NETL Life Cycle Inventory Data
Process Documentation File

Process Name: Coal Mine Methane Emissions

Reference Flow: 1 kg of Extracted coal

Brief Description: Coal mine methane (CMM) emissions associated with coal mine operations

Section I: Meta Data

Geographical Coverage: USA **Region:** Various

Year Data Best Represents: 2009

Process Type: Basic Process (BP)

Process Scope: Gate-to-Gate Process (GG)

Allocation Applied: No

Completeness: Individual Relevant Flows Captured

Flows Aggregated in Data Set:

☑ Process ☐ Energy Use ☐ Energy P&D ☐ Material P&D

Relevant Output Flows Included in Data Set:

Releases to Air:	☑ Greenhouse Gases	☐ Criteria Air	☐ Other
Releases to Water:	☐ Inorganic	☐ Organic Emissions	☐ Other
Water Usage:	☐ Water Consumption	☐ Water Demand (throughput)	
Releases to Soil:	☐ Inorganic Releases	☐ Organic Releases	☐ Other

Adjustable Process Parameters:

cmm	*[kg/kg] Adjustable parameter - mass of coal mine methane per kg of produced coal available for venting, flaring, or capture (0.0205 equiv to 967 cf/ton*
capture	*[binary] Adustable parameter - 0 no capture; 1 capture*

capture_frac	*[dimensionless] Adjustable parameter - percent of coal mine methane captured (or drained)*

Tracked Input Flows:

None

Tracked Output Flows:

Methane [Intermediate product]	*Captured methane - assumed to meet pipeline specifications*

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_Stage1_O_Coal_Mine_Methane_2013.01.xlsx*, which provides additional details regarding relevant calculations, data quality, and references.

Goal and Scope

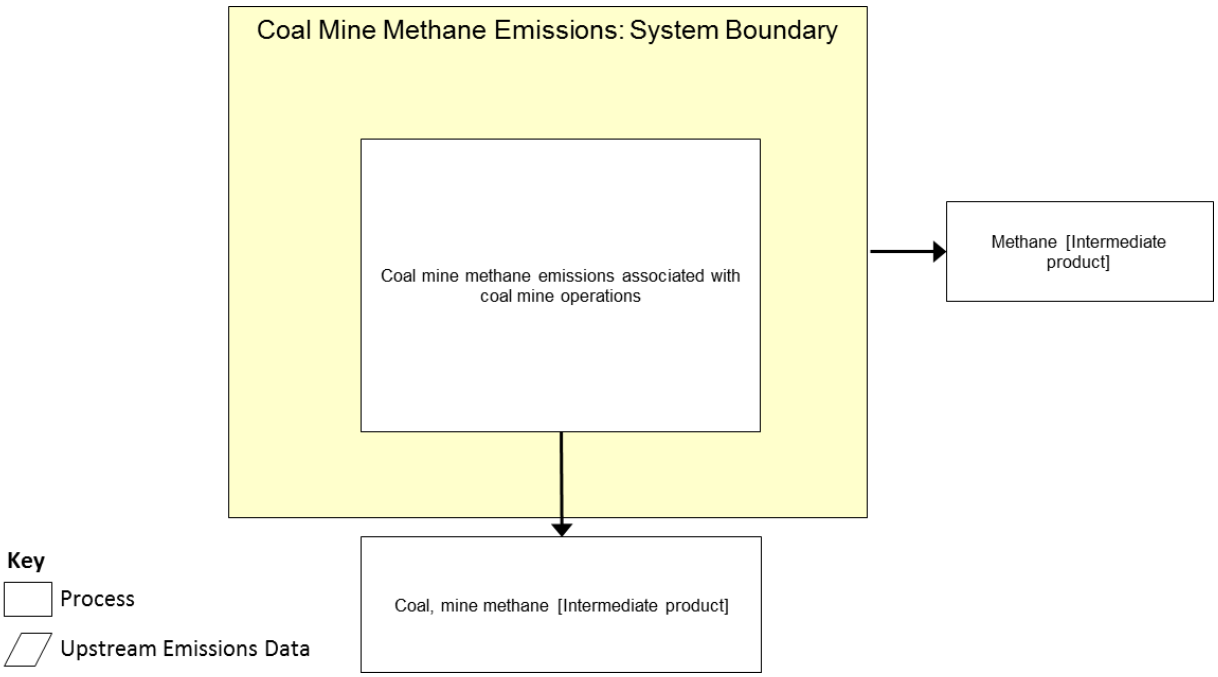
This unit process provides a summary of relevant input and output flows associated with coal mine methane emissions. An option is provided to capture a percentage of the total methane produced, but there are no burdens associated with capturing the methane. All vented methane is assumed to be in too low a concentration to be directly flared. The reference flow of this unit process is: 1 kg of extracted coal.

Boundary and Description

This unit process provides the average methane emissions and captured methane streams associated with coal mining operations. This unit process is used in combination with other unit processes (UPs) to provide a complete emissions profile for coal extraction. The captured methane flow can be connected to a venting and flaring UP, a compressor for injection to a natural gas pipeline, a boiler, or similar UPs.

Figure 1 provides an overview of the boundary of this unit process.

Figure 1: Unit Process Scope and Boundary



The coal mine methane available for either emission or capture for underground coal mining was determined by adding annual vented air methane (VAM) emissions and captured/drained methane for a collection of U.S. mines (EPA, 2010). A weighted average of the available methane per kg of coal provides the expected available methane (EIA, 2009). The expected available methane for surface mine is from a single source and is included as the minimum value (EPA, 2004).

The expected percentage of captured methane was determined from the expected national VAM emissions and the total methane available. The expected capture percentage provides an emission result consistent with underground mines across the U.S. The UP can easily be configured to reflect conditions at a particular well with higher capture rates. Included in this UP, but not linked to the Data Summary, are regionalized values for CMM emissions and capture fractions.

Table 1 shows the input and output flows of this unit process. Additional details regarding input and output flows, including calculation methods, are contained in the associated DS sheet.

Table 1: Unit Process Input and Output Flows

Flow Name	Value	Units (Per Reference Flow)
Inputs		
None	N/A	N/A
Outputs		
Coal, mine methane [Intermediate product]	**1.00**	**kg**
Methane [Organic emissions to air (group VOC)]	1.47E-02	kg
Methane [Intermediate product]	5.78E-03	kg

* **Bold face** clarifies that the value shown *does not* include upstream environmental flows.

Embedded Unit Processes

None.

References

EPA, 2010 — U.S. Environmental Protection Agency. 2010. *Coal Mine Methane Recovery at Active U.S. Coal Mines: Current Projects and Potential Opportunities*. U.S. Environmental Protection Agency. Washington, D.C. http://www.epa.gov/cmop/resources/coal_mine_data_sheet.pdf (Accessed July 16, 2013)

EIA, 2009 — U.S. Energy Information Administration and U.S. Mine Safety and Health Administration. (n.d.). *Historic Coal Production Data: 2009*. U.S. Energy Information Administration. Washington, D.C. http://www.eia.gov/coal/data.cfm#production (Accessed July 16, 2013)

EPA, 2004 — U.S. Environmental Protection Agency. 2010. *Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs, Attachment 5: The Powder River Basin*. U.S. Environmental Protection Agency. EPA 816-R-04-003. http://www.epa.gov/ogwdw000/uic/pdfs/cbmstudy_attach_uic_attach05_powder.pdf (Accessed December 20, 2009).

Section III: Document Control Information

Date Created: July 31, 2013

Point of Contact: Timothy Skone (NETL), Timothy.Skone@NETL.DOE.GOV

Revision History:

8/3/15

How to Cite This Document: This document should be cited as:

NETL (2013). NETL Life Cycle Inventory Data – Unit Process: Coal Mine Methane Emissions - Version 02. U.S. Department of Energy, National Energy Technology Laboratory. Retrieved [DATE] from www.netl.doe.gov/LCA

Section IV: Disclaimer

Neither the U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL) nor any person acting on behalf of these organizations:

A. Makes any warranty or representation, express or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this document, or that the use of any information, apparatus, method, or process disclosed in this document may not infringe on privately owned rights; or

B. Assumes any liability with this report as to its use, or damages resulting from the use of any information, apparatus, method, or process disclosed in this document.

Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by NETL. The views and opinions of the authors expressed herein do not necessarily state or reflect those of NETL.