

## Method Specification

<b>Project Type:</b>	AWMS Greenhouse Gas (GHG) Mitigation Projects
<b>Description:</b>	Operations and Maintenance (O&M) Plan
<b>Revision Level:</b>	23 May 2005

	Approval	Date
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## **1.0 PURPOSE**

The purpose of this method specification is to describe the criteria for maintaining equipment, reporting equipment outages, and to provide detailed guidance for collection and processing of data that is used in the determination of Green House Gas (GHG) emissions.

## **2.0 SCOPE**

This document applies to GHG Mitigation Project related activities. It applies to all personnel that operate and/or maintain project activity equipment and/or have an active role in data collection and processing.

## **3.0 ASSOCIATED DOCUMENTS**

- Approved monitoring methodology AM0016 / Version 02; "Greenhouse gas mitigation from improved Animal Waste Management Systems in confined animal feeding operations"
- Flare Technical Publication
- Generator Maintenance Guide
- Jody Zall Kusek, and Ray C. Rist 2004. Ten Steps to a Results-based Monitoring and Evaluation System: A Handbook for Development Practitioners, World Bank.
- Anaerobic Digester Technical Guide
- Flow meter Installation and Service Manual
- MS004-F1, O & M Weekly Monitoring Form
- MS004-F2, O & M Monthly Monitoring Form
- MS004-1F3, Maintenance Log
- P004, Control of Nonconforming Product/Service
- P020, Monitoring & Measurement of Product/Processes
- P035, Product Realization
- P039, Competence, Training, and Awareness
- I035-1, Processing of Emission Reduction Data
- I031-2F13, Data Collection Form – B

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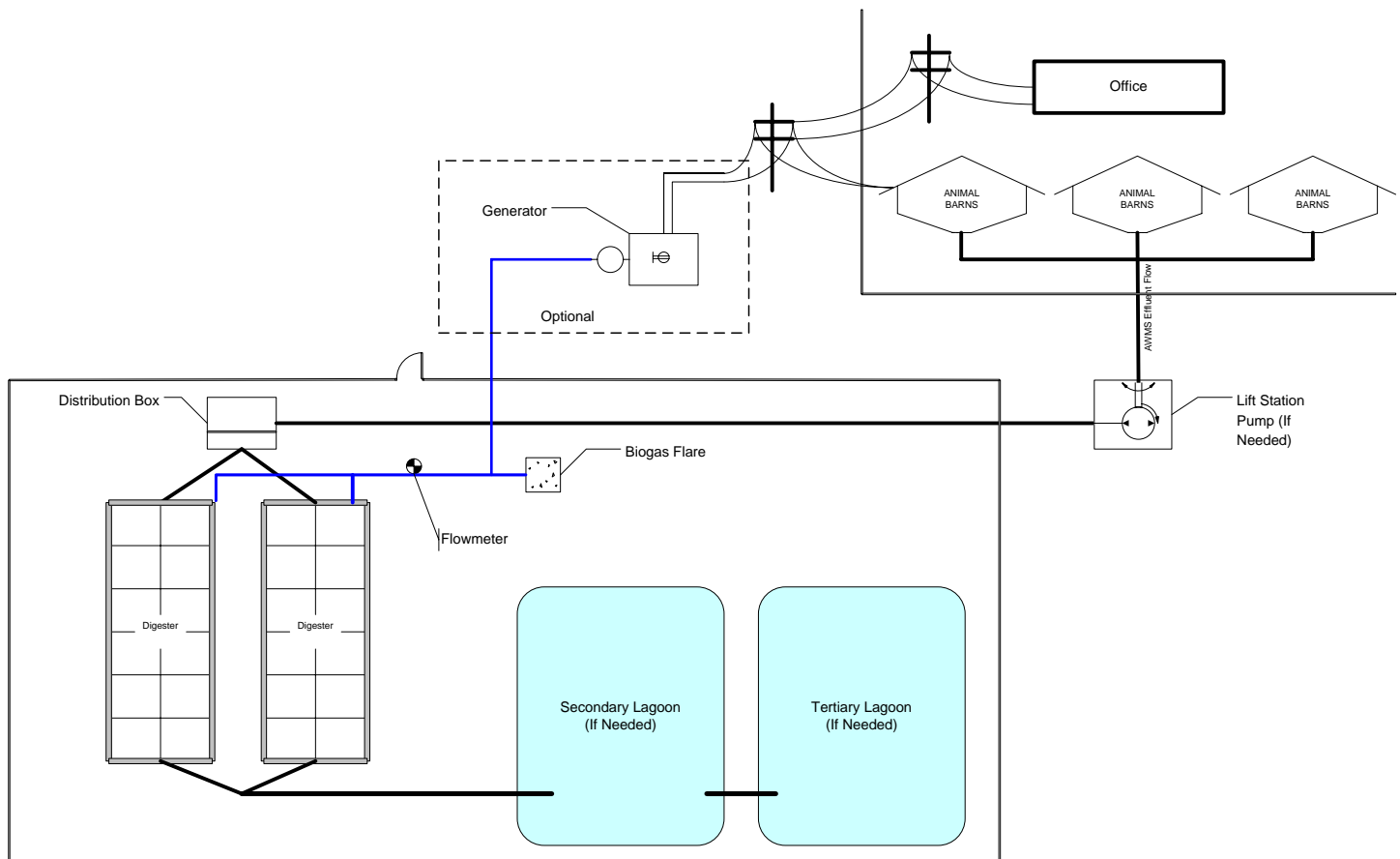
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## 4.0 OPERATION AND MAINTENANCE ACTIVITIES

### 4.1 System Overview

The Animal Waste Management System (AWMS) used in this project is shown in Figure 1. The system is made up of four (4) major system components:

- Manure transfer system which includes one lift station if needed
- Ambient temperature anaerobic digester cell
- Biogas transfer system including a biogas flow-meter
- Combustion system
  - Flare system
  - Electrical Generator System (optional)



**Figure 1. Typical GHG Mitigation Project System Overview**

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## 4.2 System Components Operation Requirements

### 4.2.1 Manure Transfer System

#### 4.2.1.1 Training

Training on the Manure Transfer System shall be provided to the operations personnel by the system manufacturer and installer. Training shall include: system components, normal operation, emergency operations, maintenance, and request for warranty service. Training on reporting procedures shall be provided to the productions operations manager by AgCert.

#### 4.2.1.2 Normal Operation

The system described in Figure 1 is a typical flush system with one optional lift station. Under normal conditions, farm hands clean the manure from the barns using water hoses and squeegees. This effluent is captured and then flushed from the barns periodically. Effluent from the barns is deposited in a lift station. Upon reaching predetermined threshold, the pump engages and routes the effluent to the digester cell. Upon being treated in the digester, the effluent is then routed from the digester to the storage lagoon. Liquid from the lagoon can then be used for irrigation.

#### 4.2.1.3 Safety Issues and Emergency Preparedness

Care should be exercised when working around the lift station and distribution box (if installed) to avoid falling into the pit.

#### 4.2.1.4 Weekly Inspection

A periodic inspection shall include the following:

- Check for pipeline obstructions
- Check for leaks in exposed pipelines
- Check for corrosion at exposed joints

#### 4.2.1.5 Alternative Operating Procedures

In the event the manure transport system becomes unusable, the farm manager shall notify AgCert in accordance with paragraph 4.3. Both parties shall work together to reach an acceptable alternate method to route the effluent so that farm operations are not affected, and GHG continues to be captured. If maintenance or warranty service is required, AgCert shall contact the appropriate service provider. Upon restoration of the system the farm manager shall notify the Regional Maintenance Technician (RMT) (phone, e-mail, etc.).

### 4.2.2 Ambient Temperature Anaerobic Digester

#### 4.2.2.1 Training

Training on the Ambient Temperature Anaerobic Digester shall be provided to production operations personnel by the system manufacturer and installer. Training shall include: system components, start-up procedures, normal operation, emergency operations, maintenance, and request for service. Training on reporting procedures shall be provided to the productions operations personnel by AgCert.

#### 4.2.2.2 Startup Procedures

See Anaerobic Digester Technical Guide

#### 4.2.2.3 Loading Rate and Total Solids Content

See Anaerobic Digester Technical Guide

#### 4.2.2.4 Normal Operation

See Anaerobic Digester Technical Guide

#### 4.2.2.5 Safety Issues and Emergency Preparedness

- No open flame permitted within 10 meters of the digester
- Do not allow personnel to stand, sit, or lean against the digester cover
- Do not use sharp objects/tools in the vicinity of the cover

#### 4.2.2.6 Weekly Inspection

A weekly inspection shall include the following:

- Cover material – check for cracks, tears, or points of distress around perimeter of digester cell.
- Check for excessive ballooning of cover or presence of odor
- Check seams for signs of gas leakage

#### 4.2.2.7 Alternative Operating Procedures

In the event the digester cell becomes unusable, the farm manager shall notify AgCert in accordance with paragraph 4.3. Both parties shall work together to reach an acceptable alternate method to treat the effluent so that farm operations are not affected, and GHG gas continues to be captured. If maintenance or warranty service is required, AgCert shall contact the appropriate service provider. Upon restoration of the system the Regional Maintenance Technician shall be notified (phone, e-mail, etc.).

#### 4.2.3 Biogas Transfer System and Biogas Sensor/Flow-Meter

##### 4.2.3.1 Training

Training on the Biogas Transfer System shall be provided to the operations personnel by the system manufacturer and installer. Training shall include: system components, normal operation, emergency operations, maintenance, and request for warranty service. Training on reporting procedures shall be provided to the production operations personnel by AgCert.

##### 4.2.3.2 Normal Operation

Biogas produced in the anaerobic digester is trapped under a positive or negative pressure geomembrane cover installed over the digester cell. The biogas is routed from the digester to the flare via PVC tubing. A flow meter, which measures gas flow, is fitted in the biogas transfer system piping.



Figure 2. Roots biogas flowmeter

##### 4.2.3.3 Safety Issues and Emergency Preparedness

Gas to the metering system should be disconnected prior to performing maintenance on the flow-meter. Care should be taken when digging in the area where the pipeline is buried.

##### 4.2.3.4 Preventive Maintenance

Preventive maintenance shall be conducted in accordance with manufacturer's recommendations. NOTE: A record of the cumulative biogas reading must be recorded prior to zeroing the meter.

##### 4.2.3.5 Weekly Inspection

The weekly inspection shall include the following:

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- Check for leaks in exposed pipelines
- Check for proper operation of the flow-meter

#### 4.2.3.6 Alternative Operating Procedures

In the event that the biogas transfer system becomes unusable; the farm manager shall **immediately** notify AgCert in accordance with paragraph 4.3. Both parties shall work together to reach an acceptable alternate method to route the biogas so that farm operations are not affected and GHG gas emissions are mitigated. If maintenance or warranty service is required, AgCert shall contact the appropriate service provider. Upon restoration of the system the RMT shall be notified (phone, e-mail, etc.).

#### 4.2.4 Combustion System - Flare

##### 4.2.4.1 Training

Training on the Flare Combustion System shall be provided by the system manufacturer and installer. Training shall include: system components, normal operation, emergency operations, maintenance, and request for warranty service. Training on reporting procedures shall be provided to the production operations personnel by AgCert.

##### 4.2.4.2 Normal Operation

The flare system is designed to combust the biogas. When biogas pressure reaches a predetermined upper threshold, the flare igniter activates. Upon activation, a heat sensor detects the igniter flame and subsequently opens the gas valve allowing biogas to flow to the flare head and thereby combust. When pressure descends to a predetermined lower threshold, the biogas valve closes. If at any point during this process, the flame extinguishes, the heat sensor detects the absence of heat and restricts the biogas flow.

##### 4.2.4.3 Safety Issues and Emergency Preparedness

Prior to performing any maintenance on the flare system, the gas flow **must** be turned off. Care should be exercised when working around the flare system as components can be extremely hot.

##### 4.2.4.4 Preventive Maintenance

Preventive maintenance shall be conducted in accordance with component manufacturer's recommendations.

##### 4.2.4.5 Alternative Operating Procedures

In the event that the flare system becomes unusable, the farm manager shall **immediately** notify AgCert in accordance with paragraph 4.3. Both parties shall work together to reach an acceptable alternate method to combust the biogas so that farm operations are not affected and GHG emissions are mitigated. If maintenance or warranty service is required, AgCert shall contact the appropriate service provider. Upon restoration of the system the RMT shall be notified (phone, e-mail, etc.).

#### 4.2.5 Optional Combustion System

##### 4.2.5.1 Training

Training on any optional combustion system, e.g., generator, space heater, etc., shall be provided by the system manufacturer and installer. Training shall include: system components, normal operation, emergency operations, maintenance, and request for warranty service. Training on reporting procedures shall be provided to the production operations personnel by AgCert.



Figure 3. Biogas Flare System

#### 4.2.5.2 Normal Operation

An optional combustion system is designed to take advantage of the biogas and convert it into renewable energy. The systems can be used to generate electricity, heat a barn, or any other process approved (in writing) by AgCert and the verifying designated operational entity (DOE).

#### 4.2.5.3 Safety Issues and Emergency Preparedness

Prior to performing any maintenance on an optional combustion system, the gas flow **must** be turned off. Care should be exercised when working around the optional combustion system as components can be extremely hot and high voltage may be present (when operating).

#### 4.2.5.4 Preventive Maintenance

Preventive maintenance shall be conducted in accordance with manufacturer's recommendations. NOTE: In any case where it is required to zero and/or remove a meter, ensure that the meter reading is noted prior to zeroing and/or removing the meter.

#### 4.2.5.5 Alternative Operating Procedures

In the event that the generator system becomes unusable, the user shall notify AgCert in accordance with paragraph 4.3. The flare shall be used as the only method to combust GHG biogas. The user shall take appropriate action to notify his service provider should maintenance or warranty service be required. Upon restoration of the system the RMT shall be notified (phone, e-mail, etc.).

### 4.3 Maintenance, Trouble Reporting and Documentation

#### 4.3.1 Emergency Maintenance:

Situations requiring immediate attention due to failure of components of the digester or combustion system that could cause significant damage to the physical structure, or could result in the release of GHG or failure to capture GHG should be immediately reported to the Regional Maintenance Technician. If unavailable, contact the National Operations & Maintenance Manager of the country where the equipment is located or the International Operations and Maintenance Manager.

Title	Phone	e-mail
Regional Maintenance Technician (RMT)	Supplied during training	Supplied during training
Argentina National O&M Manager		operationsar@agcert.com
Brazil National O&M Manager	(11) 5522 6940	operationsbr@agcert.com
Chile National O&M Manager		operationscl@agcert.com
International O&M Manager	+1.321.409.7846	operations@agcert.com
Mexico National O&M Manager	(55) 5557 1750	operationsmx@agcert.com

#### 4.3.2 Unscheduled Maintenance:

Situations requiring maintenance (not resulting in the release or failure to capture GHG) should be reported to the Regional Maintenance Technician, normally within 72 hours of discovery.

#### 4.3.3 Records Keeping

Maintenance and servicing of equipment shall be recorded.

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## 5.0 MONITORING ACTIVITES

The following table summarizes key parameters monitored:

**Table 1. Key parameters monitored (AM0016)**

ID	Item	Applies to Project	Monitored		ER Calculation Data		Performed by	AM0016 Referenced Equations	Comments
			Ex-ante	Ex-post	Primary	Secondary			
1	Population <sub>month</sub>	✓	✓	✓	✓		FH, FM, RMT	10, 14	
2	AF								
3	TF								Used to size digester
4	FW								Used to size digester
5	WF								Used to size digester
6	BA	✓	✓	✓	✓		RMT	11, 15	Used to select IPCC lookup data
7	AM								
8	CA								
9	TR	✓	✓	✓	✓		OP	11,	Used to select appropriate parameters from lookup tables
10	TS								Used to size digester
11	AWi								
12	CF	✓		✓		✓	FH, RMT		QA/QC
13	CD	✓		✓		✓	RMT		QA/QC
14	INT	✓		✓	✓		FH, RMT	10, 14	
15	DR	✓	✓	✓	✓		OP	9, 11, 13, 15, 16	Collect parameters as needed from IPCC lookup tables referenced in AM0016
16	EPy	✓		✓	✓		FM, RMT	17	Determines project activity electricity consumption
17	EFL								
18	AM								
19	EPp	✓		✓	✓		FH, RMT	17	

Farm: FH – Farm Hand; DP – Data Processor; FM – Farm Manager;  
 AgCert: RMT – Regional Maintenance Technician, QA – Quality Assurance; OP – Operations, EN - Engineer

## 6.0 MONITORING WORK INSTRUCTIONS

Work instructions for the monitoring of key parameters can be found on the following pages:

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## 6.1 Work Instruction for monitoring ID 1, Population<sub>month</sub>

### 6.1.1 Summary

This ID monitors the number of animals that use the project activity AWMS. Detailed animal counts, to include birth rates, mortality rates, etc., are collected and maintained by the farm manager as a part of his normal production operations activity.

### 6.1.2 References

- Approved monitoring methodology AM0016 / Version 02; "Greenhouse gas mitigation from improved Animal Waste Management Systems in confined animal feeding operations"

### 6.1.3 Prerequisite(s)

#### 6.1.3.1 Processes

- I036-9, Bio-security and Safety
- I035-1, Processing of Emission Reduction Data

#### 6.1.3.2 Training of Monitoring Personnel

- Farm hands shall be aware of proper data collection
- Regional Maintenance Technicians shall be trained on data processes.
- Operations personnel shall be trained on data processing and storage.

#### 6.1.3.3 Equipment, Materials and Tools

- Data collection forms (provided by farm manager)

#### 6.1.3.4 Calibration

- None



Figure 4. Population data collection.

### 6.1.4 Process

Step	Operator	Activity	Documentation	Comments
1	FH	Perform animal counts NOTE: If a farm, or farm system, does not have a software inventory system, skip to Step 4.	Data is entered on local forms	Periodically, on a sample basis, RMT shall perform audits of this activity. (Such audits must be documented in the Comments section of the O&M Weekly Monitoring Form)
2	DP	Enters data into software system	electronic	
3	FM	Reviews data for accuracy/anomalies	electronic	
4	FM	Using the software or manual system, prepare monthly animal count report(s)	paper/electronic	
5	RMT	Collects monthly animal count reports and other data during periodic visit	electronic	
6	RMT	Transmits data to MLB operations	Fax, electronic, etc	
7	QA	Quality shall audit incoming data for accuracy, integrity, etc.		Format, integrity, etc.

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Step	Operator	Activity	Documentation	Comments
8	OP	Processes data IAW I035-1		Used in equations 10, 14, 19, 20
9	OP	Store data, generate monthly ER Production Report		
10	OP	Generate Periodic ER Production Report for verified crediting period		Work with DOE to identify crediting period
Farm: FH – Farm Hand; DP – Data Processor; FM – Farm Manager; AgCert: RMT – Regional Maintenance Technician, QA – Quality Assurance; OP – Operations, EN - Engineer				

#### 6.1.5 Records Control

RECORD ID	RECORD LOCATION	RETENTION TIME	DISPOSITION
Animal Count Collection Form	Farm Office Files	Farm maintains source data collection forms until project periodic verification audit	Destroy
ER Production Report	Document Control Files	Duration of project + 5 years	Destroy

## 6.2 Work Instruction for monitoring ID 6, AWMS Type

### 6.2.1 Summary

This ID is used to establish IPCC emission factors based on the AWMS in use. It is a classification data point that is collected prior to construction and post construction to determine appropriate project activity IPCC emissions factors. The barn type does not affect emission reduction calculations.

### 6.2.2 References

- Approved monitoring methodology AM0016 / Version 02; “Greenhouse gas mitigation from improved Animal Waste Management Systems in confined animal feeding operations”
- I031-2F13, Data Collection Form - B

### 6.2.3 Prerequisite(s)

#### 6.2.3.1 Processes

- I036-9, Bio-security and Safety

#### 6.2.3.2 Training of Monitoring Personnel

- None

#### 6.2.3.3 Equipment, Materials and Tools

- None

#### 6.2.3.4 Calibration

- None

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#### 6.2.4 Process

Step	Operator	Activity	Documentation	Comments
1	RMT	Document AWMS system used on farm. (Lagoon, digester, pit, etc.)	Form B	This data point is normally captured upon construction completion and activation of new AWMS.
2	OP	Capture data from Form B and update SMS project directory		
Farm: FH – Farm Hand; DP – Data Processor; FM – Farm Manager; AgCert: RMT – Regional Maintenance Technician, QA – Quality Assurance; OP – Operations, EN - Engineer				

#### 6.2.5 Records Control

RECORD ID	RECORD LOCATION	RETENTION TIME	DISPOSITION
I031-2F13, Data Collection Form - B	Doc Control	Duration of project + 5 years	Destroy

### 6.3 Work Instruction for monitoring ID 9, Temperature

#### 6.3.1 Summary

This ID monitors the average temperature in order to select the proper IPCC MCF values for the equations. This is done on a one time basis at the beginning of the project activity. Rainfall is not monitored as rain water and effluent are captured and routed on distinct paths. Further, the project activity is not affected by rainfall.

#### 6.3.2 References

- Approved monitoring methodology AM0016 / Version 02; “Greenhouse gas mitigation from improved Animal Waste Management Systems in confined animal feeding operations”

#### 6.3.3 Prerequisite(s)

##### 6.3.3.1 Processes

- None

##### 6.3.3.2 Training of Monitoring Personnel

- The person performing this task should be skilled with the use of a PC/PDA.

##### 6.3.3.3 Equipment, Materials and Tools

- A PC with internet access is required to research temperature data.

##### 6.3.3.4 Calibration

- None

#### 6.3.4 Process

Step	Operator	Activity	Documentation	Comments
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Step	Operator	Activity	Documentation	Comments
1	OP	Access website <a href="http://www.weatheronline.co.uk">www.weatheronline.co.uk</a>		The use of any other reputable weather source is acceptable
2	OP	Select weather history for project activity location		Use name of town located most closely to the project activity
3	OP	Using the average temperature select the appropriate climate region <sup>1</sup>	Update SMS	
4	QA	Confirm climate selection and proper entry into system		
Farm: FH – Farm Hand; DP – Data Processor; FM – Farm Manager; AgCert: RMT – Regional Maintenance Technician, QA – Quality Assurance; OP – Operations, EN - Engineer				

#### 6.3.5 Records Control

RECORD ID	RECORD LOCATION	RETENTION TIME	DISPOSITION
Temperature Data	OMS	Duration of project + 5 years	Destroy

## 6.4 Work Instruction for monitoring ID 12, Biogas Produced

### 6.4.1 Summary

This ID monitors the volume of biogas sent to the combustion system. It is a quality control check to ensure proper operation of the anaerobic digester.

### 6.4.2 References

- Approved monitoring methodology AM0016 / Version 02; “Greenhouse gas mitigation from improved Animal Waste Management Systems in confined animal feeding operations”
- Data collection forms (provided by farm manager)
- P025, Control of Monitoring and Measuring Device (MMD)

### 6.4.3 Prerequisite(s)

#### 6.4.3.1 Processes

- I036-9, Bio-security and Safety

#### 6.4.3.2 Training of Monitoring Personnel

- Regional Maintenance Technicians and operations personnel shall be trained on data collection transfer processes.

#### 6.4.3.3 Equipment, Materials and Tools

- Biogas Flow Meter

<sup>1</sup> Cool climates have an average temperature below 15°C; temperate climates have an average temperature from 15°C to 25°C inclusive; warm climates have an average temperature above 25°C (Per IPCC, 1996)

#### 6.4.3.4 Calibration

- Prior to using a measuring device, ensure it is calibrated.

#### 6.4.4 Process

Step	Operator	Activity	Documentation	Comments
1	RMT	Record reading in appropriate area of Monthly Monitoring Checklist	Monthly Monitoring Form	
2	RMT	Transmit data to MLB operations	Fax, Electronic, etc	
3	QA	Perform Quality Control Check for format, integrity, etc.		
4	OP	Confirm reading within expected limits IAW manufacturer guidelines.		
5	OP	Store Data		

Farm: FH – Farm Hand; DP – Data Processor; FM – Farm Manager;  
AgCert: RMT – Regional Maintenance Technician, QA – Quality Assurance; OP – Operations, EN - Engineer

#### 6.4.5 Records Control

RECORD ID	RECORD LOCATION	RETENTION TIME	DISPOSITION
Monthly Monitoring Form	Doc Control	Duration of project + 5 years	Destroy

### 6.5 Work Instruction for monitoring ID 13, CO<sub>2</sub> Produced

#### 6.5.1 Summary

This ID monitors the amount of CO<sub>2</sub> contained in the biogas that is routed to the combustion system. It is a quality control check to ensure proper operation of the anaerobic digester. The recorded amount is used as a checks and balances of the calculated emissions.

#### 6.5.2 References

- Approved monitoring methodology AM0016 / Version 02; “Greenhouse gas mitigation from improved Animal Waste Management Systems in confined animal feeding operations”
- P025, Control of Monitoring and Measuring Device (MMD)
- Operations Manual CO<sub>2</sub> Analyzer
- MS004-1F3, O & M Monthly Monitoring Log

#### 6.5.3 Prerequisite(s)

##### 6.5.3.1 Processes

- I036-9, Bio-security and Safety

##### 6.5.3.2 Training of Monitoring Personnel

- Operating the CO<sub>2</sub> Analyzer

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- Regional Maintenance Technicians shall be trained on data collection transfer processes.
- Operations personnel shall be trained on data processing and storage

#### 6.5.3.3 Equipment, Materials and Tools

- CO<sub>2</sub> Analyzer

#### 6.5.3.4 Calibration

- Prior using a measuring device, ensure it is calibrated.

#### 6.5.4 Process

Step	Operator	Activity	Documentation	Comments
1	RMT	Prepare the gas analyzer as directed in the operator manual.	CO <sub>2</sub> Analyzer Operations Manual	
2	RMT	Connect the analyzer hose with water trap to biogas line nipple connection located just prior to flare unit		
3	RMT	Open valve on biogas line		
4	RMT	Take gas reading in accordance with GA-90 Operations Manual		
5	RMT	Record CO <sub>2</sub> readings in appropriate spaces of Monthly Monitoring Checklist	Monthly Monitoring Form	
6	RMT	Close valve on biogas line		
7	RMT	Disconnect hose in reverse order of connection		
8	RMT	Double check that biogas valve is closed prior to leaving area		
9	RMT	Transmit data to MLB operations	Fax, Electronic, etc	
10	QA	Perform Quality Control Check for format, integrity, etc.		
11	OP	Confirm reading within expected limits IAW manufacturer guidelines.		
12	OP	Store Data		
Farm: FH – Farm Hand; DP – Data Processor; FM – Farm Manager; AgCert: RMT – Regional Maintenance Technician, QA – Quality Assurance; OP – Operations, EN - Engineer				

#### 6.5.5 Records Control

RECORD ID	RECORD LOCATION	RETENTION TIME	DISPOSITION
Monthly Monitoring Checklist	Doc Control	Duration of project + 5 years	Destroy

## 6.6 Work Instruction for monitoring ID 14, Operational Status

### 6.6.1 Summary

This ID monitors the operational status of project related equipment.

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## 6.6.2 References

- Approved monitoring methodology AM0016 / Version 02; "Greenhouse gas mitigation from improved Animal Waste Management Systems in confined animal feeding operations"
- MS004-F1, Weekly Monitoring Checklist

## 6.6.3 Prerequisite(s)

### 6.6.3.1 Processes

- I036-9, Bio-security and Safety

### 6.6.3.2 Training of Monitoring Personnel

- Farm hands shall be aware of proper data collection techniques.
- Regional Maintenance Technicians shall be trained on data collection transfer processes.
- Operations personnel shall be trained on data processing and storage.

### 6.6.3.3 Equipment, Materials and Tools

- None

### 6.6.3.4 Calibration

- None

## 6.6.4 Process

Step	Operator	Activity	Documentation	Comments
1	FM / FH	Verify Bio-Gas Metering System is functioning properly, initial and date Weekly Check List indicating compliance	Weekly Check List	
2	FM / FH	Verify Combustion Systems are functioning properly, initial and date Weekly Check List indicating compliance	Weekly Check List	
3	FM / FH	Verify Manure Management System is functioning properly, initial and date Weekly Check List indicating compliance	Weekly Check List	
4	FM / FH	Verify Manure Storage Cover integrity, initial and date Weekly Check List indicating compliance	Weekly Check List	
5	FM / FH	Verify Bio-Gas Metering System is functioning properly, initial and date Weekly Check List indicating compliance	Weekly Check List	
6	RMT	Collect Weekly Checklist`		
7	RMT	Transmit data to MLB operations	Fax, Electronic, etc	
8	QA	Perform Quality Control Check for format, integrity, etc.		
9	OP	Store Data		

Farm: FH – Farm Hand; DP – Data Processor; FM – Farm Manager;

AgCert: RMT – Regional Maintenance Technician, QA – Quality Assurance; OP – Operations, EN - Engineer

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## 6.6.5 Records Control

RECORD ID	RECORD LOCATION	RETENTION TIME	DISPOSITION
Weekly Monitoring Form	Doc Control	Duration of project + 5 years	Destroy

## 6.7 Work Instruction for monitoring ID 16, Project Activity Power Consumption

### 6.7.1 Summary

This Leakage<sup>2</sup> ID monitors the amount of power consumed by project activity equipment (computers, motors, etc.) or equipment used as a result of the project activity. It is used for the determination of possible leakage.

### 6.7.2 References

- Approved monitoring methodology AM0016 / Version 02; "Greenhouse gas mitigation from improved Animal Waste Management Systems in confined animal feeding operations"
- MS004-F1, Weekly Monitoring Checklist

### 6.7.3 Prerequisite(s)

#### 6.7.3.1 Processes

- I036-9, Bio-security and Safety

#### 6.7.3.2 Training of Monitoring Personnel

- Regional Maintenance Technicians shall be trained on data collection transfer processes.
- Operations personnel shall be trained on data processing and storage.

#### 6.7.3.3 Equipment, Materials and Tools

- None

#### 6.7.3.4 Calibration

- Prior to using a measuring device, ensure it is calibrated.

### 6.7.4 Process

Step	Operator	Activity	Documentation	Comments
1	OP/RMT	Identify equipment that is unique to the project activity		
2	OP/RMT	Determine power consumption of identified equipment by metering or calculating consumption		If calculating, ensure use of most conservative numbers
3	OP	Enter parameter into OMS		
4	OP	Store data		

Farm: FH – Farm Hand; DP – Data Processor; FM – Farm Manager;

<sup>2</sup> Leakage is defined as the net change of anthropogenic emissions by sources of greenhouse gases which occurs outside of the project boundary, and which is measurable and attributable to the CDM project activity.

Step	Operator	Activity	Documentation	Comments
AgCert: RMT – Regional Maintenance Technicians, QA – Quality Assurance; OP – Operations, EN - Engineer				

#### 6.7.5 Records Control

RECORD ID	RECORD LOCATION	RETENTION TIME	DISPOSITION
Power consumption data	OMS	Duration of project + 5 years	Destroy

## 6.8 Work Instruction for monitoring ID 19, Green Power Produced

### 6.8.1 Summary

This ID monitors the energy produced as a result of combusting the captured methane gas (CH<sub>4</sub>) in an electric power generator. The reading is recorded monthly in accumulated kwh.

### 6.8.2 References

- Approved monitoring methodology AM0016 / Version 02; "Greenhouse gas mitigation from improved Animal Waste Management Systems in confined animal feeding operations"
- P025, Control of Monitoring and Measuring Device (MMD)
- MS004-F2, O & M Monthly Monitoring Form

### 6.8.3 Prerequisite(s)

#### 6.8.3.1 Processes

- I036-9, Bio-security and Safety

#### 6.8.3.2 Training of Monitoring Personnel

- Regional Maintenance Technicians shall be trained on data collection transfer processes.
- Operations personnel shall be trained on data processing and storage.

#### 6.8.3.3 Equipment, Materials and Tools

- None

#### 6.8.3.4 Calibration

- Prior to using a measuring device, ensure it is calibrated.

### 6.8.4 Process

Step	Operator	Activity	Documentation	Comments
1	RMT	Record reading in appropriate area of Monthly Monitoring Checklist	Monthly Monitoring Form	
2	RMT	Transmit data to MLB operations	Fax, Electronic, etc	

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Step	Operator	Activity	Documentation	Comments
3	QA	Perform Quality Control Check for format, integrity, etc.		
4	OP	Store Data		

Farm: FH – Farm Hand; DP – Data Processor; FM – Farm Manager;  
 AgCert: RMT – Regional Maintenance Technician, QA – Quality Assurance; OP – Operations, EN - Engineer

#### 6.8.5 Records Control

RECORD ID	RECORD LOCATION	RETENTION TIME	DISPOSITION
MS004-F2, O & M Monthly Monitoring Form	Doc Control	Duration of project + 5 years	Destroy

## 7.0 EMISSION REDUCTION CALCULATIONS

### 7.1 Classification

The methodology calls for the classification and categorization of the farm system to include animal type, population, AWMS in use/projected, climate, region, etc. This data is used to properly select lookup table parameters.

### 7.2 Emission factor Determination Test

The methodology further calls for the application of the Emission factor Determination Test, again in order to select the appropriate IPCC lookup parameters. The project developer applied the “Emission Factor Determination Test” described in AM0016 to ascertain that “developed” country emission factors are appropriate for use with the project activity as host country factors are not available (IPCC factors used to determine national GHG inventory), developed nation genetics are used, and the farm employs formulated feed rationing which can be verified.

The data obtained from the above activities described in the above sections are required for the use in the equations identified in AM0016.

### 7.3 Calculating Methane (CH<sub>4</sub>) Emissions

Step 1: Classify farm and production system by identifying livestock category, population, region, climate, and animal waste management system (AWMS).

Step 2: Perform Emissions Factor Determination Test using AM0016, Figure 2, to identify the correct selection and application of IPCC look-up emission factors.

Step 3: Four options are available for the determination of volatile solids excretion rate. Two of the four originate from lookup tables, IPCC, and country-specific. If lookup references are not available, then the  $V_s$  may be determined via calculation based on feed nutrition content and animal weight, e.g., equations 1 and 2. IPCC default values were selected for use. Furthermore, country specific factors are not available. Should country specific factors become available, they should be evaluated and, if appropriate, used to determine  $V_s$ .

Step 4: Two options are available for the determination of methane conversion factors. IPCC default values were selected for use.

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Step 5: Substituting monitored and lookup parameters into the equations will result in the baseline and project activity emission estimates.

#### 7.4 Calculating Nitrous Oxide (N<sub>2</sub>O) Emissions

Step 1: Classify farm and production system by identifying livestock category, population, region, climate, and animal waste management system (AWMS).

Step 2: Perform Emissions Factor Determination Test using AM0016, Figure 2, to identify the correct selection and application of IPCC look-up emission factors.

Step 3: Four options are available for the determination of nitrogen excretion rate. Two of the four originate from lookup tables, IPCC, and country-specific. If lookup references are not available, then the N<sub>ex</sub> may be determined via calculation based on feed nutrition content and animal weight, e.g., equations 3 and 4. IPCC default values were selected for use. Furthermore, country specific factors are not available. Should country specific factors become available, they should be evaluated and, if appropriate, used to determine N<sub>ex</sub>.

Step 4: Substituting monitored and lookup parameters into the equations will result in the baseline and project activity emission estimates.

#### 7.5 Calculating Leakage

##### 7.5.1 Electricity Leakage

The calculation of electricity leakage is described in AM0016, pp. 14 & 15. In summary:

Step 1: Power equipment added as a result of the project activity includes the electronics related to the gas flow meter. Determine actual power consumption based on information contained in the operator's manual or equipment label provided by the manufacturer.

Step 2: A power generator which operates using methane gas is also installed. A meter has been installed on the unit which reflects actual hours run/operated. Determine, using conservative assumptions, the quantity of electricity produced.

Step 3: Compare the result of step 1 and Step 2.

##### 7.5.2 Land Application Leakage

The calculation of land leakage is described in AM0016, pp. 15 - 17. In summary:

The installation of the project activity AWMS has not resulted in any practice change that would influence the land emissions of nitrous oxide. Therefore, this area is not monitored.

## 8.0 REVISION HISTORY

REV DATE	ECO #	DESCRIPTION OF CHANGE	BY	APPROVED
25 Feb 05	Draft	Release	LP	JM

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REV DATE	ECO #	DESCRIPTION OF CHANGE	BY	APPROVED
23 May 05	CR0042	Updated IDs, Clarified processes; Added new responsibilities; Added emergency maintenance contacts; changed data retention time; removed training log from document; distinguished between Supplier management System (SMS) and Operations and Maintenance System (OMS)	JW	JM

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