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

A methodology revision submitted to the VCS Association

WSP Environment & Energy
507 Canyon Blvd, Suite 203
Boulder, CO 80302
720.974.0250

Background Information

This document identifies specific revisions to the UNFCCC approved consolidated methodology ACM0008 Version 6 issued 25 March 2009 titled "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". The revisions provide text modifications to the methodology language to allow for inclusion of coal mine methane capture and destruction from abandoned coal mines in addition to a proposed calculation procedure for the determination of baseline emissions from venting and sealed abandoned coal mines. The revision document shows the proposed modifications in red text where they are applicable in ACM0008. This document doesn't provide a complete re-working of ACM0008; only the sections of ACM0008 relevant to the required modifications are shown.

I. SOURCE, DEFINITIONS AND APPLICABILITY

Definitions (page 2)

Recommended Revision: Add Definition

Abandoned Mine Methane (AMM). Methane from open or sealed vents, shafts, portals or gob wells at locations where active coal mining operations and/or ventilation have ceased.

Deleted: which has been extracted

Applicability (page 2)

Recommended Revision: Add AMM to applicability statements.

Deleted: , but exclude flooded abandoned mines

This methodology applies to CMM, AMM and VAM capture, utilization and destruction project activities at ~~a~~ 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:

Deleted: utilisation

- The methane is captured and destroyed through flaring; and/or
- The methane is captured and destroyed through flameless oxidation and/or
- The methane is captured and destroyed through utilization to produce electricity, motive power and/or thermal energy; emission reductions may or may not be claimed for displacing or avoiding energy from other sources;
- The remaining share of the methane, to be diluted for safety reason, may still be vented;
- All the CBM, AMM or CMM captured by the project should either be used or destroyed, and cannot be vented, with the exception of methane in dilute concentrations vented with other exhaust gases from the processing of methane to remove contaminants.

Deleted: utilisation

Deleted: ¶

Deleted: for supply to gas grid

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.

Deleted: to

The methodology applies to both new, ~~and~~ existing mining, and post-mining activities.

The methodology **does <u>not</u> apply** to project activities with any of the following features:

- Operate in open cast mines;

- ~~Capture methane from abandoned/decommissioned coalmines;~~
-
- Capture/use of virgin coal bed methane, e.g. methane of high quality extracted from coal seams independently of any mining activities;
- Use CO2 or any other fluid/gas to enhance CBM drainage before mining takes place.

Deleted: Capture methane from a flooded abandoned/decommissioned coalmine;

II. BASELINE METHODOLOGY PROCEDURE

Project Boundary (page 4)

Recommended Revision: Amend table 1 so that AMM is not excluded

	Source	Gas		Justification/ Explanation
Baseline Emissions	Emissions of methane as a result of venting and/or fugitive leaks from sealed vents, shafts, portals or gob wells or from fractures in the overburden	CH_4	Included	• Main emission source. However, certain sources of methane may not be included, as noted in the applicability conditions; • Recovery of methane from coal seams will be taken into account only when the particular seams are mined through or disturbed by the mining activity; • ~~Recovery of methane from abandoned coalmines will not be included;~~ • The amount of methane to be released depends on the amount used (for local consumption, gas sales, etc) in the baseline.

Identification of the Baseline Scenario (page 5, 6, 7, 13, 14, 15, 16, 17)

Recommended Revision: There are numerous references to CMM/CBM/VAM and CMM or CBM or VAM, for example, in the descriptive text on these pages. It is recommended that this text be altered to include AMM, e.g. CMM/CBM/VAM/AMM.

Baseline Emissions (page 12)

Recommended Revision: Remove AMM exclusion from baseline

Methane destruction in the baseline

Depending on the nature of the activities in the baseline scenario, CBM/CMM can be removed at four different stages – (1) as coal bed methane from a CBM to goaf wells prior to mining, or from underground pre-mining CMM drainage; (2) during the mining process using surface or underground post mining CMM drainage techniques, (3) during the mining process using ventilation air or (4) after the mining process by drainage from sealed goafs and passageways. ~~but before the mine is closed~~.

Deleted: roadways

Baseline Emissions (page 13)

Recommended Revision: Add AMM to Baseline methane destruction calculation

$$BE_{MDy} = (CEF_{CH4} + r \times CEF_{NMHC}) \times \sum_i (CBM_{BL,i,y} + VAM_{BL,i,y} + CMM_{BL,i,y} + PMM_{BL,i,y} + AMM_{BL,i,y}) \quad \textbf{(12)}$$

Where:

BE_{MDy}	= Baseline emissions from destruction of methane in the baseline scenario in year *y* (tCO_2e)
i	= Use of methane (flaring, power generation, heat generation, supply to gas grid to various combustion end uses)
$CBM_{BL,i,y}$	= CBM that would have been captured, sent to and destroyed by use *i* in the baseline scenario in the year *y* (expressed in tCH_4)
$VAM_{BL,i,y}$	= VAM that would have been captured, sent to and destroyed by use *i* in the baseline scenario in the year *y* (expressed in tCH_4)
$CMM_{BL,i,y}$	= Pre-mining CMM that would have been captured, sent to and destroyed by use *i* in the baseline scenario in year *y* (expressed in tCH_4)
$PMM_{BL,i,y}$	= Post-mining CMM that would have been captured, sent to and destroyed by use *i* in the baseline scenario in year *y* (tCH_4)
$AMM_{BL,i,y}$	= Post-mining AMM that would have been captured, sent to and destroyed by use *i* in the baseline scenario in year *y* (tCH_4)
CEF_{CH4}	= Carbon emission factor for combusted methane (2.75 tCO_2e/tCH_4)
CEF_{NMHC}	= Carbon emission factor for combusted non methane hydrocarbons. This parameter should be obtained through periodical analysis of captured methane ($tCO_2eq/tNMHC$)
r	= Relative proportion of NMHC compared to methane

Calculation of the mean annual demand (Thy) for each year of the crediting period (p. 13)

Recommended Revision: Include AMM in calculation of mean thermal demand in baseline

$$(VAM_{BL,th,y} + CMB_{BL,th,y} + CMM_{BL,th,y} + PMM_{BL,th,y} + AMM_{BL,th,y}) = \sum_{k=1}^{365} TH_{BL,k} \quad \textbf{(14)}$$

Where:

$VAM_{BL,th,y}$	= VAM that would have been captured and destroyed by thermal demand in the baseline scenario (tCH_4)
$CBM_{BL,th,y}$	= CBM that would have been captured and destroyed by thermal demand in the baseline scenario (tCH_4)
$CMM_{BL,th,y}$	= Pre-mining CMM that would have been captured and destroyed by thermal demand in the baseline scenario (tCH_4)
$PMM_{BL,th,y}$	= Post-mining CMM that would have been captured and destroyed by thermal demand in the baseline scenario (tCH_4)
$AMM_{BL,th,y}$	= AMM that would have been captured and destroyed by thermal demand in the baseline scenario (tCH_4)
th	= Index for thermal use of CBM, VAM, CMM and PMM in the baseline, which includes on-site heat generation and supply to the gas grid for various combustion end uses

$TH_{BL,k}$ = Methane used to serve estimated thermal energy demand in the baseline for day k of year y (tCH_4)

Methane released into the atmosphere (page 17)

Recommended Revision: Remove restriction of applicability of AMM; Include AMM in baseline methane release calculation

Depending on the nature of the project activity, CBM/VAM/CMM/AMM can be removed at four different stages – (1) as coal bed methane from a CBM wells prior to mining, or from underground pre-mining CMM drainage; (2) during the mining process using surface or underground post mining CMM drainage techniques; (3) during the mining process using ventilation air or (4) after the mining process by drainage from sealed goafs and passageways. ~~but before the mine is closed.~~ This methane would have been emitted to the atmosphere in the baseline scenario, unless some capture and use activities form part of the baseline:

Deleted: roadways

$$BE_{MRy} = GWP_{CH4} \times [\sum_i (CBMe_{i,y} - CBM_{BLi,y}) + \sum_i (CMM_{PJi,y} - CMM_{BLi,y}) + \sum_i (PMM_{PJi,y} - PMM_{BLi,y}) + \sum_i (VAM_{PJi,y} - VAM_{BLi,y}) + \sum_i (AMM_{i,y} - AMM_{BLi,y})] \quad \textbf{(16)}$$

Where:

BE_{MRy} = Baseline emissions from release of methane into the atmosphere in year *y* that is avoided by the project activity (tCO_2e)

i = Use of methane (flaring, power generation, heat generation, supply to gas grid to various combustion end uses)

$CBMe_{i,y}$ = Eligible CBM captured, sent to and destroyed by use i in the project for year *y* (expressed in tCH_4)

$CBM_{BLi,y}$ = CBM that would have been captured, sent to and destroyed by use *i* in the baseline scenario in the year *y* (expressed in tCH_4)

$CMM_{PJi,y}$ = Pre-mining CMM captured, sent to and destroyed by use *i* in the project activity in year *y* (expressed in tCH_4)

$CMM_{BLi,y}$ = Pre-mining CMM that would have been captured, sent to and destroyed by use *i* in the baseline scenario in year *y* (expressed in tCH_4)

$PMM_{PJi,y}$ = Post-mining CMM captured, sent to and destroyed by use *i* in the project activity in year *y* (tCH_4)

$PMM_{BLi,y}$ = Post-mining CMM that would have been captured, sent to and destroyed by use *i* in the baseline scenario in year *y* (tCH_4)

$VAM_{PJi,y}$ = VAM sent to and destroyed by use *i* in the project activity in year *y* (tCH_4). In the case of flameless oxidation, $VAM_{PJ,i,y}$ is equivalent to MD_{OX} defined previously

$VAM_{BLi,y}$ = VAM that would have been captured, sent to and destroyed by use *i* in the baseline scenario in year *y* (tCH_4)

$AMM_{i,y}$ = AMM sent to and destroyed by use *i* that would have been released to the atmosphere in the absence of the project in year *y* (expressed in tCH4).

$AMM_{BLi,y}$ = AMM that would have been captured, sent to and destroyed by use *i* in the baseline scenario in year *y* (expressed in tCH_4)

GWP_{CH4} = Global warming potential of methane (21 tCO_2e/tCH_4)