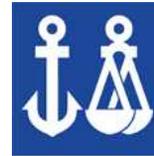


Det Norske Veritas (U.S.A.), Inc.

*via email*

July 9, 2010

Mr. Michael Huisenga  
Senior Consultant  
WSP Environment & Energy  
507 Canyon Boulevard, Suite 203,  
Boulder, CO 80302, USA



One Bush St.  
12th Floor  
San Francisco, CA 94104  
USA

**Subject:** Revised Assessment Report “Revisions to ACM0008 to Include Methane Capture and Destruction from Abandoned Coal Mines”

Dear Mr. Huisenga,

Attached is DNV’s revised assessment report after review of the Second Validator’s report. The report was revised to incorporate the findings by the Second Validator for the same methodology element. DNV has no negative opinion with the conclusions by the Second Validator.

We appreciate the opportunity to work with you on this interesting project and look forward to working with you in the future.

Please kindly let me or Weidong Yang know if you have any questions about the revised report. I can be contacted at 415-318-3913 or via email at [Barbara.tooleoneil@dnv.com](mailto:Barbara.tooleoneil@dnv.com) and Weidong can be contacted at 281-396-4015 or via email at [Weidong.yang@dnv.com](mailto:Weidong.yang@dnv.com)

Best regards,  
for Det Norske Veritas (U.S.A.), Inc.

A handwritten signature in black ink that reads "Barbara Toole O'Neil".

Barbara Toole O’Neil  
Principal Consultant, Verification, Validation and Monitoring Services

c: John Warmerdam  
Weidong Yang





# ASSESSMENT REPORT

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## Revisions to ACM0008 to Include Methane Capture and Destruction from Abandoned Coal Mines

Report No.: 2009-9224

REVISION No. 02

DET NORSKE VERITAS



## ASSESSMENT REPORT

Date of first issue: 2009-08-28	Project No.: 70003607
Approved by: Barbara Toole O'Neil	Organizational unit: Climate Change Services North America
Client: Vessels Econergy Cambria 33 Resources LLC	Customer: Mr. Thomas J. Vessels

**Methodology Element Name:** Revisions to ACM0008 to Include Methane Capture and Destruction from Abandoned Coal Mines

**Version:** 7

**Assessment Phases:**

- Desk Review
- Follow up interviews
- Resolution of outstanding issues

**Assessment Status**

- Corrective Actions Requested
- Clarifications Requested
- Full Approval by DNV
- Rejected

In summary, it is DNV's opinion that the methodology "*Revisions to ACM0008 to Include Methane Capture and Destruction from Abandoned Coal Mines*" as described in Methodology element documentation (MED) version 7, meets all relevant Voluntary Carbon Standard (VCS) requirements for a VCS methodology. In addition, DNV reviewed the second validator's validation report with no negative opinion; DNV thus approves this methodology revision, and requests VCS Association (VCSA) to provide final approval of the methodology revision.

Report No.: 2009-9224	Date of this revision: 2010-6-25	Rev. No. 02
Report title: Revisions to ACM0008 to Include Methane Capture and Destruction from Abandoned Coal		
Methodology Revision Reviewer: Weidong Yang		
Technical Review/ Expert Input: John Warmerdam Barbara Toole O'Neil		

Key words:

VCS  
Methodology Revision  
Validation

- No distribution without permission from the Client or responsible organisational unit
- Limited distribution
- Unrestricted distribution



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## ASSESSMENT REPORT

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### Abbreviations

AMM	Abandoned mine methane
CAR	Corrective action request
CBM	Coal bed methane
CDM	Clean Development Mechanism
CDM-EB	Clean Development Mechanism Executive Board
CL	Clarification request
CMM	Coal mine methane
DNV	Det Norske Veritas
EB	Executive Board
GWP	Global warming potential
MED	Methodology element documentation
VAM	Ventilation air methane
VCS	Voluntary Carbon Standard
VCSA	VCS Association



## ASSESSMENT REPORT

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Appendix A: Assessment Protocol



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## ASSESSMENT REPORT

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### 1 ASSESSMENT STATEMENT

Det Norske Veritas Certification AS (DNV) has performed a validation of methodology “*Revisions to ACM0008 to Include Methane Capture and Destruction from Abandoned Coal Mines*”. The validation was performed using the VCS criteria for methodology development.

The review of the methodology element documentation (MED) and the subsequent follow-up interviews have provided DNV with sufficient evidence to determine the fulfilment of the stated criteria. In addition, DNV reviewed the second validator’s validation report with no negative opinion.

The methodology revision was prepared based on the requirement of VCS 2007.1 and VCS Program Normative Document: Double Approval Process Version 1.

The methodology element is a revision to Clean Development Mechanism-Executive Board (CDM-EB) approved methodology ACM0008 “Consolidated methodology for coal bed methane, coal mine methane and ventilation air methane capture and use for power (electrical or motive) and heat and/or destruction through flaring or flameless oxidation” (version 6). The purpose of the revision is to include methane capture and destruction from abandoned coal mines to the applicability of ACM0008.

In summary, it is DNV’s opinion that the methodology “*Revisions to ACM0008 to Include Methane Capture and Destruction from Abandoned Coal Mines*” as described in the MED from February 22, 2010, meets all relevant VCS requirements for VCS methodology. DNV thus approves this methodology element, and requests VCSA to provide final approval of the methodology element.



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## ASSESSMENT REPORT

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### 2 INTRODUCTION

Vessels Econergy Cambria 33 Resources LLC (Vessels LLC) has commissioned Det Norske Veritas Certification AS (DNV) as the first validator to perform an assessment of the methodology element “*Revisions to ACM0008 to Include Methane Capture and Destruction from Abandoned Coal Mines*”. This report summarizes the findings of the assessment of the methodology revision, performed on the basis of VCS criteria found in VCS 2007.1 and the subsequent VCS Program Normative Documents.

### 3 METHODOLOGY

The assessment consisted of the following three phases:

- 1 a desk review of the methodology revision documentation
- 2 follow-up interviews
- 3 the resolution of outstanding issues and the issuance of the final assessment report and opinion.

The following sections outline each step in more detail.

#### 3.1 Desk Review

The following documents were reviewed during the assessment:

- 1 WSP Environment & Energy, Methodology element documentation “*Revisions to ACM0008 to Include Methane Capture and Destruction from Abandoned Coal Mines*”, Version 083109, August 2009. Version 7, 22 February 2010.
- 2 CDM-EB, ACM0008 “*Consolidated methodology for coal bed methane, coal mine methane and ventilation air methane capture and use for power (electrical or motive) and heat and/or destruction through flaring or flameless oxidation*” (version 6). April, 2009.
- 3 VCSA, Voluntary Carbon Standard 2007.1, November, 2008.
- 4 VCSA, VCS Program Normative Document: Double Approval Process, v1.0., June , 2009



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- 5 Cote, Michael, et al., Methane Emissions from Abandoned Coal Mines in the United States: Emission Inventory Methodology and 1990 - 2002 Emissions Estimates. s.l. : U.S. Environmental Protection Agency, Coalbed Methane Outreach Program, 2004.
- 6 IPCC, 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
- 7 Lunarzewski L.W. Lunagas Pty Limited, Australia, Coal Mine Gas Emission Assessment for Sealed Goaf Area or Abandoned Mine.
- 8 First Environment, Methodology Element Validation Report for Vessels Coal Gas, Inc., June 2010.

### 3.2 Follow-up Interviews

Date	Name	Organization	Topics
August 2009 (calls and emails occurred throughout the month)	Mike Huisenga	WSP Environment & Energy	<ol style="list-style-type: none"> <li>1. The methodology element's eligibility criteria;</li> <li>2. The baseline approach;</li> <li>3. Project boundary;</li> <li>4. Emission estimations;</li> <li>5. Monitoring, data and parameters.</li> </ol>
June 2010 (emails throughout the month)	Mike Huisenga	WSP Environment & Energy	Additional information after the second assessment of the methodology element.

### 3.3 Resolution of Outstanding Issues

The objective of this phase of the assessment is to resolve any outstanding issues which need to be clarified prior to DNV's positive conclusion on the methodology revision. In order to ensure transparency, an assessment protocol was customized for the methodology revision. The protocol shows, in a transparent manner, the assessment findings, the responses from the methodology developer (Vessels Eenergy Cambria 33 Resources LLC) and the assessment conclusions.

The assessment protocol consists of one table. The different columns in the table are described below. The completed assessment protocol for the Revisions to ACM0008 to Include Methane Capture and Destruction from Abandoned Coal Mines is enclosed in Appendix A to this report.



## ASSESSMENT REPORT

<i>Assessment Protocol Table: Resolution of Corrective Action and Clarification Requests</i>		
<i>Draft report clarifications and corrective action requests</i>	<i>Summary of methodology element developer response</i>	<i>Assessment conclusion</i>
<i>If the conclusions from the draft assessment are either a CAR or a CL, these should be listed in this section.</i>	<i>The responses given by the methodology developer during the communications with the assessment team should be summarized in this section.</i>	<i>This section should summarize the assessment team's responses and final conclusions.</i>

### Table 1 Assessment protocol

Corrective action requests (CAR) are issued, where:

- 1 mistakes have been made with a direct influence on methodology application;
- 2 VCS specific requirements have not been met; or
- 3 there is a risk that the methodology element would not be accepted as a VCS methodology.

A request for clarification (CL) may be used where additional information is needed to fully clarify an issue.

### 3.4 Internal Quality Control

All aspects of the project are monitored and reviewed for technical accuracy including the assessment report before the approval of the methodology revision by DNV. The technical review was performed by a technical reviewer qualified in accordance with DNV's qualification scheme.

### 3.5 Assessment Team

#### *Type of involvement*

<i>Role/Qualification</i>	<i>Last Name</i>	<i>First Name</i>	<i>Desk review</i>	<i>Interviews</i>	<i>Reporting</i>	<i>Project Coordination</i>	<i>Technical review</i>	<i>Expert input</i>
Project Manager	Poonacha	Shruthi				√		
Methodology Revision Reviewer	Yang	Weidong	√	√	√			
Sector Expert	Toole O'Neil	Barbara						√
Technical Review	Warmerdam	John					√	



## ASSESSMENT REPORT

### 4 ASSESSMENT FINDINGS

Findings established during the assessment can be seen as either non-fulfilment of VCS criteria or an identified risk to the fulfilment of methodology element objectives. The findings of the assessment are presented in the following sections. The final assessment findings relate to the methodology revision as documented and described in the revised MED.

#### 4.1 Eligibility Criteria

The eligibility criteria for the methodology element are clearly defined in the MED. DNV was able to confirm the eligibility criteria were appropriate and adequate, as the requirements for existing conditions prior to project activities are defined clearly and properly. The eligibility criteria were revised below, without any substantial changes to the original criteria defined in ACM0008 V.6 (2):

- *This methodology applies to CMM, **AMM\*** and VAM capture, utilization and destruction project activities at working **and abandoned/decommissioned** coal mines, where the baseline is the partial or total atmospheric release of the methane and the project activities include the following method to treat the gas captured:*
- *Project participants must be able to supply the necessary data for ex ante projections of methane demand as described in sections Baseline Emissions and Leakage to use this methodology, **and data for ex ante projection of emissions of methane from abandoned mines, if applicable.***
- *The methodology **does not apply** to project activities with any of the following features:  
**Capture methane from a flooded abandoned/decommissioned coalmine.**  
**Capture methane from abandoned/decommissioned coalmines that are flooded in the baseline;**  
**Begin pumping water from the mine in the project case, when pumping had not been occurring in the baseline, in order to increase the production of methane, unless pumping is mandated to comply with environmental regulations or for other reasons;***

The following definitions from the MED make the eligibility criteria more understandable:

- ***Abandoned Mine Methane (AMM).** Methane extracted from open or sealed vents, shafts, portals or gob wells at locations where active ventilation has ceased.*
- ***Flooded Mine.** A mine which has been flooded by surface or ground water and where active pumping is not taking place. Abandoned mines frequently fill with water from surrounding strata; the water impedes the escape of methane from the coal seam effectively trapping it. Flooded mines typically produce gas for only a few years.*
- ***Venting Mine.** An abandoned coal mine where vents at shafts, portals or gob wells have not been completely or partially sealed.*

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\* The words in bold italics are revisions made to the methodology element.



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## ASSESSMENT REPORT

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### 4.2 Baseline Approach

No revisions, except for inclusion of AMM in all the necessary descriptive text by changing the original text from “CMM/CBM/VAM” to “CMM/CBM/VAM/AMM”.

### 4.3 Additionality

No revisions.

### 4.4 Project Boundary

Revisions includes: deletion of “*recovery of methane from abandoned coal mines will not be included*” from the baseline emission sources, refining baseline emission sources to cover “*fugitive leaks from sealed vents, shafts portals or gob wells or from fractures in the overburden*” and “*injection into gas grids*”. These revisions are deemed proper to be compatible with the revision of the eligibility criteria.

### 4.5 Emissions

The approach provided for calculating baseline emissions, project emissions and emission reductions related to the revision are deemed appropriate by DNV.

#### 4.5.1 Baseline emissions

Baseline emissions are the key revisions to ACM0008 in the methodology element. The revisions are limited to AMM related scenarios. The revisions are appropriate, as explained below:

- 1 The emission rate of an abandoned mine through time is properly described by a hyperbolic decline curve for emissions rate, based on documents prepared by Cote, Michael, et al (5), “2006 IPCC Guidelines for National Greenhouse Gas Inventories” by IPCC (6), and “Coal Mine gas Emission Assessment for Sealed Goaf Area or Abandoned Mine” by Lunarzewski L.W (7).
- 2 The calculations to determine the emission rate decline curve coefficients are correctly defined. Two alternative approaches are presented, based on whether coal mine-specific data are available or not.
- 3 The equations for the *ex ante* forecast of methane emissions from abandoned mines are defined properly, based on the document prepared by Cote, Michael, et al. (5). The parameters used in the equations are also properly defined.
- 4 The value used to specify the baseline emissions related to the AMM is defined as the lesser of the *ex ante* projected mass of methane emissions and *ex post* measured mass of methane captured by the project activity. This is a conservative determination of baseline emissions.

One equation (Equation 26) was revised and one equation (Equation 33) was added to clarify the calculation of baseline emissions related to gas delivered to the gas grid. This revision is not the main subject of the methodology element, but is explanatory to the application of ACM0008.



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## ASSESSMENT REPORT

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### 4.5.2 Project emissions

No revisions, except for text that specifies the inclusion of emissions related to the destruction of AMM in project emission calculations.

### 4.5.3 Emission reductions

No revisions.

### 4.6 Leakage

No revisions.

### 4.7 Monitoring

All monitored and unmonitored data and parameters are appropriately defined. These data and parameters are primarily related to the estimation of baseline emissions associated with AMM and the monitoring requirements for each are described properly. Except for the inclusion of captured AMM in the monitored parameters, there is no substantial revision to this portion of ACM0008.

### 4.8 Data and Parameters

All monitored data and parameters are appropriately defined in the MED allowing emission reductions to be estimated and verified during the verification periods.

### 4.9 Data Quality Management

Requirements for data and calculation reviews are clearly defined in the MED. These requirements are sufficient to reduce uncertainties related to the calculation of emissions reductions.

### 4.10 Adherence to the project-level principles of the VCS Program

The MED was developed in line with the project-level principles of VCS 2007.1, as discussed above. The principles of relevance, completeness, consistency, accuracy, transparency, and conservativeness are properly addressed in the MED.

### 4.11 Comments by Stakeholders

The MED was made publicly available on VCSA's website ([http://www.v-c-s.org/methodology\\_rtatimcadfacm.html](http://www.v-c-s.org/methodology_rtatimcadfacm.html)). Global stakeholders were invited to provide comments during a 30 days period from 14 July 2009 – 13 August 2009.

Four sets of comments were received during the comment period. Responses were provided by Vessels LLC and some revisions were made to the methodology based on these comments. The responses to the comments and the revisions to the methodology related to the comments are deemed appropriate by DNV.



## ASSESSMENT REPORT

The public comments and the responses by Vessels LLC are attached as separate documents.

### 5 ELIGIBILITY CRITERIA FOR VALIDATOR

The details of the project validation conducted by DNV for the sectors 8 and 10 are provided in Table below. This presents evidence for fulfilment of the eligibility criteria requirement outlined in the double approval process by VCSA.

**Eligibility Criteria Table:**

Serial No.	ID.	Ref No.	Name of the project	Issue date of Report	Project Reg. date	Sector
1	CDM0940	770	Huaibei Haizi and Luling Coal Mine Methane Utilization Project	15-Nov-06	18-Feb-07	8,10
2.	CDM1006	1929	Nantong Coalmine Methane	2-Mar-09	6-Mar-09	8,10
3.	CDM1470	1918	Jiaozuo Coal Mine Methane (CMM) Power Generation Project of Jiaozuo Coal Industrial Group Co. Ltd., Jiaozuo City, Henan Province	18-Feb-09	27-Feb-09	8,10
4.	CDM1516	1931	Jinling Coal Mine Methane (CMM) Power Generation Project of Dengfeng City, Henan Province	19-Feb-09	16-Mar-09	8,10
5.	CDM1671	1887	Huainan Panyi and Xieqiao Coal Mine Methane Utilization Project	25-Nov-08	27-Nov-08	8,10
6.	CDM1726	1613	Yima Coal Industry (Group) Co., Ltd. CMM utilization project	10-June-08	2-Aug-08	8,10
7.	CDM1764	1135	Jiangxi Fengcheng Mining Administration CMM Utilization Project	23-Sept-07	24-Sep-07	8,10
8.	CDM1845	1896	China Jincheng Sihe 120MW Coal Mine Methane Power Generation Project	15-Apr-09	22-Apr-09	8,10
9.	CDM1849	1880	Tiefa Coal Industry Group CMM Utilization Project for City Gas	24-Sept-08	6-Dec-08	8,10
10.	CDM2086	1614	Pingdingshan Coalmine Methane Utilization	29-Jan-08	22-Aug-08	8,10



## **APPENDIX A**

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### **ASSESSMENT PROTOCOL**

***Resolution of Corrective Action and Clarification Requests***

Draft report clarifications and corrective action requests by assessment team	Summary of methodology developer response	Assessment team conclusion
<p><b>CAR 1</b>  <b>Baseline emission estimates:</b>                      Justification and supporting evidence needs to be provided to DNV for the following statement on page 6 of the methodology element under “<i>Step 2: Determine the hyperbolic decline curve equation coefficients</i>”:                      “The emissions rate of an abandoned mine through time can be described by an exponential decay function”</p>	<p>On page 20 of (Cote, et al., 2004) it states that “Existing data on abandoned mine emissions through time, although sparse, appear to fit a hyperbolic model of decline.”</p> <p>On page 4.7 of (IPCC, 2006) in the context of abandoned underground mines it states that “Emissions quickly decline until they reach a near-steady rate that may persist for an extended period of time.”</p>	<p>Both of the referenced works are from publicly recognized sources and DNV concludes this approach is proper.                      The CAR is closed.</p>
<p><b>CAR 2</b>  <b>Baseline emission estimates:</b>                      Justification and supporting evidence needs to be provided to DNV for equation (25), used in <i>ex ante</i> projections of emissions of methane from venting and sealed abandoned mines.</p>	<p>Equation 25 in the revision document is a combination of Equation 4 describing emissions at venting mines and Equation 6 describing the degree of sealing from (Cote, et al., 2004).</p>	<p>The referenced work is from publicly recognized sources and DNV concludes this approach is proper.                      The CAR is closed.</p>
<p><b>CAR 3</b>  <b>Project scope and project emission estimate:</b>                      The methodology element includes a revision to ACM0008 for baseline emission estimates related to the project activity of injecting the captured methane into a natural gas grid; this approach is not described in the ACM0008.                      Considering that purification and handling of captured methane will be needed prior to injection into the natural gas grid, the methodology element should specify the following requirements:</p> <ol style="list-style-type: none"> <li>1 The project boundary related to the project activities of purification and handling of captured methane;</li> </ol>	<p>Actually ACM0008 does describe gas injection into a gas grid. It doesn’t discuss “natural gas” grids specifically; however “gas grid” is not specifically defined to exclude “natural” gas grids. References in ACM0008 to “gas grid” are found on pages 11, 12, 13, 16, 18, 38, 39, 40</p> <p>The quantification of pipeline gas used in the baseline replaced by the project activity is justified since emissions from the use of methane from gas grids displaced by the project activity are quantified in equation 11 of ACM8 and emissions from the</p>	<p>The baseline emission estimates related to the project activity of injecting captured methane into a natural gas grid have been revised to make it clear that this applies to ACM0008.                      The project boundary is properly chosen based on the monitoring arrangement.                      The CAR is closed.</p>

***Resolution of Corrective Action and Clarification Requests***

<b>Draft report clarifications and corrective action requests by assessment team</b>	<b>Summary of methodology developer response</b>	<b>Assessment team conclusion</b>
<p>2 The emission estimates related to the project activities of purification and handling of captured methane;</p> <p>3 The technology used for the purification and handling.</p>	<p>destruction of methane injected into gas grids in the baseline is quantified in equation 12. We have modified equation 26 by adding terms specific to methane use in gas grids for clarity. Additionally, we have added gas grid usage to the project’s baseline boundary in Table 1. We have added equation 33 which is similar to the existing equations (30-33) to calculate the combustion emissions from methane injected into gas grids. This seems to be missing from ACM0008 since methane from gas grids in the baseline displaced is an eligible source, but adequate guidance to calculate the emissions is not provided. The Appendix includes a detailed argument for why methane contained in processing equipment vent gases should be excluded.</p>	
<p><b>CL 1</b></p> <p><b>Baseline emission estimates:</b></p> <p>The methodology element gives three options (Option A, B and C) for determining decline curve coefficients; the conditions under which each option shall be applied need to be clearly specify.</p>	<p>The methodology element has been changed to specify order of preference and conditions for appropriate use. Option C has been eliminated.</p>	<p>The revision related to baseline emission estimates is proper. The CL is closed.</p>
<p><b>CL 2</b></p> <p><b>Baseline emission estimates:</b></p> <p>In the Option A for determining decline curve coefficients, there is the following description: “If emission rate measurements are available before and for several years following mine closure, these emission rates can be plotted to</p>	<p>A set of criteria for emission rate measurements have been described in the revised methodology element, used to derive a hyperbolic emission rate decline curve. This is included in Option A.</p>	<p>The revision related to baseline emission estimates is proper. The CL is closed.</p>

***Resolution of Corrective Action and Clarification Requests***

<b>Draft report clarifications and corrective action requests by assessment team</b>	<b>Summary of methodology developer response</b>	<b>Assessment team conclusion</b>
<p>derive the coefficients describing the curve on which these values lie.”                      Since the coefficients will be used to estimate baseline emissions, the following requirements need to be specified:</p> <ol style="list-style-type: none"> <li>1 The minimum time duration for emission rate measurements, including before and after mine closure;</li> <li>2 The appropriate sample frequency for these measurements;</li> <li>3 The data quality requirements for these measurements.</li> </ol>		
<p><b>CL 3</b>  <b>Baseline emission estimates:</b>                      The methods used to determine the values of all parameters used in Equation (25) need to be specified and should be related to the parameters required in the “<i>Step 1: Identify relevant mine parameters</i>”.</p>	<p>Option C has will be excluded since there is presently no published source for a methodology which can be used to determine decline curves from known physical parameters.</p>	<p>The CL is closed.</p>

**Works Cited**

**Cote, Michael, et al. 2004.** *Methane Emissions from Abandoned Coal Mines in the United States: Emission Inventory Methodology and 1990 - 2002 Emissions Estimates.* s.l. : U.S. Environmental Protection Agency, Coalbed Methane Outreach Program, 2004.

**IPCC. 2006.** *2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 4: Fugitive Emissions.* 2006.

## Appendix A to the “Resolution of Corrective Action and Clarification REQUESTS”

### Justification for excluding methane in the vent gas of processing systems

AM0053 addresses biogenic methane injected into natural gas distribution grids from LFG or AD projects. These projects draw their project boundary before the gas upgrading systems, thus “gas delivered to pipeline” is actually still LFG or biogas containing CO<sub>2</sub> and is not delivered upgraded “natural gas”. Presumably, this is because the LFG project and the gas upgrading project are typically developed by separate project proponents (e.g. LFG developer and gas distribution company). For the gas upgrading project, emissions from venting of CH<sub>4</sub> need to be accounted for since they are not accounted for in the LFG project. In the revised ACM0008, we account for venting by using the “gas injected” quantity rather than “gas to pipe feeding natural gas grid” quantity.

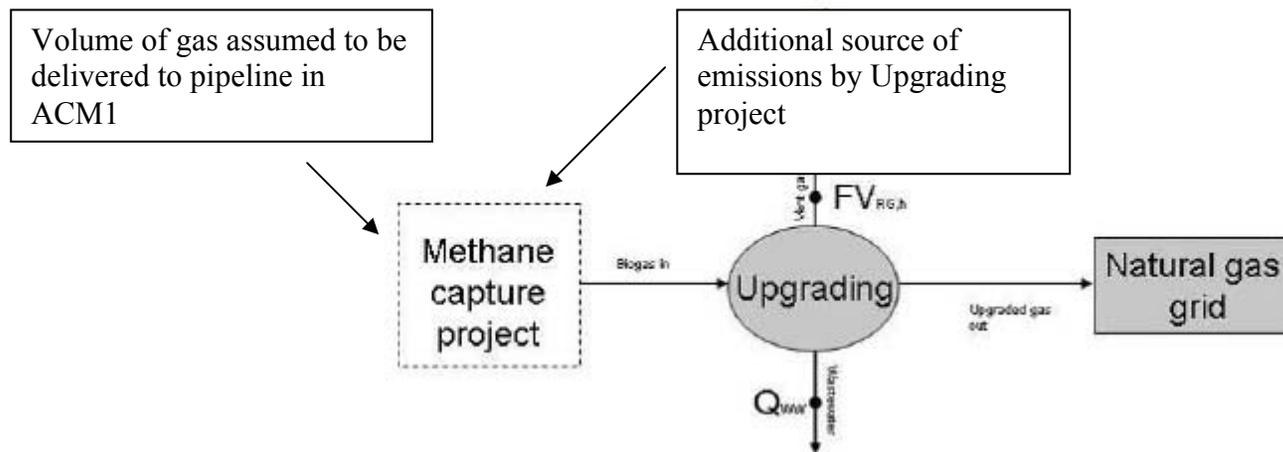


Figure 1: Illustration of why AM0053 is needed to address projects using ACM0001

Upgraded gas out = biogas in – vent gas

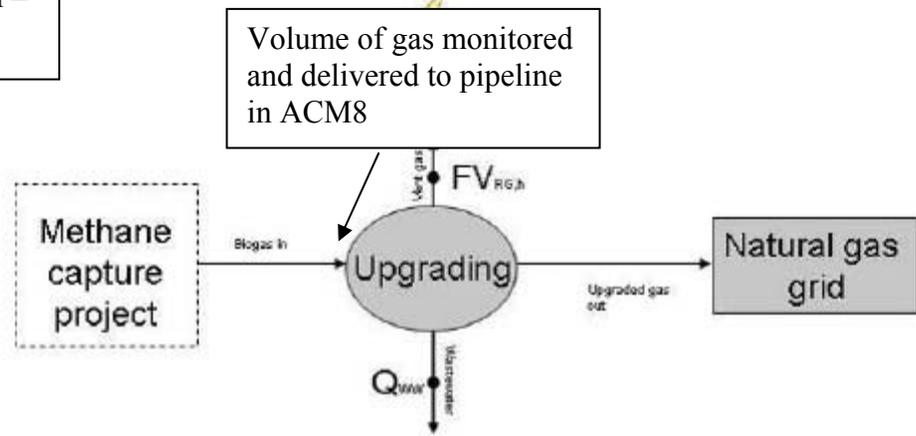


Figure 2: Illustration of why AM0053 is not needed for projects using revised ACM0008

The fact that for a LFG project the measured gas volume is LFG and not “upgraded” gas is illustrated in the figure below from ACM1. This shows that the monitored value and the value which is used to determine the delivered gas is actually the flow rate of LFG (multiplied by concentration of CH<sub>4</sub> at the landfill) that “is sent to the pipeline for feeding to the natural gas distribution network” and is not pipeline injected gas.

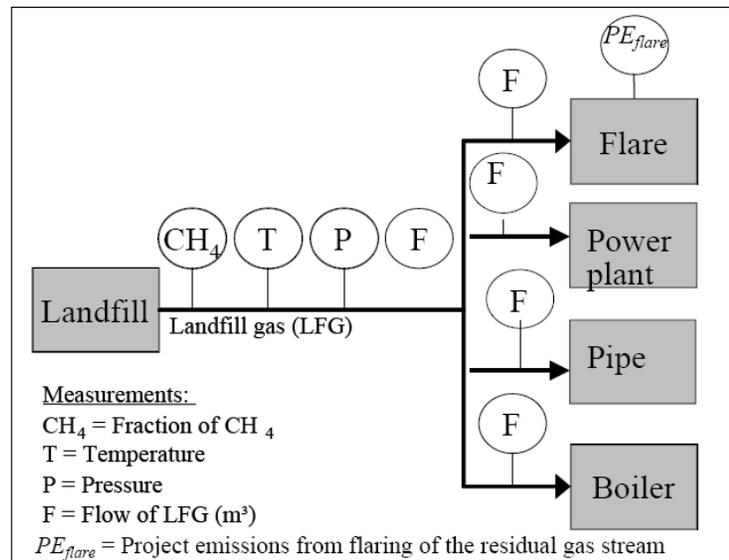


Figure 3: taken from page 15 of ACM0001

DET NORSKE VERITAS

For in ACM0008, we specify that the “delivered” gas is the gas injected into a natural gas pipeline which is necessarily after the raw gas passes through the upgrading equipment. Thus, this quantity already accounts for the vented gas.

Furthermore, vent gas emissions should not be quantified because they are emissions that would occur in the absence of the project and are not part of the baseline (when gas produced = baseline).