

# Technical and Instrumentation Elements of the Proposed Approach

**ClimateCHECK**  
SET THE STANDARD™



**Presented By:**

Rob Janzen, Ph.D. P.Ag.  
VP, Western Operations  
ClimateCHECK

**Presented To:**

**Developing a Covered Manure  
Storage Protocol: Science at Work**

Edmonton, Alberta  
24 & 25 February 2010

## KEY MESSAGES

**Adapt best features of existing protocols to AB conditions for a ‘first generation’ CMS protocol using the ISO 14064:2 standard**

- **Recommend the kinds of manure cover technologies amenable for this protocol.**
- **Recommend proper procedures and conditions for covered storages to effectively and efficiently capture and collect biogas.**
- **Recommend the proper procedures and criteria for conversion devices to combust methane effectively and efficiently.**
- **Identify opportunities for enhancing methane production from covered systems for future efforts.**

# Emissions from manure storage cover, piping, flanges, etc.

- CDM uses IPCC guidelines where physical leakage from anaerobic digesters 15% of total biogas. If project participants use lower values for leakage, they should provide measurements proving lower value. CAR protocol uses a factor of 5% for fugitive emissions of a 'bank to bank' impermeable cover.
- Possible Option for Fugitive Emissions – the CMS protocol should assume a loss of fugitive emissions equivalent to 15% of CH<sub>4</sub> emission that would have occurred in the absence of the cover.
- Alternate Option – the CMS protocol should assume a loss as fugitive emissions equivalent to 5% of CH<sub>4</sub> emission that would have occurred in the absence of the cover.



## Emissions from secondary storage of manure

- CAR, GHGS (from CDM ACM0010) calculate CH<sub>4</sub> emissions in non-covered secondary storages — 30% of volatile solids entering covered storage transferred to secondary storage.
- Possible Option – emissions from secondary storage are based on 30% of the emissions that would have occurred in the absence of the cover
- Other Possible Option – allow methane emissions to be quantified from the secondary storage according to the same quantification method used for manure slurry in the Alberta Pork and Dairy protocols. – this allows for management options that reduce the methane emissions from the 30% Vs carryover.



# Emissions from biogas transportation to flare

- Existing protocols address potential of fugitive emissions of CH<sub>4</sub> from the capture system, but emissions from the piping system seem to be included in the general collection efficiency, or excluded. In the case where the biogas is just flared and the pipeline from collection point to flare is short (<1km, and for onsite delivery only), one flow meter can be used. In such cases the physical leakage can be considered as zero.
- Possible Option – consider fugitive emissions from piping biogas from the cover to the flare as part of the general collection efficiency of the system as in other protocols.



# Emissions from Combustion Device(s)

- Involves data from biogas flow volume, CH<sub>4</sub> concentration in the biogas, combustion efficiency of the flare or other combustion device, operational status of the flare, etc. These elements developed most extensively in the CAR and GHGS existing protocols. And, the GHGS protocol provides the most detailed prescription, and also includes the option of using a Simple (or Basic) and Advanced monitoring approaches.
- Possible Option - align the gas monitoring and measurement criteria with the requirements of the CAR and/or the GHGS capture and destruction protocols.
- Other Possible Option – develop new criteria; if so, what?
- Section 5.4 - Nitrous oxide is expected to be a minimal source in the biogas flare or other methane combustion device (SS7; Table 2) and are not considered in other existing protocols.
- Possible Option – The N<sub>2</sub>O emissions from flared biogas can be excluded from quantification (group to justify this option).



# Emissions from Combustion Device(s)

- Flare Efficiency of Methane Destruction (P. 28) – recommendations appear in other protocols for biogas flares and solution gas (oil/gas production). Both open (elevated) and enclosed flares are allowed in these protocols. Elevated flares are economical but less reliable and require more operating requirements. Enclosed flares are best but expensive.
- Possible Option – The CMS protocol should adopt the GHGS combustion efficiency values for enclosed flares in Case C and D in Table 3 of the discussion document.
- Possible Option – Allow use of elevated (open) flares at 98% efficiency so long as the protocol requires evidence that the flare is designed and operating appropriately on an ongoing basis. What would these operating parameters be? (group to justify a procedure; or cite a procedure in published guidance/standards).



# Emissions from Combustion Device(s)

**Table 3. Default Methane Destruction Efficiencies (from the GHGS protocol).**

	<b>Methane Destruction Technique</b>	<b>Destruction Efficiency</b>	<b>Notes</b>
A	Open Flare: 40 CFR 60.18 Compliant	96%	96% can be used if the flare is operated according to 40 CFR 60.18, otherwise 50% should be used.
B	Open Flare: 40 VFR 60.18 Non-Compliant	50%	
C	Enclosed flare that achieves a minimum retention time of 0.3 seconds.	98%	Includes a burner and damper system for combustion control.
D	Enclosed Flares with retention time greater than 0.3 seconds.	90%	98% can be used if the enclosed flare otherwise 90% should be used.



# Cover Types and Configurations

- Many configurations of storages, cover types, cover configurations. Most protocols speak to impermeable covers of a sealed, bank to bank system. How does this relate to the opportunity for using the covered storage as a means of allowing the biogas to build up, and then flare or use at specified times?
- Possible Option – impermeable covers with bank-to-bank seals on constant level storage configurations (bottom pipe inflows; overflow exit to secondary) are appropriate for this protocol.
- Possible Option – negative air pressure configurations with a ‘tight’ cover are more appropriate for this protocol.



# Covers/Storages

- Bank to Bank, sealed (non permanent perimeter seals) cover
- Variable or Constant Level?
- Constant/Variable level of gas under the cover
- Leakage under the anchor trench – potential issue
- Research Gap – partial covers; kept flat (gas diffusion into uncovered part)
- Bank to bank cover with a hatch
- Keeping the cover taught – with weight system that's secured; measure leakage on the anchor trench



# Covers/Storages

- Retrofitting existing lagoons
- Dig out the liner and replace with vent –can be done

