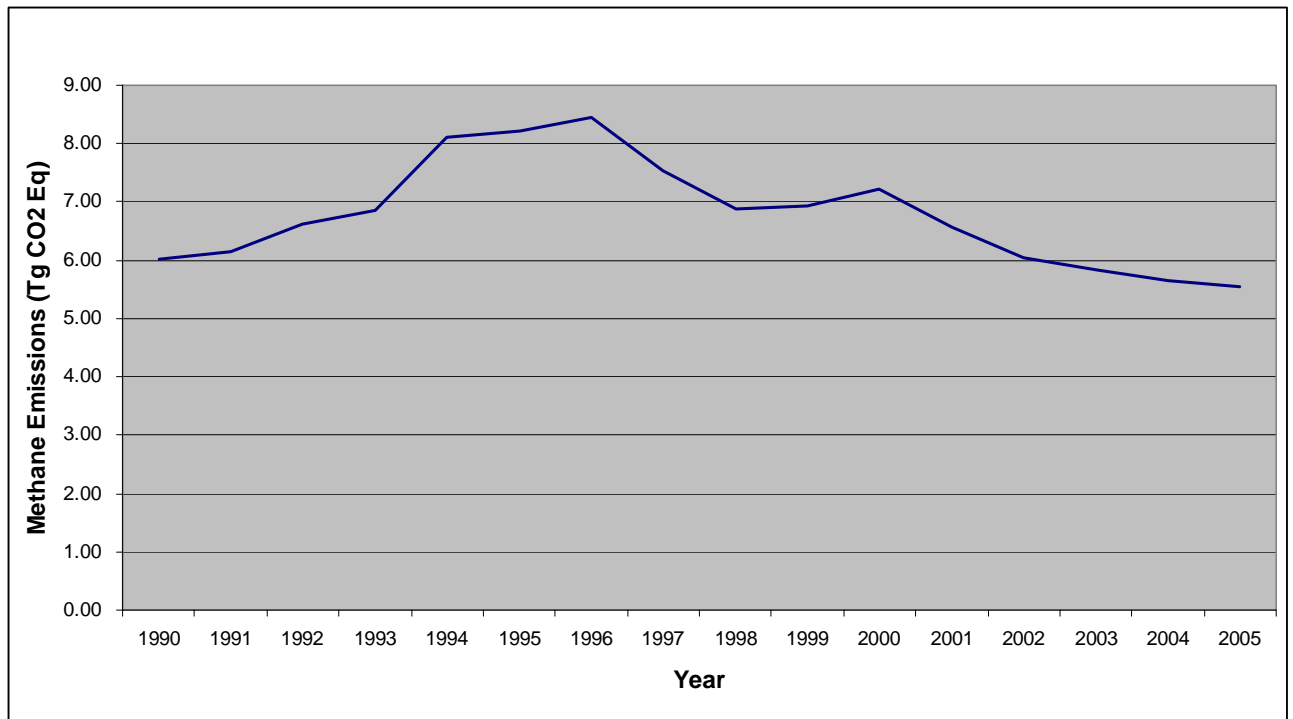
All underground and surface coal mining liberates methane (CH₄) as part of the normal mining operations. The amount of CH₄ liberated depends on the amount that resides in the coal (*in situ*) and surrounding strata when mining occurs. The in-situ CH₄ content depends upon the amount of CH₄ created during the coal formation (i.e., coalification) process, and the geologic characteristics of the coal seams. During coalification, more deeply buried deposits tend to generate more CH₄ and retain more of the gas after uplift to minable depths. Deep underground coal seams generally have higher CH₄ contents than shallow coal seams or surface deposits.

Underground coal mines contribute the largest share of CH₄ emissions, with active underground mines the leading source of underground emissions. However, mines also continue to release CH₄ after closure. As mines mature and coal seams are mined through, mines close and are abandoned. Many are sealed and some flood through intrusion of groundwater or surface water into the void. Shafts or portals are generally filled with gravel and capped with a concrete seal, while vent pipes and boreholes are plugged in a manner similar to oil and gas wells. Some abandoned mines are vented to the atmosphere to prevent the buildup of CH₄ that may find its way to surface structures through overburden fractures. As work stops within the mines, the CH₄ liberation decreases but it does not stop completely. Following an initial decline, abandoned mines can liberate CH₄ at a near-steady rate over an extended period of time, or, if flooded, produce gas for only a few years. The gas can migrate to the surface through the conduits described above, particularly if they have not been sealed adequately. In addition, diffuse emissions can occur when CH₄ migrates to the surface through cracks and fissures in the strata overlying the coal mine. The following factors influence abandoned mine emissions:

- Time since abandonment;
- Gas content and adsorption characteristics of coal;
- CH₄ flow capacity of the mine;
- Mine flooding;
- Presence of vent holes; and
- Mine seals.

Gross abandoned mine CH₄ emissions ranged from 6.0 to 9.0 Tg CO₂ Eq. from 1990 through 2004, varying, in general, by approximately 1 to 18 percent from year to year. Fluctuations were due mainly to the number of mines closed during a given year as well as the magnitude of the emissions from those mines when active. Abandoned mine emissions peaked in 1996 (9.0 Tg CO₂ Eq.) due to the large number of mine closures from 1994 to 1996 (70 gassy mines closed during the three-year period). In spite of this rapid rise, abandoned mine emissions have been generally on the decline since 1996. There were fewer than thirteen gassy mine closures during each of the years from 1998 through 2004, with only one closure in 2004. By 2004, abandoned mine emissions were reduced to 5.7 Tg CO₂ Eq. See Figure 1-1.

Figure 1-1: Methane Emissions from Abandoned Mines Over Time in Tg CO₂ Equivalent



At present, recovery occurs at 44 abandoned mines in the U.S. Table 1-1 shows the coal basin and states where abandoned mine recovery projects are occurring. Of these projects, all but two are pipeline injection projects. The remaining two projects are direct sales projects. Section 2.0 of this report highlights three abandoned mine methane recovery projects in the Illinois Basin.

Table 1-1: Breakdown of AMM Projects by Coal Basin and State

Coal Basin	State	Number of Abandoned Mines with Recovery
Central Appalachian	Virginia	5
Northern Appalachian	Ohio	2
Northern Appalachian	Pennsylvania	1
Northern Appalachian	West Virginia	6
Raton	Colorado	1
Illinois	Illinois	27
Illinois	Indiana	1
Warrior	Alabama	1
Total		44

In addition to profiling three successful abandoned mine methane projects; the report identifies 14 mines as potential candidates for projects. Table 1-2 summarizes the mines profiled by coal basin and state.

Table 1-2: Abandoned Mines Profiled as Project Candidates

Coal Basin	State	Number of Abandoned Mines Profiled
Piceance	Colorado	3
Illinois	Illinois	8
Illinois	Kentucky	1
Uinta	Utah	2
Total		14

2. Abandoned Mine Projects

Abandoned Mine Project Case Studies

This section includes three case studies of successful abandoned mine methane projects. All three projects are operating in the Midwestern U.S. The Grayson Hill Energy project, operating in Southern Illinois, is a pipeline sales project that also uses abandoned mine methane to operate the project's gas processing plant. The Kings Station Mine project of Gibson County, Indiana is selling gas through a local pipeline to an automobile plant. The DTE Methane Resources project is selling abandoned mine methane to a pipeline in Southern Illinois. These particular projects were selected for profiling based on their level of success and the variety of end uses the projects present.

Basic information about the projects is outlined in the case studies, such as location and project developer information, followed by a detailed analysis of each project. Each study explains how the project was selected and what technology is in use, as well as any barriers that were overcome.

Grayson Hill Energy Project

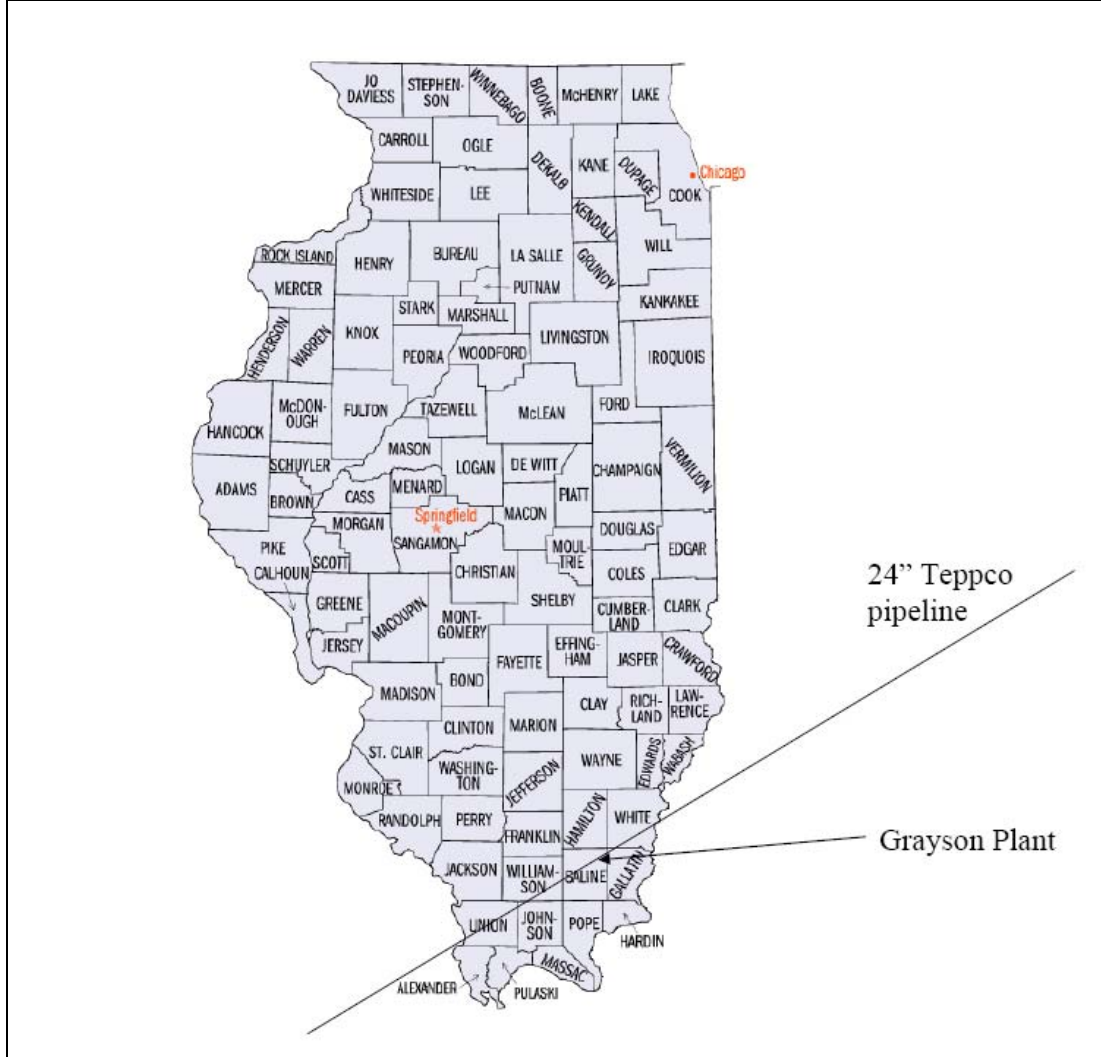
1.0 Background Information	
1.1 Name of mine or mines included in the project	Peabody 46 & 43 Brushy Creek #6 O’Gara #1, #14, #8, #10 Deering Wasson
1.2 Mine owner and parent company when active	NA
1.3 Dates of mine abandonment	N/A
1.4 Mine methane emissions at time of abandonment (mmcf/d)	N/A
1.5 Region/coal seam	Saline County, IL Illinois 5 & 6 Seams
1.6 Coal type/rank	Bituminous
1.7 All involved parties	
Project developers	Grayson Hill Energy and Itera International Energy Corp. are joint project developers.
Funding sources	Privately funded by Itera and Grayson Hill
Equipment/technology vendors	CAT, JOY, Cummins, and Engelhard technologies are employed by the project.
1.8 Project type	Pipeline sales and electricity use for gas processing plant
1.9 Project size (MW equivalent or volume of gas produced)	<ul style="list-style-type: none"> Approximately 1.0mmcf/d of 96% methane gas is processed from the plant for pipeline sales to the nearby 24” Texas Eastern pipeline. Their gas processing plant utilizes electricity produced from two 750 Kw coal mine methane-powered Caterpillar motors.
1.10 Greenhouse gas emissions avoided per year (volume and MMTCO ₂ e)	
1.11 First year of operation	2003
1.12 Actual or projected end-date of project	N/A
1.13 Project operator contact information	
<u>Grayson Hill Energy</u> Chris Schimp 1705 Grayson Road Eldorado, IL 62930 (618) 967-3468 Cell (618) 268-6027 Office graysonenergy@yahoo.com	<u>Itera International Energy Corp. (USA)</u> Robert Howells 995 Gate Parkway N #400 Jacksonville, FL 32246 (904) 618-967-3468 Cell (904) 996-8800 Office rhowells@itera.com

2.0 Project description

The Initial business was electrical generation from four coal mine methane fueled 750 kw generators into the local grid. The waste heat was utilized in 16 hydroponic greenhouses producing 10,000 lbs. of tomatoes per week. Imports of cheap Canadian fruit by area markets made this business non-profitable; however, proximity of the Texas Eastern pipeline led to the Grayson Hill Project's present business plan.

Gas has been produced from the project since 2003 and sold to the 24-inch Texas Eastern Pipeline which crosses the property owned by Grayson Hill Energy (see Figure A-1).

Figure 2-1: Location of Texas Eastern Pipeline Relative to Grayson Hill Energy Property



The project has a 50 mile gathering system of 4-inch HDPE pipe, laid by Grayson Hill Energy using a plow. The gathering system is fed by rotary screw compressors, most of them driven by 6-cylinder Cummins diesel engines. All of these machines are leased.

Grayson Hill Energy installed and commissioned a 2,500 mcf/d nitrogen reject unit at the project site's processing plant. This aspect of the plant began delivering gas in June of 2004. The unit at the site was built by Guild Associates Inc. of Ohio with adsorbent material manufactured by Engelhard. Grayson Hill Energy leases a rotary screw compressor at the processing plant which

allows gas to be supplied to the nitrogen rejection unit at 110 psi and has low maintenance and repair costs. The nitrogen rejection unit is driven by a 250 horsepower electric engine.

The product gas is compressed with a refurbished JOY machine. This compressor is also driven by a 250 horsepower electric engine and provides gas to the pipeline at 560 to 800 psi.

To protect the plant from the extreme weather in the area, a building has been erected over the gas processing plant. Rollup doors were fitted to the main openings and two large extractor fans provide necessary cooling to the plant in the summer.

3.0 Site Location

The site was located by identifying existing underground mines and drilling wells.

4.0 Identification of the Project as an Appropriate Project Candidate

The location is ideal as it is adjacent to the Texas Eastern Pipeline. There are multiple utilization options available, as is evident by use in hydroponic greenhouses, pipeline sales, and electricity generation. The market in the area is conducive to the project with the pipeline intersecting the property as well as sales to the local power grid. There is also the potential for expansion of the project, as it is possible other abandoned mines in the area may be in communication with the project.

5.0 Ownership Issues Associated with the Project

The coal owner has the right to capture gas from abandoned mines in the state of Illinois. Grayson Hill Energy obtained the rights to capture and sell the gas by acquiring leases or ownership of the coal.

6.0 Testing Procedures and Preliminary Studies Done at the Site

Ongoing gas analysis is conducted on product gas as it is sold to the pipeline. Inert gases are somewhat of an issue for Grayson Hill Energy creating higher than anticipated losses; however, the nitrogen rejection unit adjusts for this.

7.0 Type of Project

Ultimately, pipeline sales was selected as the best option at Grayson Hill Energy due to the proximity of the Texas Eastern Pipeline and the aforementioned market issues associated with tomato sales. Electrical generation for the gas processing operations is also appropriate here as opposed to purchasing electricity from the local power grid.

8.0 Difficulties

Any ownership difficulties were addressed by obtaining the appropriate leases for the coal. Market issues were only encountered in the case of the tomato sales; however, this was alleviated by altering the course of the project to become a pipeline project. Logistical issues were not a problem due to the ideal location of the project and its proximity to the pipeline. Technically, issues were encountered due to inert gas content; however, the nitrogen rejection unit is adjusted to address this. The Grayson Hill Energy project is the first CMM project in the United States to utilize a molecular gate nitrogen rejection unit.

Kings Station Mine Project

1.0 Background Information	
1.1 Name of mine or mines included in the project	Kings Station
1.2 Mine owner and parent company when active	Kings Station Coal Company
1.3 Dates of mine abandonment	10/26/1973
1.4 Mine methane emissions at time of abandonment (mmcf/d)	0.35 mmcf/d
1.5 Region/coal seam	Gibson County, IN Illinois 5 & 6 seams
1.6 Coal type/rank	Bituminous
1.7 All involved parties	
Project developers	Roy Farmer and C.A. Robinson
Funding sources	Roy Farmer and C.A. Robinson
Equipment/technology vendors	Arial compressors, de-hy is QB Johnson, Amine Units is Sivallis.
1.8 Project type	Gas supply to local automobile plant
1.9 Project size (MW equivalent or volume of gas produced) 150-200 mcf/d	
1.10 Greenhouse gas emissions avoided per year (volume and MMTCO ₂ e) NA	
1.11 First year of operation	October 1997
1.12 Actual or projected end-date of project	Unkown
1.14 Project operator contact information	Roy Farmer 4353 Hy. 41 South Princeton, IN 47670 (812)-677-2121 Office rfarmer@coalmethane.com

2.0 Project Description

The Kings Station Project has two gas processing plants and sells gas to an adjacent Toyota Truck Plant, located across Highway 41 from the gas plant. The mine has a total of five drainage wells; however, three of these have encountered flooded areas of the mine. The gas processing plant was constructed for the two wells drilled into the dry areas of the mine. These two wells produce a cumulative of 150-200mcf/d of gas from the mine, consisting of 920-930 BTU gas (6% CO₂ and 1% N₂). The King Station's gas processing plant is relatively small compared to DTE Energy and Grayson Hill Energy's plants. It consists of a gas fired compressor, heat exchanger, amine unit, and a dehydration unit. The mine gas is upgraded to 1,000 BTU by injecting it with propane before it is sent to the Toyota Plant via a pipeline.

3.0 Site Location

A refinery had drilled holes for disposal into the mine and reported gas. Roy Farmer took over one of the water disposal wells for water disposal from the mine, and began drilling new production wells over the mine and began producing gas. Gas from the mine is free flowed to the compressor at 4-5 psi.

4.0 Identification of the Project as an Appropriate Project Candidate

The proximity of the Toyota Truck Plant provided the opportunity for gas sales at the Kings Station Project. Though not being utilized as an option at this time, there is also a pipeline approximately two miles from the gas processing plant as well.

It is believed that nearby abandoned mine sites may be in communication with the project, opening up the possibility for expansion as well.

5.0 Ownership Issues Associated with the Project

The rights to the gas are owned either by the coal lessee or the lessee of CBM rights. The project developers have encountered no ownership difficulties; however, damages are always paid to surface owners when access is required for drilling new wells.

6.0 Testing Procedures and Preliminary Studies Done at the Site

Prior to the project, gas analysis and open hole flow testing were done for approximately 20 to 30 days.

7.0 Type of Project

The nearby Toyota Truck Plant provided an ideal opportunity to utilize the abandoned mine methane from the Kings Station Mine. The King Station Project has a contract with the Toyota Plant requiring the project to supply a minimum of 10% of their daily requirement, which is presently 5mmcf/d.

8.0 Difficulties

The project developers have not identified any difficulties other than flooded portions of the mine.

DTE Methane Resources Project

1.0 Background Information	
1.1 Name of mine or mines included in the project	Interstate 22 Old Ben Coal 8 Old Ben Coal 14 Old Ben Coal 19 Old Ben Coal 21 Old Ben Coal 24 Old Ben Coal 26 Burlington Northern 15 Burlington Northern 22 Orient 1 Ziegler 1
1.2 Mine owner and parent company when active	Old Ben Coal Company & Orient Coal Company
1.3 Dates of mine abandonment	Old Ben Coal 24 and Old Ben Coal 26 abandoned 7/10/1998. Old Ben Coal 21 abandoned 11/13/1995. Dates unknown on others.
1.4 Mine methane emissions at time of abandonment (mmcf/d)	From 1.2 to 1.6 mmcf/d.
1.5 Region/coal seam	Franklin County, IL Herrin No. 6 Seam
1.6 Coal type/rank	Bituminous
1.7 All involved parties	
Project developers	Illinois Methane developed the project. DTE Methane Resources bought the project from Illinois Methane and is now operating.
Equipment/technology vendors	Compressors: Arial/Cat driven Amine Unit: Dicks & Tryer The nitrogen rejection unit is provided by BCKK. End use of the gas is pipeline sales to the Trunkline Gas Company.
Funding Sources	Funding is internal.
1.8 Project type	Pipeline sales
1.9 Project size (MW equivalent or volume of gas produced)	NA
1.10 Greenhouse gas emissions avoided per year (volume and MMTCO _{2e})	NA

1.11 First year of operation	September 2002
1.12 Actual or projected end-date of project	Unknown
1.14 Project operator contact information	
<p>Matt Smith (Michigan) (734) 913-6043 Office (734) 548-0884 Cell</p> <p>Phil Coleman (Michigan) 425 South Main Street, Suite 201 Ann Arbor, MI 48104 (734) 913-6284 Office (734) 730-4870 Cell</p> <p>Mark Benifel (Mt. Vernon, manager) 20227 Thorn Rd Thompsonville, IL 62890 (618) 982-9710 Office Gas Plant</p>	

2.0 Project Description

DTE Methane Resources operates the Corinth Gas Processing Plant. Mine gas is delivered to this plant via a 29 mile gas line with several compressor stations along the way. DTE is presently producing 5.5mmcf/d from 16 wells out of 10 abandoned mines. Gas produced from these mines average 750 BTU (17% N₂ and 9% CO₂). DTE uses a BCCK Nitrogen Rejection Unit (NRU) to strip the N₂ and CO₂ from the mine gas. Electricity is purchased from the local utility to run the gas plant at the price of approximately \$15k per month. The amount of gas processed for sales is undisclosed. Product gas is sold to the Trunkline Gas Company’s pipeline which is approximately one half mile from the plant.

3.0 Site Location

Acquisition of an existing project provided historical data for evaluation of productive potential.

4.0 Identification of the Project as an Appropriate Project Candidate

A site survey and economic analysis was conducted at the site. Also, proximity to the Trunkline Gas Company’s pipeline provides the necessary infrastructure for this pipeline project.

5.0 Ownership Issues Associated with the Project

In Illinois, the coal owner has ownership of coal mine methane. A surface agreement is typically executed with the surface owner involving payment of damages and compensation. No royalties are involved. Title research regarding ownership has prevented any ownership issues.

6.0 Testing Procedures and Preliminary Studies Done at the Site

Acquired production, well, and gas composition data are done at the DTE project site.

7.0 Type of Project

A pipeline sales project was selected at this location due to proximity to the Trunkline Gas Company’s pipeline. DTE acquired this project from Illinois Methane, which was already employing the compressor technology and conducting pipeline sales upon acquisition.

8.0 Difficulties

Due to the proximity of the pipeline, market issues are not a difficulty encountered by the DTE project. A consistent logistical problem at the project is acquiring easement rights to install flow lines on land where DTE Methane Resources does not have coal mine methane rights. Ownership of the methane, however, is not a problem due to coal mine methane rights residing

with DTE as the coal mineral owner. The gas processing plant required adjustment to match gas production, resulting in the plant and field compressor capacities being decreased from 12 mmcf/d to 6 mmcf/d.

3. Potential Abandoned Mine Project Sites

Abandoned Mine Profiles

This section profiles 14 abandoned mines that may be considered as project sites. Many of these mines were selected based on the amount of methane liberated when active and thus the power generation or pipeline sales potential estimated. Others, such as those in the Illinois basin, where the time of abandonment prohibits methane liberation information from being obtained by MSHA, are selected due to proximity to known project successes. A number of the mines profiled are also part of a complex of mines, such as the Willow Creek and Kenilworth mines of Utah and the Jefferson County and Macoupin county groups of Illinois. Notable in the case studies of Section 2, larger scale abandoned mine methane projects such as Grayson Hills and DTEMR involve a complex of mines, thus providing enough methane for an economically feasible project.

Information provided in the profiles, such as availability for end uses, estimated power generation and/or pipeline sales potential, and ownership information may be used in identifying prospective abandoned mine methane projects. The report also includes mine maps which may be helpful to potential project developers.

Table 3-1 below summarizes the mines profiled in this report by the coal basin in which they are located and key statistics relevant to project potential.

Table 3-1: Abandoned Mines Profiled

Basin	Mine Name	Estimated Emissions at Abandonment (mmcf/day)	Estimated Power Generating Capacity (MW)*	Estimated Pipeline Sales Potential (Bcf)*
Piceance	Sanborn Creek	5.0	7.6	0.7
Piceance	Hawk's Nest**	NA	NA	NA
Piceance	Bowie No. 1	0.11	0.6	0.06
Uinta	Willow Creek	2.0	3.0	0.30
Uinta	Kenilworth**	NA	NA	NA
Illinois	Orient 3**	NA	NA	NA
Illinois	Orient 6	0.7	1.0	0.1
Illinois	Nasson 20**	NA	NA	NA
Illinois	Little Dog**	NA	NA	NA
Illinois	Superior 1**	NA	NA	NA
Illinois	Superior 2**	NA	NA	NA
Illinois	Superior 3**	NA	NA	NA
Illinois	Superior 4**	NA	NA	NA
Illinois	Baker	1.51	2.3	0.2

* Assuming 40% recovery efficiency. Other estimates are provided in profiles below.

** Emissions from the pre-1972 mines are characterized using the methodology described in USEPA (2004) on a regional, not individual mine basis. This prevented reporting on individual production and emissions from mines abandoned before 1972 as part of the profiling done in this report.

Piceance Basin Mines

Updated: 7/10/2008

Status: Abandoned

Sanborn Creek
GEOGRAPHIC DATA

Basin: Piceance

State: CO

Coalbed: D Seam

County: Gunnison

CORPORATE INFORMATION

Operator When Active: Oxbox Mining, LLC

Current/Most Recent Controller: Oxbow Carbon & Minerals, Inc.

Previous Owner (s): Somerset Mining Company

Previous or Alternate Name of Mine: None

ADDRESS

Contact Name: Robert Koch

Phone Number: (970) 929-5122

Operator Main Address: 7901 S. Park Plaza, Ste. 202

City: Littleton

State: CO

ZIP: 80120

Address When Active: PO Box 535

City: Somerset

State: CO

ZIP: 81434

GENERAL INFORMATION

Number of Employees at Mine at Last Operation: 119

Mining Method: Longwall

Year of Initial Production: 1991

Primary Coal Use: Steam/Metallurgical

Date of Abandonment: 10/1/2003

BTUs/lb of Coal Produced: 12,370

Coal Type: Bituminous

Depth to Seam (ft): 1,500 – 2,000

Seam Thickness (ft): 9 - 12

PRODUCTION, VENTILATION AND DRAINAGE DATA

	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>
Coal Production (million short tons/year):	1.1	2.2	2.8	2.5	0.5
Estimated Total Methane Liberated (million cf/day):	5.3	7.0	7.0	5.4	5.0
Emission from Ventilation Systems:	5.3	5.3	5.2	4.1	-
Estimated Methane Drained:	0.0	1.7	1.8	1.3	-
Estimated Specific Emissions (cf/ton):	1759	1161	913	788	-

Estimated Drainage Efficiency at Mine Closure: 25%

Sanborn Creek (continued)

ENERGY AND ENVIRONMENTAL VALUE OF EMISSIONS REDUCTIONS

	<u>Assumed Potential Recovery Efficiency</u>		
(Based on 2003 data)	<u>20%</u>	<u>40%</u>	<u>60%</u>
CO₂ Equivalent of CH₄ Emissions Reductions (mm tons)	0.2	0.3	0.5

Power Generation Potential

Utility Electric Supplier:

Parent Corporation of Utility:

	<u>MW</u>	<u>GWh/year</u>
Potential Generating Capacity (2003 data)		
Assuming 20% Recovery Efficiency:	3.8	33.3
Assuming 40% Recovery Efficiency:	7.6	66.5
Assuming 60% Recovery Efficiency:	11.4	99.8

Pipeline Sales Potential

Potential Annual Gas Sales (2003 data)	<u>Bcf</u>
Assuming 20% Recovery (Bcf):	0.4
Assuming 40% Recovery (Bcf):	0.7
Assuming 60% Recovery (Bcf):	1.1

Description of Surrounding Terrain: Mountains

Transmission Pipeline in County? Yes

Owner of Nearest Pipeline: Rocky Mountain Natural Gas

Distance to Pipeline (miles): < 25

Pipeline Diameter (in): 8.0

Owner of Next Nearest Pipeline: NA

Distance to Next Nearest Pipeline (miles): NA

Pipeline Diameter (in): NA

Other Utilization Possibilities

Name of Nearby Coal Fired Power Plant: NA

Distance to Plant (miles):

Comments: Gas well drilling (CBM) to the north may eventually provide a gas pipeline for a project.

Updated: 7/10/2008

Status: Abandoned

Hawk's Nest

GEOGRAPHIC DATA

Basin: Piceance

State: CO

Coalbed: E Seam

County: Gunnison

CORPORATE INFORMATION

Operator When Active: Western Slope Carbon

Current/Most Recent Controller: Oxbow Mining, LLC

Previous Owner (s): Champion Coal Company

Previous or Alternate Name of Mine: Hawk's Nest East/West

ADDRESS

Contact Name: Robert Koch

Phone Number: (970) 929-5122

Operator Main Address: 7901 S. Park Plaza, Ste. 202

City: Littleton

State: CO

ZIP: 80120

Address When Active: PO Box 535

City: Somerset

State: CO

ZIP: 81434

GENERAL INFORMATION

Number of Employees at Mine at Last Operation: NA

Mining Method: Longwall

Year of Initial Production: Pre-1972

Primary Coal Use: Steam/Metallurgical

Date of Abandonment: 1/3/1986

BTUs/lb of Coal Produced: NA

Coal Type: Bituminous

Depth to Seam (ft): NA

Seam Thickness (ft): NA

Pipeline Sales Potential

Description of Surrounding Terrain: Mountains

Transmission Pipeline in County? Yes

Owner of Nearest Pipeline: Rocky Mountain Natural Gas

Distance to Pipeline (miles): < 25

Pipeline Diameter (in): 8.0

Owner of Next Nearest Pipeline: NA

Hawk's Nest (continued)

Distance to Next Nearest Pipeline (miles): NA

Pipeline Diameter: NA

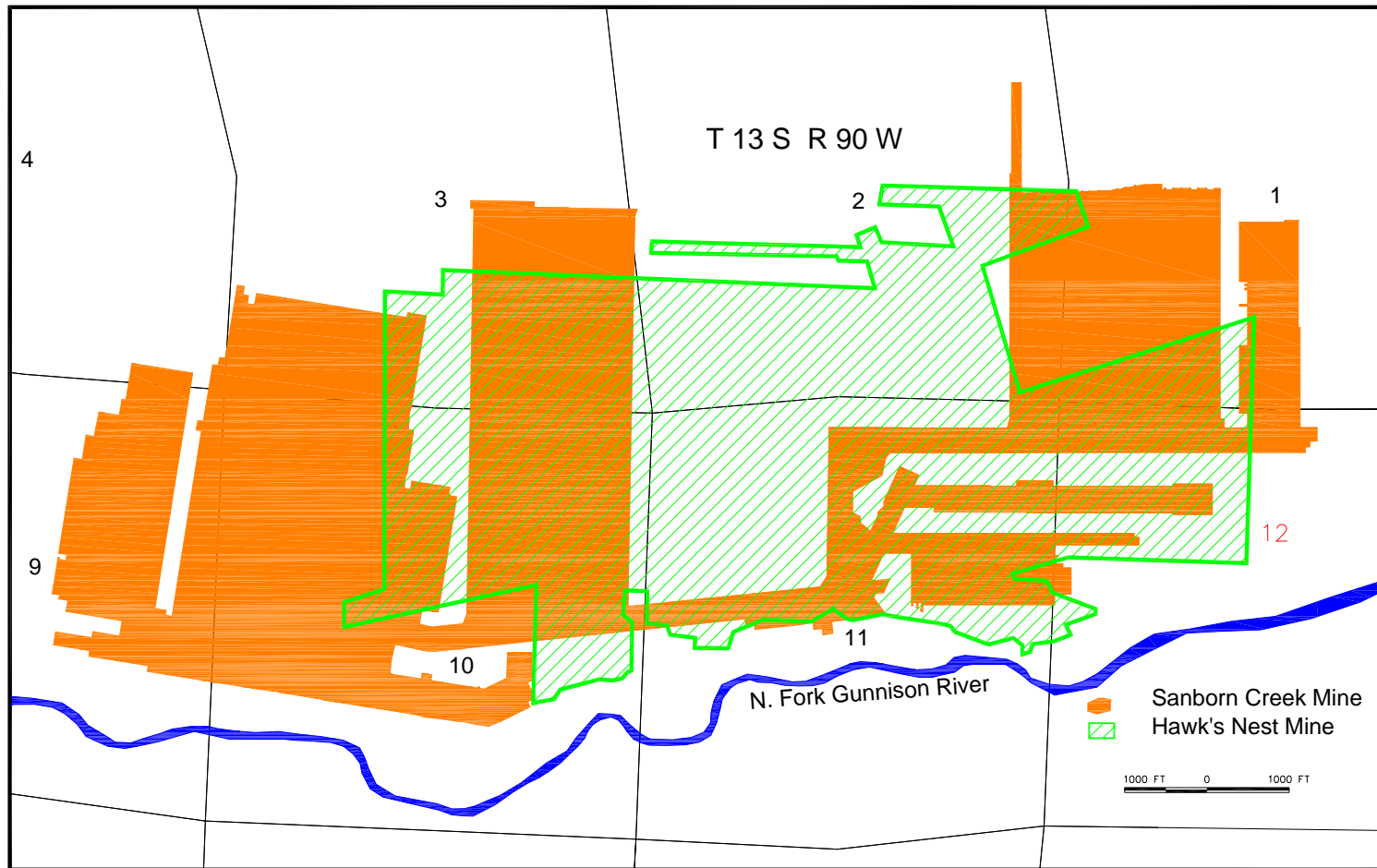
Other Utilization Possibilities

Name of Nearby Coal Fired Power Plant: NA

Distance to Plant (miles): NA

Comments: Gas well drilling (CBM) to the north may eventually provide a gas pipeline for a project.

Figure 3-1: Sanborn Creek and Hawk's Nest Mines



Updated: 7/10/2008

Status: Abandoned

Bowie No. 1

GEOGRAPHIC DATA

Basin: Piceance

State: CO

Coalbed: B Seam

County: Delta

CORPORATE INFORMATION

Operator When Active: Bowie Resources, Ltd.

Current/Most Recent Controller: Horizon Natural Resources

Previous Owner (s): Cyprus Orchard Valley Coal Corp.

Previous or Alternate Name of Mine: None

ADDRESS

Contact Name: Bill Bear

Phone Number: (970) 929-5257

Operator Main Address: 1855 Old Hwy. 133

City: Somerset

State: CO

ZIP: 81434

Address When Active: PO Box 1488

City: Paonia

State: CO

ZIP: 81428

GENERAL INFORMATION

Number of Employees at Mine at Last Operation: 53

Mining Method: Continuous

Year of Initial Production: 1986

Primary Coal Use: Steam

Date of Abandonment: 12/10/1998

BTUs/lb of Coal Produced: 11,312

Coal Type: Bituminous

Depth to Seam (ft):

Seam Thickness (ft): 14

PRODUCTION, VENTILATION AND DRAINAGE DATA

	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>
Coal Production (million short tons/year):	0.71	0.41	0.61	0.76	0.0
Estimated Total Methane Liberated (million cf/day):	0.0	0.0	0.2	1.14	0.11
Emission from Ventilation Systems:	0.0	0.0	0.0	1.14	0.11
Estimated Methane Drained:	0.0	0.0	0.0	0.0	0.0
Estimated Specific Emissions (cf/ton):	-	-	120	548	-
Methane Recovered (million cf/day):	0.0	0.0	0.0	0.0	0.0

Estimated Drainage Efficiency at Mine Closure: 0%

Bowie No. 1 (continued)

ENERGY AND ENVIRONMENTAL VALUE OF EMISSIONS REDUCTIONS

(Based on 1998 data)	Assumed Potential Recovery Efficiency		
	<u>20%</u>	<u>40%</u>	<u>60%</u>
CO₂ Equivalent of CH₄ Emissions Reductions (mm tons)	0.0	0.0	0.0

Power Generation Potential

Utility Electric Supplier: Delta – Montrose Electric Coop.

Parent Corporation of Utility: Touchstone Energy Cooperatives

	<u>MW</u>	<u>GWh/year</u>
Potential Generating Capacity (1998 data)		
Assuming 20% Recovery Efficiency:	0.3	2.6
Assuming 40% Recovery Efficiency:	0.6	5.3
Assuming 60% Recovery Efficiency:	0.9	7.9

Pipeline Sales Potential

Potential Annual Gas Sales (1998 data)	<u>Bcf</u>
Assuming 20% Recovery (Bcf):	0.03
Assuming 40% Recovery (Bcf):	0.06
Assuming 60% Recovery (Bcf):	0.10

Description of Surrounding Terrain: Mountains

Transmission Pipeline in County? Yes

Owner of Nearest Pipeline: Rocky Mountain Natural Gas

Distance to Pipeline (miles): <25

Pipeline Diameter (in): 8.0

Owner of Next Nearest Pipeline: NA

Distance to Next Nearest Pipeline (miles): NA

Pipeline Diameter (in): NA

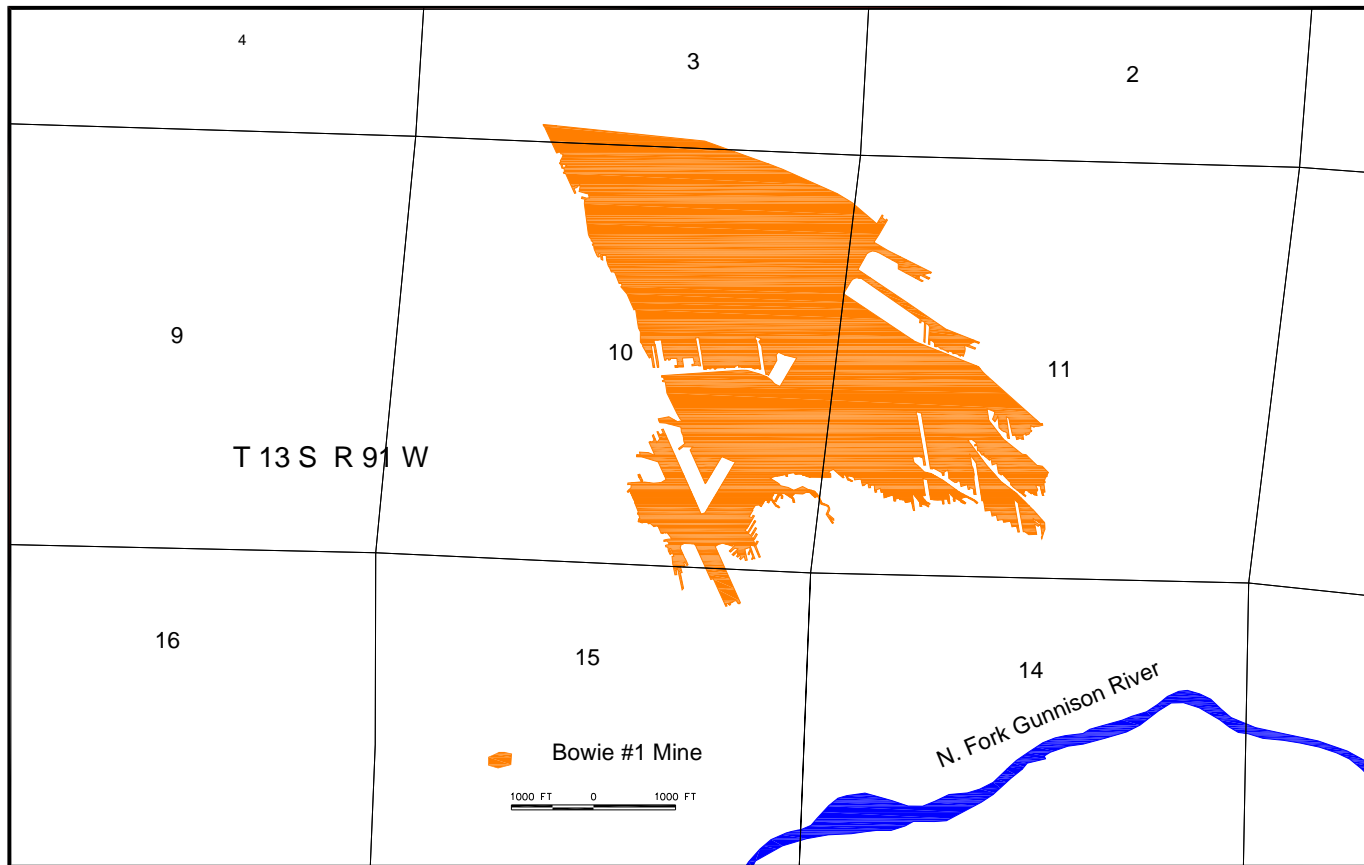
Other Utilization Possibilities

Name of Nearby Coal Fired Power Plant: NA

Distance to Plant (miles): NA

Comments: Gas well drilling (CBM) to the north may eventually provide a gas pipeline for a project.

Figure 3-2: Bowie #1 Mine



Uinta Basin Mines

Updated: 7/10/2008

Status: Abandoned

Willow Creek
GEOGRAPHIC DATA

Basin: Uinta

State: UT

Coalbed: Bookcliffs Coal Field, Castlegate D Seam

County: Carbon

CORPORATE INFORMATION

Operator When Active: Plateau Mining Corp.

Current/Most Recent Controller: Foundation Coal Company

Previous Owner (s): Amwest Exploration Company, Cyprus Plateau Mining Corp.

Previous or Alternate Name of Mine: None

ADDRESS

Contact Name: Dennis Ware

Phone Number: (435) 472-4737

Address: PO Box 30

City: Helper

State: UT

ZIP: 84526

Address When Active: 847 NW Hwy 191

City: Helper

State: UT

ZIP: 84526

GENERAL INFORMATION

Number of Employees at Mine at Last Operation: 267

Mining Method: Longwall

Year of Initial Production: 1996

Primary Coal Use: Steam

Date of Abandonment: 8/3/2003

BTUs/lb of Coal Produced: 12,825 (average)

Coal Type: Bituminous

Depth to Seam (ft): NA

Seam Thickness (ft): 8 to 20 feet

PRODUCTION, VENTILATION AND DRAINAGE DATA

	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>
Coal Production (million short tons/year):	0.5	1.3	0	0	0
Estimated Total Methane Liberated (million cf/day):	1.63	NA	1.12	0.56	2.0
Emission from Ventilation Systems:	1.63	NA	1.12	0.56	2.0
Estimated Methane Drained:	0	0	0	0	0
Estimated Specific Emissions (cf/ton):					

Estimated Drainage Efficiency at Mine Closure: NA

Willow Creek (continued)

ENERGY AND ENVIRONMENTAL VALUE OF EMISSIONS REDUCTIONS

	Assumed Potential Recovery Efficiency		
(Based on 2003 data)	<u>20%</u>	<u>40%</u>	<u>60%</u>
CO₂ Equivalent of CH₄ Emissions Reductions (mm tons)	0.0	0.1	0.2

Power Generation Potential

Utility Electric Supplier:

Parent Corporation of Utility:

	<u>MW</u>	<u>GWh/year</u>
Potential Generating Capacity (2003 data)		
Assuming 20% Recovery Efficiency:	1.5	13.0
Assuming 40% Recovery Efficiency:	3.0	26.0
Assuming 60% Recovery Efficiency:	4.6	40.0

Pipeline Sales Potential

Potential Annual Gas Sales (2003 data)	<u>Bcf</u>
Assuming 20% Recovery (Bcf):	0.15
Assuming 40% Recovery (Bcf):	0.30
Assuming 60% Recovery (Bcf):	0.44

Description of Surrounding Terrain: Tablelands; Open High/Low Mountains

Transmission Pipeline in County? Yes

Owner of Nearest Pipeline: Questar Pipeline Company

Distance to Pipeline (miles): NA

Pipeline Diameter (in): 20.0

Owner of Next Nearest Pipeline: NA

Distance to Next Nearest Pipeline (miles): NA

Pipeline Diameter (in): NA

Other Utilization Possibilities

Name of Nearby Coal Fired Power Plant: Utah Power Carbon Plant

Distance to Plant (miles): 1

Comments:

Updated: 7/10/2008

Status: Abandoned

Kenilworth

GEOGRAPHIC DATA

Basin: Uinta

State: UT

Coalbed: Kenilworth Seam

County: Carbon

CORPORATE INFORMATION

Operator When Active: North American Coal Company

Current/Most Recent Controller: United States Bureau of Land Management, Price, UT

Previous Owner (s): Price River Coal Company, Independent Coal & Coke Company

Previous or Alternate Name of Mine:

ADDRESS

Contact Name: Sue Burger

Phone Number: (435) 636-3651

Address: BLM 125 S 600 W

City: Price

State: UT

ZIP: 84501

Address When Active:

City: Kenilworth

State: UT

ZIP: 84529

GENERAL INFORMATION

Number of Employees at Mine at Last Operation: NA

Mining Method: Longwall

Year of Initial Production: Pre-1972

Primary Coal Use: Steam

Date of Abandonment: October 1960

BTUs/lb of Coal Produced: NA

Coal Type: Bituminous

Depth to Seam (ft):

Seam Thickness (ft):

Pipeline Sales Potential

Description of Surrounding Terrain: Tablelands; Open High/Low Mountains

Transmission Pipeline in County? Yes

Owner of Nearest Pipeline: Questar Pipeline Company

Distance to Pipeline (miles): NA

Pipeline Diameter (in): 20.0

Owner of Next Nearest Pipeline: NA

Kenilworth (continued)

Distance to Next Nearest Pipeline (miles): NA

Pipeline Diameter (in): NA

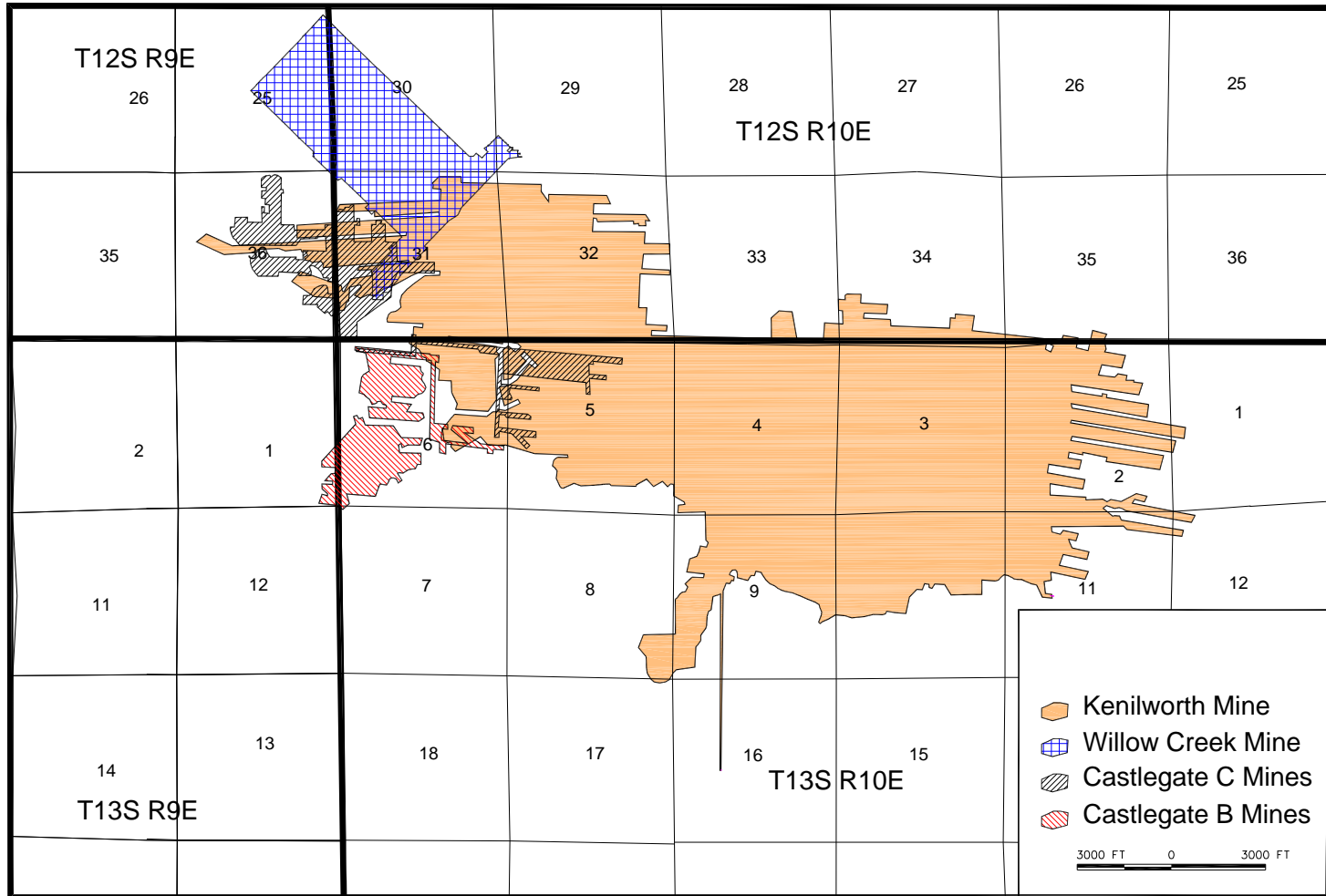
Other Utilization Possibilities

Name of Nearby Coal Fired Power Plant: Utah Power Carbon Plant

Distance to Plant (miles): 2

Comments:

Figure 3-3: Kenilworth and Willow Creek Mines



Illinois Basin Mines

Jefferson County Group

Updated: 7/10/2008

Status: Abandoned

Orient 3

GEOGRAPHIC DATA

Basin: Illinois

State: IL

Coalbed: Herrin #6

County: Jefferson

CORPORATE INFORMATION

Operator When Active: Freeman United Coal Mining Co.

Current/Most Recent Controller: Crown Family

Previous Owner (s): Egyptian Energies

Previous or Alternate Name of Mine:

ADDRESS

Contact Name: Bill Kolf

Phone Number: (312) 899-4964

Address: NA

City: Waltonville

State: IL

ZIP: NA

Address When Active: Freeman United Coal Mining Co., 4400 Ash Grove Drive, Suite A

City: Springfield

State: IL

ZIP: 62708

GENERAL INFORMATION

Number of Employees at Mine at Last Operation: NA

Mining Method: Longwall

Year of Initial Production: NA

Primary Coal Use: Steam

Date of Abandonment: 2/1/1984

BTUs/lb of Coal Produced: NA

Coal Type: Bituminous

Depth to Seam (ft): 685

Seam Thickness (ft): 9.5

Pipeline Sales Potential

Description of Surrounding Terrain: Flat

Transmission Pipeline in County? NA

Owner of Nearest Pipeline: NA

Distance to Pipeline (miles): NA

Pipeline Diameter (in): NA

Orient 3 (continued)

Owner of Next Nearest Pipeline: NA

Distance to Next Nearest Pipeline (miles): NA

Pipeline Diameter (in): NA

Other Utilization Possibilities

Name of Nearby Coal Fired Power Plant: NA

Distance to Plant (miles): NA

Comments:

Jefferson County Group

Updated: 7/10/2008

Status: Abandoned

Orient 6

GEOGRAPHIC DATA

Basin: Illinois

State: IL

Coalbed: Herrin No. 6

County: Jefferson

CORPORATE INFORMATION

Operator When Active: Freeman United Coal Mining Co.

Current/Most Recent Controller: Crown Family

Previous Owner (s): Egyptian Energies

Previous or Alternate Name of Mine:

ADDRESS

Contact Name: Bill Kolf

Phone Number: (312) 899-4964

Address:

City: Waltonville

State: IL

ZIP:

Address When Active: Freeman United Coal Mining Co., 4400 Ash Grove Drive, Suite A

City: Springfield

State: IL

ZIP: 62708

GENERAL INFORMATION

Number of Employees at Mine at Last Operation:

Mining Method: Longwall

Year of Initial Production:

Primary Coal Use: Steam

Date of Abandonment: 3/13/1997

BTUs/lb of Coal Produced:

Coal Type: Bituminous

Depth to Seam (ft): 700

Seam Thickness (ft): 7

PRODUCTION, VENTILATION AND DRAINAGE DATA

	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
Coal Production (million short tons/year):	1.3	1.4	1.4	1.1	0.25
Estimated Total Methane Liberated (million cf/day):	0.8	0.7	0.8	0.7	-
Emission from Ventilation Systems:	0.8	0.7	0.8	0.7	-
Estimated Methane Drained:	0	0	0	0	0
Estimated Specific Emissions (cf/ton):	224	183	209	232	-

Estimated Drainage Efficiency at Mine Closure: NA

Orient 6 (continued)

ENERGY AND ENVIRONMENTAL VALUE OF EMISSIONS REDUCTIONS

(Based on 1996 Data)	Assumed Potential Recovery Efficiency		
	<u>20%</u>	<u>40%</u>	<u>60%</u>
CO₂ Equivalent of CH₄ Emissions Reductions (mm tons)	0.0	0.0	0.0

Power Generation Potential

Utility Electric Supplier:

Parent Corporation of Utility:

	<u>MW</u>	<u>GWh/year</u>
Potential Generating Capacity (1996 data)		
Assuming 20% Recovery Efficiency:	0.5	4.5
Assuming 40% Recovery Efficiency:	1.0	9.1
Assuming 60% Recovery Efficiency:	1.6	13.8

Pipeline Sales Potential

Potential Annual Gas Sales (1996 data)	<u>Bcf</u>
Assuming 20% Recovery (Bcf):	0.05
Assuming 40% Recovery (Bcf):	0.1
Assuming 60% Recovery (Bcf):	0.16

Description of Surrounding Terrain: Flat

Transmission Pipeline in County? NA

Owner of Nearest Pipeline: NA

Distance to Pipeline (miles): NA

Pipeline Diameter (in): NA

Owner of Next Nearest Pipeline: NA

Distance to Next Nearest Pipeline (miles): NA

Pipeline Diameter (in): NA

Other Utilization Possibilities

Name of Nearby Coal Fired Power Plant: NA

Distance to Plant (miles): NA

Comments:

Jefferson County Group

Updated: 7/10/2008

Status: Abandoned

Nasson 20

GEOGRAPHIC DATA

Basin: Illinois

State: IL

Coalbed: Herrin #6

County: Jefferson

CORPORATE INFORMATION

Operator When Active: Bell & Zoller

Current/Most Recent Controller: NA

Previous Owner (s): NA

Previous or Alternate Name of Mine: NA

ADDRESS

Contact Name: NA

Phone Number: NA

Address: NA

City: Waltonville

State: IL

ZIP: NA

Address When Active: NA

City: NA

State: IL

ZIP: NA

GENERAL INFORMATION

Number of Employees at Mine at Last Operation:

Mining Method: Longwall

Year of Initial Production:

Primary Coal Use: Steam

Date of Abandonment:

BTUs/lb of Coal Produced:

Coal Type: Bituminous

Depth to Seam (ft): 700

Seam Thickness (ft): 7

Pipeline Sales Potential

Description of Surrounding Terrain: Flat

Transmission Pipeline in County? NA

Owner of Nearest Pipeline: NA

Distance to Pipeline (miles): NA

Pipeline Diameter (in): NA

Owner of Next Nearest Pipeline: NA

Distance to Next Nearest Pipeline (miles): NA

Nasson 20 (continued)

Pipeline Diameter (in): NA

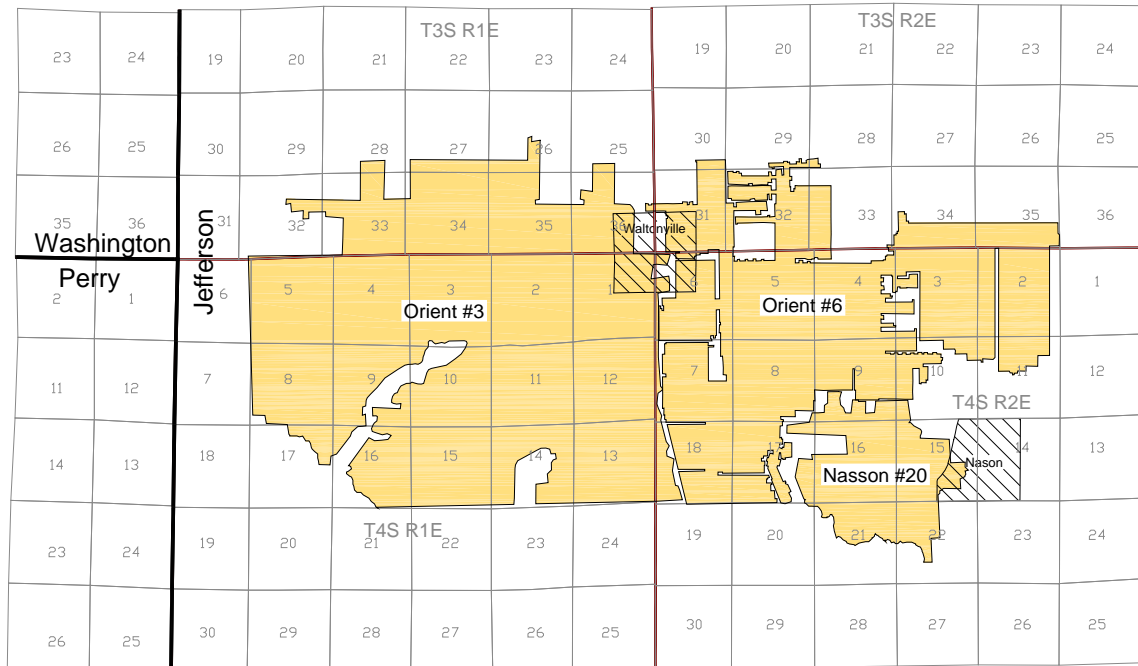
Other Utilization Possibilities

Name of Nearby Coal Fired Power Plant: NA

Distance to Plant (miles): NA

Comments:

Figure 3-4: Jefferson County Group



Macoupin County Group

Updated: 7/10/2008

Status: Abandoned

Little Dog

GEOGRAPHIC DATA

Basin: Illinois

State: IL

Coalbed: Herrin #6

County: Macoupin

CORPORATE INFORMATION

Operator When Active: Florida Coal Company

Current/Most Recent Controller: Norfolk Western

Previous Owner (s): NA

Previous or Alternate Name of Mine: NA

ADDRESS

Contact Name: NA

Phone Number: NA

Address: NA

City: NA

State: NA

ZIP: NA

Address When Active: NA

City: NA

State: IL

ZIP: NA

GENERAL INFORMATION

Number of Employees at Mine at Last Operation:

Mining Method: Room & Pillar

Year of Initial Production: 1941

Primary Coal Use: NA

Date of Abandonment: 1968

BTUs/lb of Coal Produced: NA

Coal Type: Bituminous

Depth to Seam (ft): 325'

Seam Thickness (ft): 6.5

Pipeline Sales Potential

Description of Surrounding Terrain: Flat

Transmission Pipeline in County? NA

Owner of Nearest Pipeline: NA

Distance to Pipeline (miles): NA

Pipeline Diameter (in): NA

Little Dog (continued)

Owner of Next Nearest Pipeline: NA

Distance to Next Nearest Pipeline (miles): NA

Pipeline Diameter (in): NA

Other Utilization Possibilities

Name of Nearby Coal Fired Power Plant: NA

Distance to Plant (miles): NA

Comments:

Macoupin County Group

Updated: 7/10/2008

Status: Abandoned

Superior 1

GEOGRAPHIC DATA

Basin: Illinois

State: IL

Coalbed: Herrin #6

County: Macoupin

CORPORATE INFORMATION

Operator When Active: Superior Coal Company

Current/Most Recent Controller: Ayshire Land Co.

Previous Owner (s): NA

Previous or Alternate Name of Mine: NA

ADDRESS

Contact Name: NA

Phone Number: NA

Address: NA

City: NA

State: NA

ZIP: NA

Address When Active: NA

City: NA

State: IL

ZIP: NA

GENERAL INFORMATION

Number of Employees at Mine at Last Operation: NA

Mining Method: Room & Pillar

Year of Initial Production: 1904

Primary Coal Use: NA

Date of Abandonment: 1952

BTUs/lb of Coal Produced: NA

Coal Type: Bituminous

Depth to Seam (ft): 325

Seam Thickness (ft): 7

Pipeline Sales Potential

Description of Surrounding Terrain: Flat

Transmission Pipeline in County? NA

Owner of Nearest Pipeline: NA

Distance to Pipeline (miles): NA

Pipeline Diameter (in): NA

Superior 1 (continued)

Owner of Next Nearest Pipeline: NA

Distance to Next Nearest Pipeline (miles): NA

Pipeline Diameter (in): NA

Other Utilization Possibilities

Name of Nearby Coal Fired Power Plant: NA

Distance to Plant (miles): NA

Comments:

Macoupin County Group

Updated: 7/10/2008

Status: Abandoned

Superior 2

GEOGRAPHIC DATA

Basin: Illinois

State: IL

Coalbed: Herrin #6

County: Macoupin

CORPORATE INFORMATION

Operator When Active: Superior Coal Company

Current/Most Recent Controller: Ayshire Land Co.

Previous Owner (s): NA

Previous or Alternate Name of Mine: NA

ADDRESS

Contact Name: NA

Phone Number:

Address: NA

City: NA

State: NA

ZIP: NA

Address When Active: NA

City: NA

State: IL

ZIP: NA

GENERAL INFORMATION

Number of Employees at Mine at Last Operation:

Mining Method: Room & Pillar

Year of Initial Production: 1904

Primary Coal Use:

Date of Abandonment: 1954

BTUs/lb of Coal Produced: NA

Coal Type: Bituminous

Depth to Seam (ft): 300'

Seam Thickness (ft): 7

Pipeline Sales Potential

Description of Surrounding Terrain: Flat

Transmission Pipeline in County? NA

Owner of Nearest Pipeline: NA

Distance to Pipeline (miles): NA

Pipeline Diameter (in): NA

Superior 2 (continued)

Owner of Next Nearest Pipeline: NA

Distance to Next Nearest Pipeline (miles): NA

Pipeline Diameter (in): NA

Other Utilization Possibilities

Name of Nearby Coal Fired Power Plant: NA

Distance to Plant (miles): NA

Comments:

Macoupin County Group

Updated: 7/10/2008

Status: Abandoned

Superior 3

GEOGRAPHIC DATA

Basin: Illinois

State: IL

Coalbed: Herrin #6

County: Macoupin

CORPORATE INFORMATION

Operator When Active: Superior Coal Co.

Current/Most Recent Controller: Ayshire Land Co.

Previous Owner (s): NA

Previous or Alternate Name of Mine: NA

ADDRESS

Contact Name: NA

Phone Number: NA

Address: NA

City: NA

State: NA

ZIP: NA

Address When Active: NA

City: NA

State: IL

ZIP: NA

GENERAL INFORMATION

Number of Employees at Mine at Last Operation:

Mining Method: Room & Pillar

Year of Initial Production: 1906

Primary Coal Use: NA

Date of Abandonment: 1968

BTUs/lb of Coal Produced: NA

Coal Type: Bituminous

Depth to Seam (ft): 325'

Seam Thickness (ft): 7

Pipeline Sales Potential

Description of Surrounding Terrain: Flat

Transmission Pipeline in County? NA

Owner of Nearest Pipeline: NA

Distance to Pipeline (miles): NA

Pipeline Diameter (in): NA

Owner of Next Nearest Pipeline: NA

Superior 3 (continued)

Distance to Next Nearest Pipeline (miles): NA

Pipeline Diameter (in): NA

Other Utilization Possibilities

Name of Nearby Coal Fired Power Plant: NA

Distance to Plant (miles): NA

Comments:

Macoupin County Group

Updated: 7/10/2008

Status: Abandoned

Superior 4

GEOGRAPHIC DATA

Basin: Illinois

State: IL

Coalbed: Herrin #6

County: Macoupin

CORPORATE INFORMATION

Operator When Active: Superior Coal Company

Current/Most Recent Controller: Ayshire Land Co.

Previous Owner (s): NA

Previous or Alternate Name of Mine: NA

ADDRESS

Contact Name: NA

Phone Number: NA

Address: NA

City: NA

State: NA

ZIP: NA

Address When Active: NA

City: NA

State: IL

ZIP: NA

GENERAL INFORMATION

Number of Employees at Mine at Last Operation: NA

Mining Method: Room & Pillar

Year of Initial Production: 1918

Primary Coal Use: NA

Date of Abandonment: 1954

BTUs/lb of Coal Produced: NA

Coal Type: Bituminous

Depth to Seam (ft): 300'

Seam Thickness (ft): 7

Pipeline Sales Potential

Description of Surrounding Terrain: Flat

Transmission Pipeline in County? NA

Owner of Nearest Pipeline: NA

Distance to Pipeline (miles): NA

Pipeline Diameter (in): NA

Superior 4 (continued)

Owner of Next Nearest Pipeline: NA

Distance to Next Nearest Pipeline (miles): NA

Pipeline Diameter (in): NA

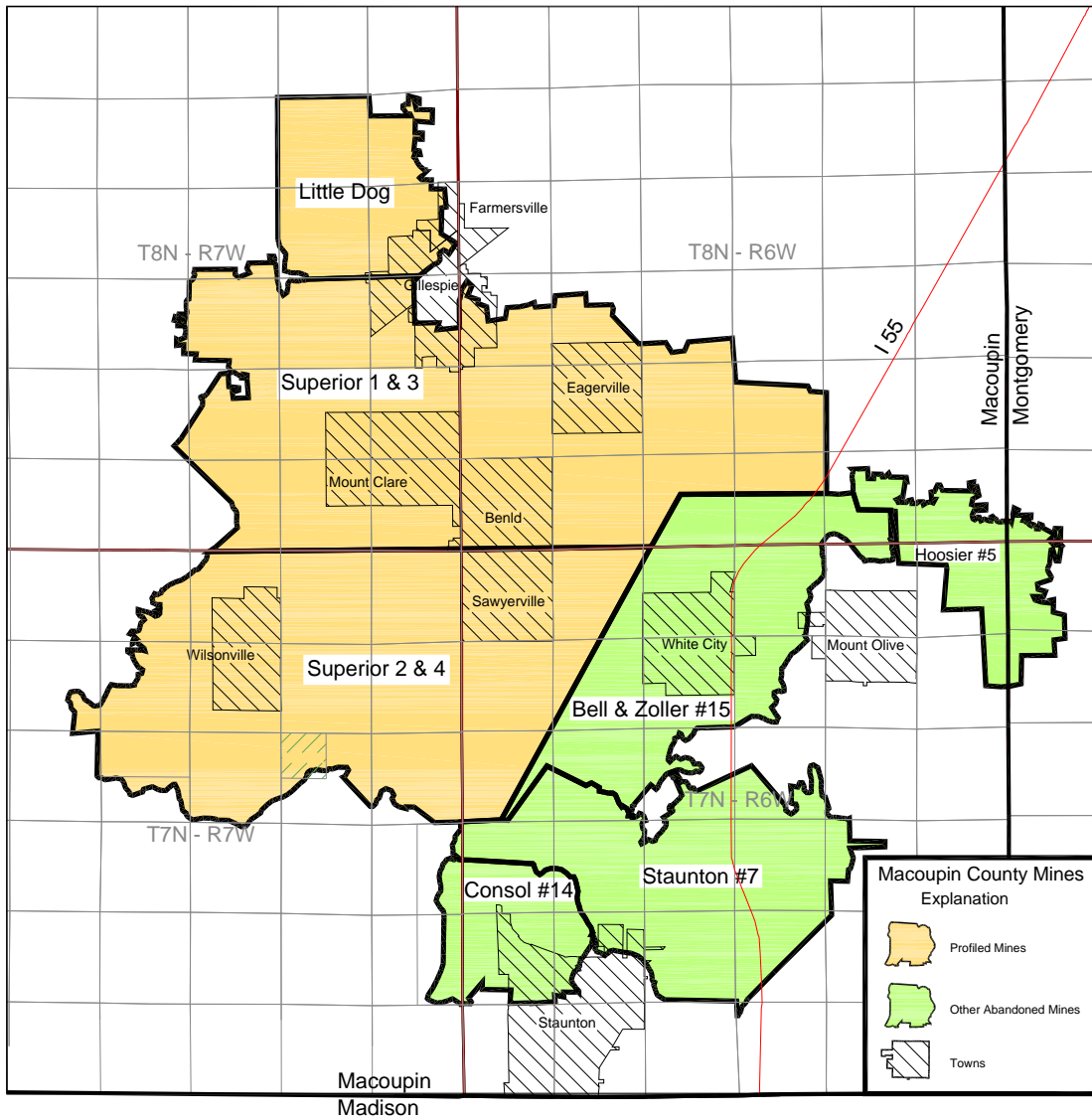
Other Utilization Possibilities

Name of Nearby Coal Fired Power Plant: NA

Distance to Plant (miles): NA

Comments:

Figure 3-5: Macoupin County Group



Updated: 7/10/2008

Status: Abandoned

Baker

GEOGRAPHIC DATA

Basin: Illinois

State: KY

Coalbed: W. Kentucky No. 13

County: Webster

CORPORATE INFORMATION

Operator When Active: Ohio County Coal Company

Current/Most Recent Controller: Peabody Energy

Previous Owner (s): Lodestar Energy, Inc.; The Renco Group

Previous or Alternate Name of Mine: Pyro/Baker

ADDRESS

Contact Name: Peabody Energy

Phone Number: (314) 342-3400

Address: 701 Market Street

City: St. Louis

State: MO

ZIP: 63101

Address When Active: 735 St. Route 857

City: Clay

State: KY

ZIP: 42404

GENERAL INFORMATION

Number of Employees at Mine at Last Operation: 390

Mining Method: Longwall/Continuous

Year of Initial Production: NA

Primary Coal Use: Steam

Date of Abandonment: 4/4/2005

BTUs/lb of Coal Produced: 9,400 (average)

Coal Type: Bituminous

Depth to Seam (ft): 800 – 1,000

Seam Thickness (ft): 6.0

PRODUCTION, VENTILATION AND DRAINAGE DATA

	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>
Coal Production (million short tons/year):	4.48	4.28	3.36	2.87	0.61
Estimated Total Methane Liberated (million cf/day):	2.20	2.19	3.37	2.27	1.51
Emission from Ventilation Systems:	1.98	2.19	3.37	2.27	1.51
Estimated Methane Drained:	0.22	0	0	0	0
Estimated Specific Emissions (cf/ton):	179	187	366	289	898

Estimated Drainage Efficiency at Mine Closure: NA

Baker (continued)

ENERGY AND ENVIRONMENTAL VALUE OF EMISSIONS REDUCTIONS

(Based on 2003 data)	Assumed Potential Recovery Efficiency		
	<u>20%</u>	<u>40%</u>	<u>60%</u>
CO₂ Equivalent of CH₄ Emissions Reductions (mm tons)	0.0	0.1	0.1

Power Generation Potential

Utility Electric Supplier: Kentucky Utilities Co.

Parent Corporation of Utility: KU Energy

	<u>MW</u>	<u>GWh/year</u>
Potential Generating Capacity (2003 data)		
Assuming 20% Recovery Efficiency:	1.1	10.0
Assuming 40% Recovery Efficiency:	2.3	20.0
Assuming 60% Recovery Efficiency:	3.4	30.1

Pipeline Sales Potential

Potential Annual Gas Sales (2003 data)	<u>Bcf</u>
Assuming 20% Recovery (Bcf):	0.1
Assuming 40% Recovery (Bcf):	0.2
Assuming 60% Recovery (Bcf):	0.3

Description of Surrounding Terrain: Open hills

Transmission Pipeline in County? No

Owner of Nearest Pipeline: Texas Gas Transmission

Distance to Pipeline (miles): 8.3

Pipeline Diameter (in): 26.0

Owner of Next Nearest Pipeline: NA

Distance to Next Nearest Pipeline (miles): NA

Pipeline Diameter (in): NA

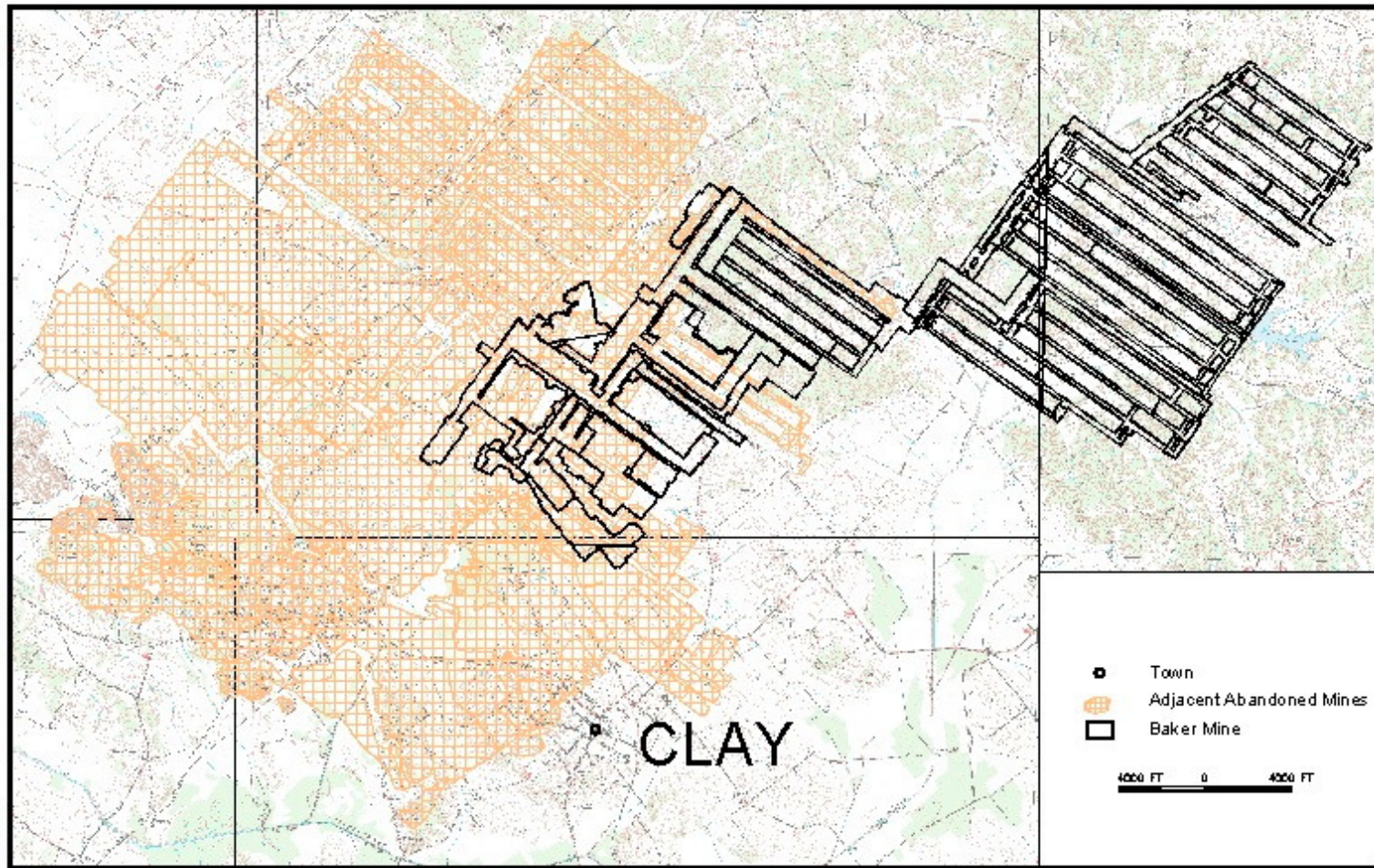
Other Utilization Possibilities

Name of Nearby Coal Fired Power Plant: None

Distance to Plant (miles): NA

Comments:

Figure 3-6: Baker Mine



References

IPCC (Intergovernmental Panel on Climate Change) 1997. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Japan. 1997

Keystone. 1997-2001. *Keystone Coal Industry Manual. Years 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, and 2005*. Chicago, Illinois: Maclean Hunter Publishing Co.

MSHA (Mine Safety and Health Administration). Online. <http://www.msha.gov>

USEPA (U.S. Environmental Protection Agency). 2004. Methane Emissions from Abandoned Mines in the United States: Emission Inventory Methodology and 1990-2002 Estimates.

USEPA (U.S. Environmental Protection Agency). 2006. Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2004, Office of Atmospheric Programs, USEPA # 430-R-06-002. April 2006.

References and Calculations Used in the Mine Profiles

Data Item	Sources	Calculations
Geographic Data (State, County, Basin, Coalbed)	Keystone Manual	
Corporate Information:		
Current Owner	Past versions of Keystone Coal Manual and recent coal industry publications	
Previous Owner	Past versions of Keystone Coal Manual	
Parent Company	Past versions of Keystone Coal Manual	
Phone/Address/Contact Information	Past versions of Keystone Coal Manual	
General Information:		
Number of Employees	Past versions of Keystone Coal Manual	
Year of Initial Production	MSHA; Past versions of Keystone Coal Manual and articles in coal industry publications	
Mining Method	Past versions of Keystone Coal Manual	
Primary Use	Past versions of Keystone Coal Manual	
Production, Ventilation, and Drainage Data		
Coal Production	MSHA	
Emissions from Ventilation Systems	MSHA	
Estimated Methane Drained	The number of mines assumed to have drainage systems is based on calls to individual MSHA districts.	
Estimated Total Methane Liberated		Sum of "emissions from ventilation systems" and "estimated methane drained."
Energy and Environmental Value		
CO ₂ Equivalent of Methane Emissions	Global Warming Potential of Methane Compared to	

Data Item	Sources	Calculations
Reductions (mm tons)	CO ₂ based on IPCC (1997). GWP is 21 over 100 years.	
Power Generation Potential Electricity Supplier	Directory of Electric Utilities	
Potential Electric Generating Capacity Pipeline Potential		Capacity = Estimated CH ₄ liberated in cf/day x recovery efficiency x 1 day/24 hours x 1000 BTUs/cf x kwh/11000 BTUs
Potential Annual Gas Sales		Estimated methane liberated (mmcf/d) x 365 days/yr x recovery efficiency