

**State of California  
Air Resources Board**

**Potential Mine Methane Capture Compliance Offset Protocol  
Third Meeting of the Technical Working Group**

**Cal/EPA Headquarters Building  
Coastal Hearing Room  
1001 I Street, Sacramento, California 95814**

**June 17, 2013  
1:30 – 3:30 pm PDT**

Conference call-in number: 1-888-989-4506  
Passcode: 44600

Meeting agenda and materials posted at:  
<http://www.arb.ca.gov/cc/capandtrade/protocols/mmcprotocol.htm>

## AGENDA

1. Baseline quantification methodology for abandoned mine projects using the decline curve approach (presentation slides to be made available separately)
2. Spatial and temporal boundaries for underground and surface drainage projects
  - a. CAR Coal Mine Methane Project Protocol Version 1.1
  - b. CDM Methodology ACM0008 Version 6
  - c. VCS VMR0001: Revisions to ACM0008 to Include Pre-drainage of Methane from an Active Open Mine as a Methane Emission Reduction Activity
  - d. RCE Draft Surface Coal Mine Methane Offset Protocol
3. Spatial and temporal boundaries for abandoned mine projects
  - a. RCE Draft Abandoned Coal Mine Methane Offset Protocol
  - b. VCS VMR0002: Revisions to ACM0008 to Include Methane Capture and Destruction from Abandoned Coal Mines
4. Discussion of early action projects

# PROTOCOL EXCERPTS AND DISCUSSION QUESTIONS CONCERNING SPATIAL & TEMPORAL BOUNDARIES

## Underground and Surface Pre-mining Drainage

ARB wants to ensure that the credits issued as a result of the MMC protocol are emission reductions associated with the mining process. The protocol will therefore exclude coal bed methane (CBM). Physical boundaries need to be established to differentiate between CBM and eligible mine methane, that which would be emitted during the mining process. Physical boundaries are divided into horizontal and vertical extents in most of the existing protocol.

- Horizontal extent: A limit placed for the purpose of excluding gas outside of the area disrupted by the mining process. Mine plans are the primary source for determining the whether or not the well will be intersected by mining and thereby within our outside of the horizontal extent.
- Vertical extent: A limit on the distance between the endpoint of a borehole and the mined coal seam to ensure that the methane being extracted originates from the physical area disrupted by the mining process and not outside of that.

Physical and temporal boundaries are linked so as to ensure that the quantification of emission reductions is conservative. Methane captured through pre-mining drainage wells is captured and destroyed prior to when the methane would otherwise be emitted in the absence of the project. The baseline must represent the without-project scenario, therefore requiring methane emissions from pre-mining drainage wells only be accounted for in the reporting period when a well is 'mined through' or in the 'zone of influence'. This creates a lag between the capture and destruction of methane extracted through pre-mining drainage wells and the issuance of credits. This temporal adjustment to the baseline is found in the CAR, CDM, VCS, and RCE protocols.

### **CAR Coal Mine Methane Project Protocol Version 1.1**

CAR's protocol does not specify a horizontal extent. A vertical extent ranging from 150 meters above the coal seam to 50 meters below it is included in the definition of 'mined through'.

CAR defines mined through as any of the following:

- The working face intersects the endpoint of the borehole
- The working face passes directly underneath the bottom of the borehole, as long as the endpoint of the borehole is within a -50 meters to +150 meters vertical range of the mined coal seam
- The working face intersects the plane of the borehole
- The working face passes both underneath and to the side of the borehole (which will happen when the bottom of the borehole lies above a block of coal that will be left unmined as a pillar)

If the mine plan calls for mining past rather than through the borehole, then quantification is allowed once the linear distance between the endpoint of the borehole and the working face that will pass nearest the endpoint of the borehole has reached an absolute minimum.

### **CDM Methodology ACM0008 Version 6**

CDM uses the mine concession area and mine plan to identify wells that will be intersected by mining or are likely to extract methane from an area that will overlap with future coal production. A zone or radius of influence is then calculated for each well based on either the cumulative flow measured at the well (m<sup>3</sup>) or the total cumulative gas drained from all the wells measured at a centralized monitoring station. When the zone of disturbance around a longwall panel overlaps with the zone of radius, the well becomes eligible. Then the total eligible gas from that well must be calculated based on:

- Horizontal plane: Limited to the percentage of the total area of influence covered by the area of overlap. If the well is physically intersected by mining this is 100%.
- Vertical plane: Defined by a de-stressed zone ranging from 140 meters above the coal seam to 40 meters below it. If cased boreholes are used and the seams are fractured within the de-stressed zone, then 100% of the gas is eligible. If other seams outside of the de-stressed zone are fractured, the eligible share (%) of extracted gas is calculated based dividing the thickness of the coal that lies within the longwall emission zone by the total thickness of coal that is producing gas in the production well.

### **VCS VMR0001: Revisions to ACM0008 to Include Pre-drainage of Methane from an Active Open Mine as a Methane Emission Reduction Activity**

VCS VMR0001 utilizes the CDM methodology of calculating a radius of influence for each well up until the point when the well produces elevated amounts of atmospheric gases (usually nitrogen concentrations that are at least 5% above baseline levels. 100% of the gas is eligible when mining operations require that a CBM well be shut in or abandoned.

The horizontal plane is determined in the same fashion as in the CDM methodology. The vertical plane is defined by a de-stressed zone that includes all strata above the mined coal seam and up to 40 meters below the seam. If other seams outside of the de-stressed zone are fractured, the CDM approach to determining the eligible share of the gas extracted from the well is applied.

### **RCE Draft Surface Coal Mine Methane Offset Protocol**

Under RCE's draft surface mine protocol, wells must be within areas expected to be mined within twenty years according to mine plans. RCE's protocol relies upon the mine concession area and latest mine plan to determine if a well is likely to extract methane from an area that will overlap with future coal extraction (i.e. be within the physical area disrupted by mining activities).

RCE considers a well to be in the zone of influence of the surface mine when either:

- SMM well produces elevated amounts of atmospheric gases (nitrogen concentrations that are greater than five percent above baseline levels). Standard well operating procedures must ensure that the elevated amounts of atmospheric gases are not due to leakage around the well bores.
- SMM well is physically bisected by surface mining activities, such as excavation of overburden, drilling and blasting, removal of the coal).

Horizontal plane: When one of the above conditions is met, the eligible share is considered to be 100%.

Vertical plane: All strata above the mined seams and the strata 130 feet (43 meters) below the lowest mined seam is considered within the de-stressed zone. Rather than attempting to calculate and exclude gas extracted from outside of the de-stressed zone, the protocol requires that wells drilled beyond the 130 feet be plugged back to within the limit.

### **Discussion Questions:**

- 1) Does it make sense to have a single definition of 'mined through'/'in the zone of influence' for both surface and underground pre-mining drainage wells?
- 2) What is the best definition to adopt?
- 3) Does it make sense to have a uniform limit on the vertical extent for both surface and underground pre-mining drainage wells?
- 4) What should that limit be?
- 5) Does the CDM approach add value or just complexity? What portion of projects do we believe that this calculation process would result in 100% of gas being eligible?
- 6) Some members of the technical working group have suggested that placing a limit on the time between the drilling of a pre-drainage well and the mine through date would serve as an additional check against the inclusion of CBM. This was specifically suggested for projects that involve pipeline injection (if pipeline injection is deemed an eligible end use). A 2-year limit was suggested. Does such a limit make sense and/or seem useful? CAR's protocol points out that pre-mining wells may be drilled in locations that are not scheduled to be mined through for months or years; sometimes surface pre-mining wells are drilled before the associated mine even opens. RCE suggested that new pre-drainage wells are typically drilled 4-7 years in advance of mining. Is there a consensus on what an appropriate limit would be?

### **Abandoned Mines**

Abandoned mine projects utilize equipment to enhance the extraction of methane to levels above that which would have occurred in the absence of a project. To ensure that credits are only issued for emission reductions that would have occurred in the without-

project scenario, the RCE protocol quantifies baseline emissions using the lesser value of: 1) the methane captured and destroyed during the reporting period, and 2) the methane emissions calculated using the decline curve to project ex-ante emissions.

It is likely that the lesser value will be the decline curve value. Under RCE's protocol, emission reductions in excess of the emissions of methane from the decline curve in any given reporting period do not carry over to a future reporting period. It has been proposed that the methane extracted in excess of the decline curve in any given reporting period be eligible for crediting in future reporting periods if in a latter reporting period the decline curve exceeds the methane captured. This would provide greater certainty for project developers who, at the start of the project, could calculate the decline curve over the life of the project.

### **RCE Draft Abandoned Coal Mine Methane Offset Protocol**

The RCE draft protocol relies upon final mine maps to define the physical extents of the mine workings and requires that wells used to extract methane from the abandoned mine (new or existing) be within those bounds. There are no further requirements for the horizontal extent. With regards to the vertical extent, wells must meet the following criteria to be deemed eligible:

1. Completed only within the extents of a given mine
  - a. Includes the gob area up to 525 feet (175 meters) above the mined seam and wells need to be cased to at least 525 feet (175 meters) above the mined seam
  - b. Must not be drilled more than 130 feet (43 meters) below the mine seam
2. The gas from two vertically separated mines cannot be comingled in a wellbore as cross flow between mines can occur

### **VCS VMR0002: Revisions to ACM0008 to Include Methane Capture and Destruction from Abandoned Coal Mines**

No limits on vertical extents are stated in the protocol.

#### **Discussion Questions:**

- 1) Does it make sense to make the limit on the distance between the well and the mined seam identical to the surface or/and underground pre-mining drainage wells?
- 2) What should that limit be?

### **VAM Projects & Gob Wells**

There seems to be no need to place such limits on VAM projects or gas extracted from gob wells at active mines since the gas that is collected and destroyed is done so at the time that it would have been emitted in the without-project scenario and all of the gas is directly related to mining activities (no concern over CBM).

## PROGRAM CONTACTS

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