



UNFCCC Clean Development Mechanism Monitoring Plan

BRASCARBON Methane Recovery Project BCA-BRA-05

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B.7.1 Data and parameters monitored:

Data / Parameter:	T_f
Data unit:	$^{\circ}\text{C}$
Description:	Combustion temperature of the flare
Source of data:	Brascarbon Monitoring Report System
Value of data:	To be monitored
Measurement procedures (if any):	According to the Monitoring Operational Procedure POP-01
Monitoring frequency	Every 1 minute measurement and registration by a Control Logic Program (CLP) which stores the burning temperature every minute.
QA/QC procedures	Check the data for more accurate information.
Any comment:	Monitoring operational procedure POP-01 can be found at the Brascarbon Operational Procedure Manual

Data / Parameter:	SITE INSPECTION
Data unit:	-----
Description:	Inspection on the site considering relevant regulation and the infrastructure of the site
Source of data:	Brascarbon Monitoring Report System
Value of data:	Documents
Measurement procedures (if any):	Annual follow-up of the documentation to check the expiration date, changes in the production lay-out and surroundings of the digester. Use of the annex attached at the operational procedure POP-02
Monitoring frequency	Annually
QA/QC procedures	Check of the confined animal production official documents
Any comment:	Monitoring operational procedure POP-02 can be found at the Brascarbon Operational Procedure Manual

Data / Parameter:	$N_{LT,y}$
Data unit:	Number
Description:	Annual average number of animals of type "LT" in year "y"
Source of data:	Brascarbon Monitoring Report System
Value of data:	Number of heads
Measurement procedures (if any):	Checking of the documentation located at the confined animal production and use of the table annexed at the operational procedure POP-03. Use of the Equation B3 established in the section B4 step 2 item B – determination of the annual average number of animals.
Monitoring frequency	Monthly
QA/QC procedures	Check of the site records and documents.
Any comment:	Monitoring operational procedure POP-03 can be found at the Brascarbon Operational Procedure Manual

Data / Parameter:	W_{site}
Data unit:	Kg
Description:	Average animal weight of a defined livestock population at the project site in year
Source of data:	Brascarbon Monitoring Report System
Value of data:	Default value of 198 kg(breeding) and 50Kg (market). See table B1
Measurement procedures (if any):	Checking data and records in the confined feed animal operation
Monitoring frequency	Quarterly
QA/QC procedures	Check of the site records and documents,
Any comment:	Monitoring operational procedure POP-016

Data / Parameter:	$BG_{burnt,y}$
Data unit:	m^3
Description:	Biogas flared or used as a fuel in the year y.
Source of data:	Brascarbon Monitoring Report System
Value of data:	to be measured during the monitoring period
Measurement procedures (if any):	Reading of the volume in the local flow gear and register in the table annexed in the operational procedure POP-04. The biogas flared is measured continuously and the data is stored in the CLP every minute. The data is recovered monthly from the CLP by the use of the pen drive.
Monitoring frequency	Monthly
QA/QC procedures	Check the registers sent from the field to proceed with the emissions reductions calculation. Control and assure the calibration program of the flow meter.
Any comment:	Monitoring operational procedure POP-04 can be found at the Brascarbon Operational Procedure Manual

Data / Parameter:	$W_{CH_4,y}$
Data unit:	Fraction
Description:	Methane content in biogas in the year “y”
Source of data:	Brascarbon Monitoring Report System
Value of data:	---
Measurement procedures (if any):	Use of methane concentration analysis instrument or ORSAT.
Monitoring frequency	Periodical. To assure that the monitoring frequency provides a 95% confidence level, the adequate frequency will be determined through a statistical analysis of the methane fraction variation, based on methane fraction data gathered on a group of farms per region during a certain period time.
QA/QC procedures	Check the registers in the generated documents. Control and assure the calibration program of the instrument.
Any comment:	Monitoring operational procedure POP-05 can be found at the Brascarbon Operational Procedure Manual

Data / Parameter:	T_{biogas}
Data unit:	°C
Description:	Temperature of the biogas at ambient conditions
Source of data:	Brascarbon Monitoring Report System Official data from CPTEC/INPE http://satelite.cptec.inpe.br/PCD/metadados.jsp?uf=12&id=32334&tipo=MET
Value of data:	According to the ambient conditions
Measurement procedures (if any):	Measurement with a local thermometer. Measurement according Operational Procedure POP-06
Monitoring frequency	Monthly
QA/QC procedures	Check the registers in the generated documents and thermometer calibration
Any comment:	Monitoring operational procedure POP-06 can be found at the Brascarbon Operational Procedure Manual

Data / Parameter:	P biogas
Data unit:	mbar
Description:	Pressure of the biogas at atmospheric conditions
Source of data:	Brascarbon Monitoring Report System Official data from CPTEC/INPE http://satelite.cptec.inpe.br/PCD/metadados.jsp?uf=12&id=32334&tipo=MET
Value of data:	1013 mbar (or 1 atm)
Measurement procedures (if any):	Measurement with portable local pressure gauge. Measurement according Operational Procedure POP-13
Monitoring frequency	Monthly
QA/QC procedures	Check the registers in the generated documents and thermometer calibration
Any comment:	Monitoring operational procedure POP-13 can be found at the Brascarbon Operational Procedure Manual

Data / Parameter:	D _{CH₄,y}
Data unit:	tones / m ³
Description:	Density of the methane combusted at room temperature and 1013 mbar pressure
Source of data:	Brascarbon Monitoring Report System
Value of data:	Determined according the ambient temperature variation
Measurement procedures (if any):	Calculation According to the Operational Procedure POP-07. Use of the formula considering pressure, temperature and molecular mass of methane
Monitoring frequency	Monthly
QA/QC procedures	Check and approve the density value calculation.
Any comment:	Monitoring operational procedure POP-07 can be found at the Brascarbon Operational Procedure Manual. Reference: Annex 13-Tool to determine project emissions from flaring gases containing methane.

Data / Parameter:	Q _{DM}
Data unit:	-----
Description:	Sludge soil application
Source of data:	Brascarbon Monitoring Report System
Value of data:	-----
Measurement procedures (if any):	Supervision in the field
Monitoring frequency	Defined according to the digester performance
QA/QC procedures	Check the registers in the generated documents.
Any comment:	Monitoring operational procedure POP-09 can be found at the Brascarbon Operational Procedure Manual

Data / Parameter:	FE or $\eta_{flare, h}$
Data unit:	%
Description:	Flare Efficiency
Source of data:	Brascarbon Monitoring Report System
Value of data:	<p>If flare temperature $\geq 500^{\circ}\text{C}$ then 90% efficiency</p> <p>If flare operation conditions is out of spec then 50% efficiency</p> <p>If flare temperature $< 500^{\circ}\text{C}$ then 0% efficiency</p>
Measurement procedures (if any):	<p>Enclosed flare is used in the entire project.</p> <p>Brascarbon considers 90% efficiency for the hour with all temperature measurements above or equal to 500°C, 50% for the hour with any parameter of flare operation is out of the range of manufacturer specifications and 0% efficiency for the hour with any temperature measurement is below 500°C.</p> <p>All data and parameters that are required to monitor the flare operation within the range of operating conditions according to manufacturer's specifications will be continuously monitored. The temperature and biogas flow rate data will be monitored minute by minute by a sensor installed in the pipe and in the enclosed flare respectively and both are stored by a CLP. The data stored in the CLP is recovered monthly by the use of a pen drive and the file containing the information will be sent to the QA/QC officer to manage the information. Brascarbon developed the formulary 08.001 in the operational procedure to monitor the hourly flare efficiency according to the criteria above mentioned.</p>
Monitoring frequency	Monthly
QA/QC procedures	<p>Check the registers in the generated documents.</p> <p>The enclosed flare will regularly undergo a maintenance process subject to the appropriate industrial standards and/or manufacturer's specifications in order to ensure measurement accuracy.</p>
Any comment:	<p>The Monitoring Operational Procedure POP-08 was developed to calculate the monthly efficiency and it can be found at the Brascarbon Operational Procedure Manual.</p> <p>According to the manufacture specifications of the enclosed flares the body dimension, the burners, the air mixer, the refractory and the continuous sparking system of the enclosed flares were sized according to the maximum theoretical flow of biogas for each swine farm.</p> <p>50% efficiency of the flare is considered when the temperature $\geq 500^{\circ}\text{C}$ and the flare is operating of the specification parameters (flow and temperatures).</p>

Data / Parameter:	ER _{y,ex-post}
Data unit:	Ton CO ₂ e
Description:	Ex-post emission reductions achieved by the project activity based on monitored values for the year “y”.
Source of data:	Brascarbon Monitoring Report System
Value of data:	to be determinate according to the measured data
Measurement procedures (if any):	Comparison of the baseline with the actual measured data according to the operational procedure POP-17
Monitoring frequency	Yearly
QA/QC procedures	Check the ER calculation and the registers in the generated documents.
Any comment:	Used to cap the maximal emission reduction in any year. Monitoring Operational Procedure POP-17 can be found at the Brascarbon Operational Procedure Manual

Data / Parameter:	FFR
Data unit:	-----
Description:	Formulated Feed Rations
Source of data:	Brascarbon Monitoring Report System
Value of data:	-----
Measurement procedures (if any):	According to the Operational Procedure POP-14
Monitoring frequency	Monthly
QA/QC procedures	Check the registers and/or food purchases records on the farm.
Any comment:	Monitoring operational procedure POP-14 can be found at the Brascarbon Operational Procedure Manual

Data / Parameter:	GENETIC SOURCE
Data unit:	-----
Description:	Genetic source from annex I party
Source of data:	Brascarbon Monitoring Report System
Value of data:	Western Europe
Measurement procedures (if any):	Data and records from the confined feed animal operation. According Operational Procedure POP-15
Monitoring frequency	Annually
QA/QC procedures	Check data and records from the farm operation
Any comment:	Monitoring operational procedure POP-15 can be found at the Brascarbon Operational Procedure Manual

Data / Parameter:	MS% i,y
Data unit:	Fraction
Description:	Fraction of manure handled in project emissions in system “i”, year “y”.
Source of data:	Brascarbon Monitoring Report System
Value of data:	
Measurement procedures (if any):	During the site inspection, checking if changes in the adopted waste management system and surroundings of the digester was modified from the original proposal project activity. Use of the annex attached at the operational procedure POP-02
Monitoring frequency	Annually
QA/QC procedures	Check of the confined animal production official documents
Any comment:	Monitoring operational procedure POP-02 can be found at the Brascarbon Operational Procedure Manual

Data / Parameter:	FV _{RG,h}
Data unit:	m ³ /h
Description:	Volumetric flow rate of the residual gas in dry basis at normal conditions in hour h
Source of data:	Brascarbon Monitoring Report System
Value of data:	to be measured during the monitoring period
Measurement procedures (if any):	Recover the hourly data registered in the data logger (CLP) of the volume in the local control panel according to the operational procedure POP-04
Monitoring frequency	Monthly
QA/QC procedures	Check the registers sent from the field. Control and assure the calibration program of the flow meter.
Any comment:	Monitoring operational procedure POP-04 can be found at the Brascarbon Operational Procedure Manual

Data / Parameter:	TM _{RG,h}
Data unit:	Kg/h
Description:	Mass flow rate of methane in the residual gas in the hour h
Source of data:	Brascarbon Monitoring Report System
Value of data:	to be measured during the monitoring period
Measurement procedures (if any):	To be calculated according to the “Tool to determine project emissions from flaring gases containing methane”. A operational procedure POP 04 includes the instruction to the calculation.
Monitoring frequency	Monthly
QA/QC procedures	Check the registers sent from the field. Calculation of the parameter according to the procedures mentioned above.
Any comment:	Monitoring operational procedure POP-04 can be found at the Brascarbon Operational Procedure Manual



Data / Parameter:	fv _{CH4,RG}
Data unit:	Fraction
Description:	Volumetric fraction of methane content in the residual gas on dry basis measured as 95% confidence level
Source of data:	Brascarbon Monitoring Report System
Value of data:	
Measurement procedures (if any):	Use of methane concentration analysis instrument on dry basis in the sampling point at piping to the flare.
Monitoring frequency	Periodical. To assure that the monitoring frequency provides a 95% confidence level, the adequate frequency will be determined through a statistical analysis of the methane fraction variation, based on methane fraction data gathered on a group of farms per region during a certain period time.
QA/QC procedures	Check the registers in the generated documents. Control and assure the calibration program of the instrument.
Any comment:	Monitoring operational procedure POP-05 can be found at the Brascarbon Operational Procedure Manual

Data / Parameter:	N _{day,y}
Data unit:	Number
Description:	Number of days animal is alive in the farm, in year “y”
Source of data:	Brascarbon Monitoring Report System
Value of data:	Number of days
Measurement procedures (if any):	Checking of the documentation located at the confined animal production and use of the operational procedure POP-03
Monitoring frequency	Monthly
QA/QC procedures	Check of the site records and documents.
Any comment:	Monitoring operational procedure POP-03 can be found at the Brascarbon Operational Procedure Manual

Data / Parameter:	$N_{p,y}$
Data unit:	Number
Description:	Number of animals produced annually of type “LT” in year “y”
Source of data:	Brascarbon Monitoring Report System
Value of data:	Number of heads
Measurement procedures (if any):	Checking of the documentation located at the confined animal production and use of the table annexed at the operational procedure POP-03
Monitoring frequency	annually
QA/QC procedures	Check of the site records and documents.
Any comment:	Monitoring operational procedure POP-03 can be found at the Brascarbon Operational Procedure Manual

Data / Parameter:	E
Data unit:	kwh
Description:	Electricity consumed from the grid by the project
Source of data:	Brascarbon
Value applied:	0 kwh
Measurement procedures (if any):	POP 22 - Eventual energy used to determinate project emissions
QA/QC procedures	Check of the site records and documents.
Monitoring frequency	annually
Any comment:	All energy demand consumed in the project is supplied by batteries charged by solar cells which is an advantage for sunny countries, like Brazil. The energy for the temperature controlling system PLC (Programmable Logic Controller) and the sparkling system is supplied by a 12 volts battery. The autonomy for the batteries is of 240 hours and each system works independently (PLC and sparkling system). There are no blowers, pneumatic or electric valves, pumps, compressors, etc, in the project. The flow system is operated by gravity and atmospherically. Although the application of the treated water from the lagoons in the field irrigation was outside of boundary of project and this activity was carried out into baseline, with the project, in a normal situation this water will be sent to the pasture by gravity. In the second best choice it can be used water biogas pumps and the third option is the use of electrical pump powered by a biogas generator. In either situation, no energy is consumed in the process.

B.7.2 Description of the monitoring plan:

The following table, Table B9, presents the monitoring plan to be applicable for each farm described in the PDD and followed by Brascarbon in order to achieve certified emissions reductions, after each validation and verification process. Other information of monitoring plan and system can be found in the Annex 4.

Table B9 – Monitoring Plan

ID	DATA	Data Type	Data Unit	Data Variable	Frequency	Measured(m) Calculated(c) Estimated(e) Documented(d)	Proportion of the data to be monitored	How will the data be archived?	For how long is archived data to be kept?	Comment
1	T f	Temp	oC	Flare Temp.	Every 1 minute	M	100%	electronic	Duration of the project +5years	Use for flare efficiency
2	Site Inspection	Document	----	----	Annually	D	100%	electronic	Duration of the project +5years	General Site Inspection
3	NLT,y	Number	-	Nr, Of heads	Monthly	M	100%	electronic	Duration of the project +5years	Used to quantify the methane generation potential
4	BGBurnt,y	Volume	m ³	Biogas produced	Monthly	M	100%	electronic	Duration of the project +5years	This parameter measures the instantaneous and cumulative biogas flow rate
5	w CH ₄ ,y	Fraction	%	Methane content	TBD(*)	M	100%	electronic	Duration of the project +5years	Concentration in wet basis
6	T biogas	Temp	oC	Biogas Temperature	Monthly	M	100%	electronic	Duration of the project +5years	Use to biogas density calculation
7	D CH ₄	Mass	Ton/m ³	Density	Monthly	C	100%	electronic	Duration of the project +5years	Density
8	FE	Efficiency	%	Temperature	Monthly	C	100%	electronic	Duration of the project +5years	Calculated according to the flare burning temperature and the flare specification.
9	QDM	Supervision	--	---	Every Batch Disposed	E	100%	electronic	Duration of the project +5years	Sludge disposed outside project boundary
10	W site	Mass	kg	Average Animal weight	Quarterly	D	100%	electronic	Duration of the project +5years	Yearly methane potential generation
11	ER y,estimated	Mass	Ton	CO ₂ e	Annually	C	100%	electronic	Duration of the project +5years	Yearly methane potential generation
12	FFR	-----	---	Feed Formulation	Monthly	D	100%	electronic	Duration of the project +5years	Feed Formulation Ratios
13	P biogas	Pressure	mbar	Biogas Pressure	Monthly	M	100%	electronic	Duration of the project +5years	Feed Formulation Ratios
14	Genetic Source	Document	-----	genetic	Annually	D	100%	electronic	Duration of the project +5years	Genetic Source
15	MS% i,y	fraction	%	Manure handled	Annually	E	100%	electronic	Duration of the project +5years	General Site Inspection
16	FV RG,h	volume	m ³ /h	volume	Monthly	M	100%	electronic	Duration of the project +5years	Volume of residual gas
17	fv CH ₄ ,RG	fraction	%	Methane content	TBD(*)	M	100%	electronic	Duration of the project +5years	Volumetric methane fraction of the residual gas
18	TM RG,h	mass	Kg/h	Mass flow rate	Monthly	M	100%	electronic	Duration of the project +5years	Total mass flow rate of the residual gas
19	N day,y	number	days	days	Monthly	M	100%	electronic	Duration of the project +5years	Nr. Of days animal is alive
20	N p,y	number	heads	Nr of heads	Monthly	M	100%	electronic	Duration of the project +5years	Nr. Of heads per category annually
21	E	KWh	Kw	power	When consumed	M	100%	electronic	Duration of the project +5years	Electricity consumed in the project activity

(*) TBD: to be determinate to attend 95% confidence level



The monitoring plan will concentrate on ensuring the emission reductions are accurately accounted within the project boundary.

Brascarbon introduced operational procedures, from the Brascarbon Operational Procedures Manual, to facilitate the monitoring system of the parameters described in the Table B9 – Monitoring Plan.

A list of the operational procedures can be found in the annex 4, at the end of this project document design.

The summary of the operational procedures with the main activities is described below:

Monitoring of the Flare Temperature

Temperature of the flare will be controlled by a logic system which will be able to store the flare temperature every minute. The sensor - thermo coupling - is installed in the flare body.

The signal from the thermocouple is sent to the PLC where the information of the temperature is recorded every each minute.

The file information from the logic system will be recovered monthly using a pendrive and the file will be sent to the QA/QC officer to manage the information for further verification. A spreadsheet in excel is available from the system to show the temperature per minute per day.

The system CLP and the thermocouple will be powered by solar cell – no use of energy from the grid. A 12 volts battery is also included in the system to save energy to be used during the night or days lack of sun. The battery capacity is for 240 hours.

In the operational procedure POP 1 can be found the formulary 01.001 where the temperature information is managed according to the specification above mentioned.

All QA/QC procedures are described in the operational procedure related to the maintenance and/or calibration of the equipment.



PEN DRIVE



CLP

Site Inspection.

A check list included in the procedure POP 2 – Site Inspection - number 02.001 is the basic orientation to guide the technicians during inspection in the field to follow all items related to the project activity installation.

Attached on it, the MS% i,y - Fraction of manure handled in the system during the year, is included to be inspected during the each farm visit.

No changes in the manure managing system will be permitted during the project activity.

Variable to be monitored: SITE INSPECTION and MS%i,y.



Average number of animals.

To calculate the average number of animals per category LT in the year y ($N_{LT,y}$) the operational procedure has the formulary 03.002 from the operational procedure POP 3 (average number of animals) where it takes into account of the number of days the animal is alive in the year y ($N_{day,y}$) and the number of animals produced per category LT in the year y ($N_{p,y}$).

The days of animals alive and the total animal produced is also monitored with the same procedure and the formulary 03.002.

The formula used to the calculation is indicated in the PDD section B.4, step 2 item B, equation B3.

Variables to be monitored: $N_{LT,y}$, $N_{day,y}$ and $N_{p,y}$.

Measurement of the volumetric flow rate of the biogas and residual gas.

The operational procedure POP 4- Measurement of the biogas flow rate, is a guide to explain to the technicians how to obtain the biogas flow rate.

The control of the flow rate is by a CLP (see picture in the POP 1 description above) installed in the control panel in the project activity site.

The panel is equipped with solar cells to supply energy to the system, a battery (capacity for 10 days lack of sun) and the flow rate transmitter device to receive information from the thermal mass meter. The flow meter used in the project activity is a thermal mass flow meter.

The system is very confident and supplied by Endress+hauser, leader of measurement system of liquids and gases. Example of the meter used in the project activity:



The information recorded in the CLP is recovered by the use of a pendrive and the file containing the information will be sent to the QA/QC officer to manage the information for further verification. A spreadsheet in excel is available from the system to show the flow rate per minute per day.

The variable measured with this procedure are: $BG_{burnt,y}$ and $FV_{RG,h}$.

The data monitored is controlled in the formulary 04.001 attached in the operational procedure POP-04.

Methane content determination.

The POP 5- Methane content was prepared to guide the technicians how to obtain the methane content using an electronic equipment.

The methane content is obtained by a electronic equipment BIOGAS or TESTO.

The concentration of methane is measured in a few seconds before starting the measurement button.

The operation of the equipment and the devices to be used is clearly described in the operational procedure as so as in the equipment manual.



Both equipment is able to measure the methane concentration in the biogas or in the flare residual gas.

The variables measured with this equipment are: $W_{CH_4,y}$ and $fV_{CH_4,RG,y}$.

All QA/QC procedures are described in the operational procedure related to the maintenance and/or calibration of the equipment.

The data monitored is controlled in the formulary 04.001 and 005.001.

Biogas temperature measurement.

The biogas temperature is obtained by a electronic equipment BIOGAS.

The methane temperature is measured in a few seconds after inserting the thermocouple in the biogas line device.

The operation of the equipment and the devices to be used is clearly described in the operational procedure as so as in the equipment manual.

All QA/QC procedures are described in the operational procedure related to the maintenance and/or calibration of the equipment.

The variable measured with this equipment is: T biogas.

The data monitored is controlled in the formulary 04.001 described in the operational procedure POP 4 – Biogas temperature measurement.

Density of the methane determination.

The POP 7- Density of the Methane - is a guide to calculate the methane density. The formulary 07.001 attached in the operational procedure shows the data to be filled to make the calculation.

The methane density calculation is according to the Tool to determine project emissions from flaring gases containing methane.

The variable monitored with this procedure: D_{CH_4} .

Flare efficiency.

The operational procedure POP 8 – Flare efficiency was developed to monitor and calculate the flare efficiency according to the flare manufacturers specification and AMS.III-D version 14.

The Flare Efficiency (FE) is the efficiency of the methane destruction in the hour h in the measured temperature. The flare efficiency is 90% when the flare temperature is higher or equal to 500°C for the respective hour if the flare operation is according to the flare specification. If in any specific hour the flare operation is out of the specification then 50% efficiency is adopted for the respective hour. The flare efficiency is 0% when the flare temperature is less than 500°C for the respective hour.

The frequency of flare efficiency monitoring is hourly and the data of the flare operation can be found in the formulary 01.001 extracted from the CLP that stored all information of the flare monitoring every minute. Monthly is prepared also the formulary 08.001 containing all information of the flare efficiency calculation where it uses the data stored in the CLP.

Brascarbon developed the formulary 08.001 in the operational procedure to monitor the hourly flare efficiency according to the criteria above mentioned.

The data stored in the CLP is recovered by down loading the file through a pen drive connection.

The CLP is powered by photo-voltaic cell – no use of energy from the grid, and the file data is recovered monthly to calculate the Flare Efficiency.

The information of the flare efficiency for each hour during 24 hour per day is registered in the formulary 08.001, flare efficiency monitoring control. This formulary is available for revision and verification at Brascarbon office. The burning temperature and biogas flow rate will be monitored minute by minute by a sensor installed in the pipe and in the enclosed flare respectively and the data is stored in the CLP. The data stored in the CLP is recovered monthly and the information is sent to the QA/QC officer to manage the information to proceed with the emissions reductions calculation. The flare operation is continuously monitored and the documents to prove all data and parameters that are required to monitor the flare operation within the range of operating conditions according to manufacturer's specifications can be found and available at Brascarbon office.

To assure that the flare operates adequately a maintenance program is established to guarantee that the flare operation is according to the manufacturer specification.

The variable monitored with this procedure: FE.

Biogas pressure.

The biogas pressure is obtained by a electronic equipment BIOGAS and procedures described in the operational procedure POP 13- Biogas pressure.

The operating pressure of the digester is atmospherically.

The operation of the equipment and the devices to be used is clearly described in the operational procedure as so as in the equipment manual.

All QA/QC procedures are described in the operational procedure related to the maintenance and/or calibration of the equipment.

The variable measured with this equipment is: P biogas.

The data monitored is controlled in the formulary 04.001.

Formulated feed rations.

Monitoring and controlling of the formulated feed rations used per animal category per confined feed animal operation.

The variable monitored: FFR.

Reference of the operational procedure: POP 14 – formulated feed rations monitoring.

Genetic Source.

Monitoring and controlling of the genetic source in the project activity per farm.

The variable monitored: GENETIC SOURCE.

Reference of the operational procedure: POP 15 – Genetic Source Monitoring.

Animal weight.

The animal weight is monitored and controlled by a formulary 16.001 where each animal category is monitored during the year, according to the operational procedure POP 16 – Animal Weight Monitoring.

Quarterly the data from the feed operations are checked and transferred to the formulary.

Records available in the feed operations will be copied and filed at Brascarbon office and attached with the formulary 16.001.

The variable monitored: W site.



Methane mass flow rate in the residual gas.

The residual mass flow rate can be determined by the POP 17 – Emissions reductions ex-post, where it calculates all parameters to determine the emissions reductions ex-post.

The operational procedure is based according to the Annex 13 – Tool to determine project emissions from flaring gases containing methane equation 15 on Step 7 and equation 13 Step 5.

The variables monitored with this procedure:

$TM_{RG,h}$; mass flow rate of the methane in the residual gas in the hour h.

$ER_{y,ex-post}$; emissions reductions achieved by the project activity based in the monitored values in the year y, in ton CO₂e

$BE_{y,ex-post}$; baseline emissions monitored ex-post, in ton CO₂e..

$PE_{y,ex-post}$; Project emissions ex-post with monitored data, in ton CO₂e .

MD_y ; Methane captured and destroyed ex-post.

The formularies 17.001 and 17.002 as so as 10.001 are used to determine the variables above mentioned.

Monitoring System

The monitoring system will be followed according to the Brascarbon Operations Procedures Manual, detailed to attend all necessary controls in the site to attend all monitoring parameters in the the approved methodology AMS.III.D – Version 14 – “*Methane recovery in animal manure management systems*” and IPCC 2006.

Operational / Monitoring Procedures

Operational / Monitoring procedures listed in the Annex 4.

Quality Assurance/Control: QA/QC

The measuring instruments will be calibrated by the manufacturers’ representatives on a manufacturer’s recommendation basis. The certification of calibration will be controlled by QA/QC officer. The QA/QC officer will be also responsible to assure that all Brascarbon Operations Procedures will be executed based in the Iso9000.

Training

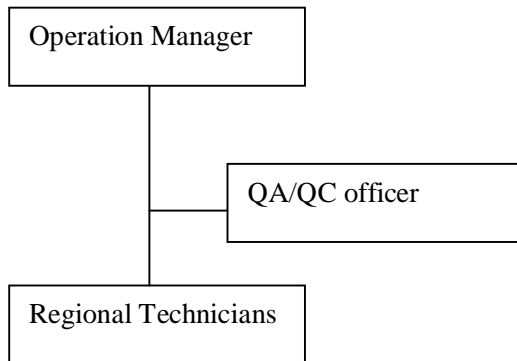
The training of the technicians and all employees is provided by the Operations Manager. The topics of the training is as below:

1. General explanation of the project.
2. Explanation of the procedures of the Operations Procedure Manual.
3. Procedures and preparations for the star-up.
4. Maintenance procedures.
5. Biogas safety instructions.
6. Biogas measurement.
7. Safety Issues.



The training document and the equipment manuals are stored for easy reference in the Brascarbon office.

Organization



Operation Manager

Engineer, responsible for the project operations (maintenance and monitoring).

Regional Technicians

Technician, responsible for the monitoring and maintenance of the site projects according to the procedures in the Operations Procedure Manual.

QA/QC officer

Responsible to assure the quality control of the information and the CDM project documents.

Maintenance

For maintenance of the equipment and to attend the monitoring system, BRASCARBON will use the practices recommended by the equipment supplier for repairs, calibration, etc... The regular maintenance in the site project boundary will be according to the Brascarbon Operation Procedures Manual for all items considered in the project such as the digester, flare, measuring systems, pipings, electrical parts and others.