



VERIFICATION / CERTIFICATION REPORT

AWMS GHG MITIGATION PROJECT BR05-B-04, PARANÁ, SANTA CATARINA, AND RIO GRANDE DO SUL, BRAZIL

(UNFCCC Registration Ref. No. 0411)

Verification Period:
1 December 2009 to 31 May 2010

REPORT No. 2010-1441

REVISION No. 02

DET NORSKE VERITAS



VERIFICATION / CERTIFICATION REPORT

Date of first issue: 27 January 2011	Project No.: PRJC-253345-2010-CCS-NOR
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DET NORSKE VERITAS
CERTIFICATION AS

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Summary:

Det Norske Veritas Certification AS (DNV) has performed the verification of the emission reductions reported for the “AWMS GHG Mitigation Project BR05-B-04, Paraná, Santa Catarina, and Rio Grande do Sul, Brazil” (UNFCCC Registration Ref. No. 0411) for the period 1 December 2009 to 31 May 2010.

In our opinion, the GHG emission reductions reported for the project in the monitoring report (MR06-BR05-B-04, V.3) of 5 January 2011 are fairly stated.

The GHG emission reductions were calculated correctly on the basis of the monitoring methodology AM0016 (version 02), the revised monitoring plan approved on 20 August 2007 and the Project Design Document of 18 October 2005.

Det Norske Veritas Certification AS is able to certify that the emission reductions from the “AWMS GHG Mitigation Project BR05-B-04, Paraná, Santa Catarina, and Rio Grande do Sul, Brazil” during the period 1 December 2009 to 31 May 2010 amount to 18 679 tonnes of CO₂ equivalent.

Report No.: 2010-1441		Subject Group: Environment	
Report title: AWMS GHG Mitigation Project BR05-B-04, Paraná, Santa Catarina, and Rio Grande do Sul, Brazil			
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Work verified by: Michael Lehmann			
Date of this revision: 24 February 2011	Rev. No.: 02	Number of pages: 15	

Indexing terms	
Key words Climate Change Kyoto Protocol Validation Clean Development Mechanism	Service Area Verification
	Market Sector
	Process Industry
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<i>Table of Content</i>	<i>Page</i>
1 INTRODUCTION	1
1.1 Objective	1
1.2 Scope	1
1.3 Description of the Project Activity	1
1.4 Methodology for Determining Emission Reductions	2
2 VERIFICATION METHODOLOGY	3
2.1 Review of Documentation	4
2.2 On-Site Audits at Farm Offices and Inspection of Project Implementation	5
2.3 Assessment of Emission Reductions Calculations	5
2.4 Reporting of Findings	5
3 VERIFICATION FINDINGS	6
3.1 Remaining Issues, CARs, FARs from Previous Verification	6
3.2 Project Implementation	6
3.3 Compliance of Monitoring Plan with Monitoring Methodology	6
3.4 Compliance of Monitoring with the Monitoring Plan	6
3.5 Assessment of Data and Calculation of Emission Reductions	11
3.6 Management System and Quality Assurance	11
4 CERTIFICATION STATEMENT	13
REFERENCES	14
Appendix A List of audited AWMS	
Appendix B Corrective action requests and forward action requests	
Appendix C Curricula vitae of the Verification team members	
Appendix D Checklists	
1) Management system/controls for data collection and recording	
2) Project implementation and installation of monitoring equipment	
3) Evidence and correctness of reported data	
4) Emission reduction calculations	



Abbreviations

AWMS	Animal Waste Management System
B ₀	Maximum methane potential
CAFO	Confined Animal Feeding Operations
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction(s)
CH ₄	Methane
C _m	Conversion factor from [N ₂ O – N] to N ₂ O
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
EF ₃	Emission factor for direct N ₂ O emissions from manure management systems
EF ₄	Emission factor for indirect N ₂ O emissions from atmospheric deposition of N on soils and water surfaces
FAR	Forward Action Request
F _{gasm}	Fraction of animal manure N that volatilizes as NH ₃ and NO _x
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
HRT	Hydraulic Retention Time
IPCC	Intergovernmental Panel on Climate Change
MCF	Methane conversion factor
MP	Monitoring Plan
N ₂ O	Nitrous oxide
N _{ex}	Average annual N excretion per head per animal category
PDD	Project Design Document
QA/QC	Quality Assurance/Quality Control
UNFCCC	United Nations Framework Convention for Climate Change
V _s	Volatile solids excreted in kg/day



1 INTRODUCTION

AgCert International plc (AgCert) has commissioned Det Norske Veritas Certification AS (DNV) to carry out the verification and certification of emission reductions reported for the “AWMS GHG Mitigation Project BR05-B-04, Paraná, Santa Catarina, and Rio Grande do Sul, Brazil” (the project) in the period 1 December 2009 to 31 May 2010. This report contains the findings from the verification and a certification statement for the certified emission reductions.

1.1 Objective

Verification is the periodic independent review and *ex post* determination by a Designated Operational Entity (DOE) of the monitored reductions in GHG emissions that have occurred as a result of the registered CDM project activity during a defined verification period.

Certification is the written assurance by a DOE that, during a specific period in time, a project activity achieved the emission reductions as verified.

The objective of this verification was to verify and certify emission reductions reported for the “AWMS GHG Mitigation Project BR05-B-04, Paraná, Santa Catarina, and Rio Grande do Sul, Brazil” for the period 1 December 2009 to 31 May 2010.

1.2 Scope

The scope of the verification is:

- To verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan.
- To evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement.
- To verify that reported GHG emission data is sufficiently supported by evidence.

The verification shall ensure that reported emission reductions are complete and accurate in order to be certified.

1.3 Description of the Project Activity

Participating Party(ies):	Brazil (host Party), United Kingdom of Great Britain and Northern Ireland and Switzerland (Annex I Parties)
Title of project activity:	AWMS GHG Mitigation Project BR05-B-04, Paraná, Santa Catarina, and Rio Grande do Sul, Brazil
UNFCCC Registration Ref. No.:	0411
Baseline and monitoring methodology	AM0016 (version 02)
Project Participants:	AgCert Do Brasil Solucoes Ambientais Ltda



AgCert International Ltd.

Location of the project activity: South region of Brazil.

At Paraná State: cities of Clevelândia (site 10684) and Castro (site 850061).

At Santa Catarina State: cities of Chapecó (sites 10617 and 10618), Campos Novos (sites 10619, 10620, 10621, 10657, 10658, 10659, 10661, 10700, 10701, 10702, 10703 and 26282), Xaxim (site 10630), Vargeão (site 10683), Lacerdópolis (site 10660), Luzerna (site 10680), Água Doce (site 10681) and Joaçaba (site 10682).

At Rio Grande do Sul State: cities of Santa Rosa (sites 10633 and 10741) and Vila Flores (site 29352).

Project's crediting period: 1 May 2005 to 30 April 2015

Period verified in this verification: 1 December 2009 to 31 May 2010

The project comprises reduction of methane (CH₄) emissions by means of installing ambient temperature anaerobic digesters for treatment of manure and by capturing and flaring the resulting biogas and/or utilizing the biogas for energy generation at selected sites.

The technology employed by the project activity includes installation of new covered lagoons creating an anaerobic digester. The covered and lined lagoon system creates a digester with sufficient capacity and hydraulic retention time (HRT) to nearly eliminate the volatile solids loading in the effluent. Processed effluent from the lagoon cells is routed to the clarification lagoon(s) and captured gas will be removed and combusted.

Prior to project implementation, the project farms used anaerobic lagoon systems to treat manure. Treatment of manure in anaerobic lagoons is thus the selected baseline scenario.

1.4 Methodology for Determining Emission Reductions

Project and baseline CH₄ emissions are determined on a monthly basis by monitoring the livestock (swine) population and by calculating emissions using the validated calculation formulas and validated IPCC default factors emission factors for e.g.

- the volatile solid excretion rate (Vs expressed in kg solid/swine/day) for swine manure
- the maximum methane production capacity (B₀ expressed in m³/kg of Vs) and
- methane conversion factor (MCF expressed in %) applicable for the relevant AWMS, i.e. anaerobic lagoon in the baseline scenario and anaerobic digester in the project scenario.

The project activity does not affect N₂O emissions from manure treatment. N₂O emissions from manure treatment in the project and the baseline scenario are identical when calculated in accordance with AM0016. Validated IPCC default values are used for nitrogen excreted (N_{ex} expressed in kg/swine/day) and emission factors (EF₃ and EF₄ expressed in kg N₂O-N/kg) applicable for determining direct and indirect N₂O emissions.



According to the validated project design, potential leakage effects are associated with the electricity consumed by the project and possible changes to the land application of treated manure effluent. Electricity used by the project activity equipment, such as fans, blowers, motors, pumps, igniters, etc. have been calculated and CO₂ emissions associated with the generation of this electricity has been determined using the validated emission factor of 0.719 kg CO₂ per kWh.

Emission reductions are determined as the difference between baseline emissions and project emissions and leakage ($ER_{net} = BE - PE - L_o$).

Moreover, the amount of CH₄ generated by the digester based on the monitored volume of biogas produced and the biogas composition has been calculated and compared with the CH₄ emission reductions calculated based on livestock population data and IPCC default emission factors (i.e. $BE - PE$).

As required by AM0016, the lowest of i) the amount of CH₄ generated by the digester and ii) the amount of CH₄ emission reductions that has been calculated based on livestock population data and IPCC default emission factors was selected to determine the emission reductions of the project. The selection of the lower of these two values was done for each farm individually.

2 VERIFICATION METHODOLOGY

The verification of the emission reductions has assessed all factors and issues that constitute the basis for emission reductions from the project. These include:

- i) The livestock populations managed by the farms which is recorded monthly;
- ii) The selection of appropriate IPCC default emission factors for determining project and baseline CH₄ and N₂O emissions;
- iii) The biogas flow to the flares and the CO₂ contents of the biogas in order to determine the amount of CH₄ that has been captured and flared;
- iv) The assumptions made to calculate the electricity consumption that occurs as a result of the project and associated emissions.

**Verification team**

Role	Last Name	First Name	Country	Type of involvement					
				Desk review	Site visit	Reporting	Supervision of work	Technical review	TA13.2/15.2 competence
Technical team leader (CDM verifier) with sectoral competence	Leiroz	Andrea	Brazil	✓	✓	✓	✓		✓
GHG auditor	Baines	Gabriel	Brazil	✓	✓	✓			✓
GHG auditor	Philipi	Fabiana	Brazil		✓				
Auditor	Araujo	Anali	Brazil		✓				
Sector expert	Tavares	Luis Filipe	Brazil	✓					✓
Technical reviewer	Lehmann	Michael	Norway					✓	✓

Duration of verification

Preparations: 16 July 2010 to 23 July 2010

On-site verification: 03 August 2010 to 12 August 2010

Reporting, calculation checks & QA: 23 August 2010 to 27 January 2011

Correction of verification / certification report to address issue raised in the completeness check performed by the UNFCCC Secretariat: 24 February 2011

2.1 Review of Documentation

The monitoring report (version 1 dated 12 July 2010 and version 3 dated 5 January 2011) /1/ for the period 1 December 2009 to 31 May 2010, the procedure for calculating emission reductions in AgCert's database EnviroCert /2/, supporting spreadsheets, consisting of specific monthly livestock population data and biogas volume measurement data for each farm and associated emission reduction calculations /3/, and the instruction manuals for the applied flow meter type and the CO₂ content measurement instrument /4/ were assessed. In addition, the project's Project Design Document (PDD) /5/, the revised monitoring plan approved on 20 August 2007 and the project's validation report /8/ were reviewed.

The monitoring report of 12 July 2010 has been made publicly available on the CDM website (date of requesting publication was 19 July 2010).



2.2 On-Site Audits at Farm Offices and Inspection of Project Implementation

DNV visited all farms for which emission reductions have been reported (refer to Appendix A). For all farms DNV verified that the actual implementation of the project was as described in the PDD. The site visit comprised a check of the digester system, the flare and the biogas meter and included:

- Verifying the implementation and the effectiveness of operation and maintenance of the anaerobic digester and biogas handling system;
- Verifying that the volumes of biogas produced by the digester and sent to the flare are measured with a gas flow meter and that the CO₂ content of biogas is analysed at least quarterly; and
- Verifying that monitoring equipment is calibrated and correctly operated and maintained.

DNV audited also selected farm owner offices (refer to Appendix A) in order to verify the reported livestock inventory data by comparing livestock population inventory records kept at the farm owner office of selected months with the livestock population data reported in the monitoring report.

AgCert's office in São Paulo was visited on 05 August 2010. DNV audited the processes for recording data collected by AgCert's employees in Brazil. DNV audited in particular the procedures for data recording, processing and reporting and associated QA/QC procedures.

The above assessments were guided by the checklists contained in Appendix D.

2.3 Assessment of Emission Reductions Calculations

The Excel spreadsheet with output of data from the AgCert's EnviroCert database and associated emission reduction calculations /3/ was assessed. In addition, DNV performed control calculations to verify the application of the model. The assessment was guided by the checklist contained in Appendix D.

2.4 Reporting of Findings

Findings established during the verification may be as follows:

A corrective action request (CAR) is issued, where:

- i. Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- ii. Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- iii. Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants.

A clarification request (CL) shall be raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

A forward action request (FAR) is issued for actions if the monitoring and reporting require attention and/or adjustment for the next verification period.

The verification was able to verify that the GHG emission reductions reported for the project in the monitoring report of 5 January 2011 are fairly stated.



One clarification request (CL) was identified. This CL was satisfactorily addressed by the project participant by revising the monitoring report. No corrective action requests (CAR) or forward action requests (FAR) were identified (refer to Appendix B). In addition, the monitoring report was revised to include further details as requested by the UNFCCC Secretariat's completeness check checklist.

3 VERIFICATION FINDINGS

This section summarises the findings from the verification of the emission reductions reported for the "AWMS GHG Mitigation Project BR05-B-04, Paraná, Santa Catarina, and Rio Grande do Sul, Brazil" for the period 1 December 2009 to 31 May 2010.

3.1 Remaining Issues, CARs, FARs from Previous Verification

There are no remaining issues from the previous verification audit.

3.2 Project Implementation

As part of the site visit DNV was able to confirm that the project implementation is in accordance with the project description contained in registered PDD of 18 October 2005.

DNV inspected all farms for which emission reductions have been reported and was able to verify that anaerobic digesters and systems for capturing and flaring and/or utilizing biogas have been implemented at all farms for which emission reductions have been reported.

The digesters performance is as planned and the captured biogas is flared at all sites for which emission reductions have been reported and combusted in a generator or boilers at selected sites identified in the monitoring report. Visual checks of the digesters' membrane integrity and the gas handling system are performed by AgCert and/or the farm owner, recorded and presented to the audit team.

The flares at all farms have a temperature measure device that assures the effective combustion of CH₄ during the time the biogas is directed to the flare. If the temperature decreases, the electronic system closes the main valve and restarts after a few minutes with an electric spark. The flare design ensures that no gas is sent through the flare without the flare being ignited. The flares were inspected and maintained as required by the operation manual and these checks are reported in the "Record Book" of each farm according to inspections and maintenances procedure.

3.3 Compliance of Monitoring Plan with Monitoring Methodology

DNV is able to confirm that the revised monitoring plan approved on 20 August 2007 is in accordance with the approved methodology applied by the project activity, i.e. AM0016 (version 02).

3.4 Compliance of Monitoring with the Monitoring Plan

The monitoring has been carried out in accordance with the monitoring plan approved on 20 August 2007.



DNV is able to confirm that the monitoring plan and the applied methodology have been properly implemented and followed by the project participants;

All parameters stated in the monitoring plan, the applied methodology and relevant CDM Executive Board decisions have been sufficiently monitored as evidenced on table below for each parameter monitored.

All indicators stated in the monitoring plan and the monitoring methodology AM0016 have been monitored and the data have been reported as specified. Only the electricity generated in case biogas is utilised for electricity generation is not measured as stated in the monitoring plan and electricity generation is assumed to be zero.

	<i>Assessment/ Observation</i>
<i>Data / Parameter: (as in monitoring plan):</i>	Population and classification of livestock
<i>Measuring frequency:</i>	The monitoring and reporting of livestock population data is in accordance with well established operational procedures. There is a daily count of the livestock population and birth and mortality are recorded on a daily basis.
<i>Reporting frequency:</i>	Livestock inventories are aggregated in weekly or monthly reports by the farm owner. The records of the farm owners are collected by AgCert's local employees, and monthly livestock inventories are reported to AgCert's data processing unit in Melbourne, Florida, USA.
<i>Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)</i>	Yes
<i>Type of monitoring equipment:</i>	Not applicable
<i>If applicable, has the reported data been cross-checked with other available data?</i>	Not applicable
<i>How were the values in the monitoring report verified?</i>	DNV compared the livestock population data reported in the monitoring report for selected months with livestock population inventory records kept at the farm owner offices that were audited. Reported data matched the inventory records kept at the farm owner offices.
<i>Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?</i>	AgCert's data processing unit in Melbourne, Florida, USA performs QA/QC of the reported data before the monthly livestock inventory data are recorded in AgCert's database EnviroCert.

	<i>Assessment/ Observation</i>
<i>Data / Parameter: (as in monitoring plan):</i>	Temperature and rainfall
<i>Measuring frequency:</i>	Information is taken from data published by the US National Oceanic and Atmospheric Administration



	http://www7.ncdc.noaa.gov
<i>Reporting frequency:</i>	Monthly
<i>Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)</i>	Yes
<i>If applicable, has the reported data been cross-checked with other available data?</i>	Not applicable
<i>How were the values in the monitoring report verified?</i>	Cross check of a sample of reported data with the data published on www.inmet.gov.br . It must be noted that rainfall is not considered in the determination of emission reductions.
<i>Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?</i>	Yes

	Assessment/ Observation
<i>Data / Parameter: (as in monitoring plan):</i>	Biogas produced
<i>Measuring frequency:</i>	Continuous measurement of the flow
<i>Reporting frequency:</i>	Biogas meters are read at least once a month by a local AgCert employee and the meter readings are reported and recorded in EnviroCert by AgCert's data processing unit in Melbourne.
<i>Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)</i>	Yes
<i>Type of monitoring equipment:</i>	ROOTS® Rotary Meters
<i>Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?</i>	The PDD does not specify the accuracy. The type of flow meter applied represent good monitoring practise.
<i>Calibration frequency /interval:</i>	According to the installation, operation and maintenance manual /4/, no initial calibration after correct installation is required. Moreover, the flow meter type applied has a tendency to measure lower volumes if there are any operating problems, resulting in rather an underestimation of actual biogas flows.
<i>Is the calibration interval in line with the monitoring plan? If the monitoring plan does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?</i>	See above The flow meter is maintained and operated according to a well defined Operations and Maintenance (O&M) Plan.
<i>If applicable, has the reported data been cross-checked with other available data?</i>	In line with AM0016, the measured biogas flow is cross-checked with the theoretical amount of biogas generated, calculated based on livestock population



	data and IPCC default emission factors
<i>How were the values in the monitoring report verified?</i>	The biogas volumes reported in the monitoring report were assessed against the records on biogas flow meter readings recorded in EnviroCert (output spreadsheets). Moreover, the biogas volume meter reading at the farms at the time of the on-site audit was compared with the last biogas meter reading recorded by AgCert to cross-check the reported biogas meter readings.
<i>Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?</i>	AgCert's data processing unit in Melbourne, Florida, USA performs QA/QC of the reported data before the biogas flow data are recorded in AgCert's database EnviroCert.

	Assessment/ Observation
<i>Data / Parameter: (as in monitoring plan):</i>	CO ₂ concentration of biogas
<i>Measuring frequency:</i>	Monthly
<i>Reporting frequency:</i>	Quarterly
<i>Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)</i>	Yes
<i>Type of monitoring equipment:</i>	Landtec Biogas Check portable gas analyser
<i>Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?</i>	The PDD does not specify the accuracy. The calibration certificates indicate an accuracy of 1.5% which is deemed to represent good monitoring practise.
<i>Calibration frequency /interval:</i>	The Landtec BioGas Check portable gas analyzer is adjusted prior to use at each site using standard gases. In addition, the device is sent to manufacturer (Landtec) /7/ each six (06) months to be calibrated.
<i>Is the calibration interval in line with the monitoring plan? If the monitoring plan does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?</i>	The Landtec Biogas Check portable gas analyser performs a self-calibration (against bottled gas samples) prior to use at each site. Every 6 months the portable gas analysers are taken out of service and sent to the manufacturer for recalibration. All methane content measurements were measured with a Landtec Biogas Check portable gas analyser which was last calibrated less than six months prior to the measurement /11/. The calibration frequency represents good monitoring practise.
<i>Did calibration confirm proper functioning of monitoring equipment? (Yes / No):</i>	Yes. Certificates of calibration presented confirmed that they were properly functioning.
<i>Is(are) calibration(s) valid for the whole reporting period?</i>	Yes
<i>If applicable, has the reported data been cross-</i>	Reported CO ₂ concentrations are cross-checked

VERIFICATION / CERTIFICATION REPORT

<i>checked with other available data?</i>	with CO ₂ concentration reported for other similar sites.
<i>How were the values in the monitoring report verified?</i>	The CO ₂ concentrations reported in the monitoring report were assessed against the records on CO ₂ concentration recorded in EnviroCert (output spreadsheets). Moreover, at selected sites DNV observed the measurements of the CO ₂ concentration.
<i>Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?</i>	AgCert's data processing unit in Melbourne, Florida, USA performs QA/QC of the reported data before the biogas flow data are recorded in AgCert's database EnviroCert.

	Assessment/ Observation
<i>Data / Parameter: (as in monitoring plan):</i>	Operational status and type of AWMS
<i>Observation frequency:</i>	Weekly
<i>Reporting frequency:</i>	Weekly
<i>Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)</i>	Yes
<i>How were the values in the monitoring report verified?</i>	Sample of records from weekly assessments on operational status were reviewed.

	Assessment/ Observation
<i>Data / Parameter: (as in monitoring plan):</i>	Electricity consumed
<i>Measuring frequency:</i>	The electricity used by the project activity equipment is not metered but calculated. Based on a farm specific list of project activity equipment, the electricity use has been calculated assuming that all relevant electrical equipment operates at full rated capacity, plus 10% to account for distribution losses, for 8760 hours per annum. This is in accordance with the revised monitoring plan for the project approved on 20 August 2007.
<i>Reporting frequency:</i>	Monthly
<i>Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)</i>	Yes
<i>How were the values in the monitoring report verified?</i>	The project participant provided DNV with information on the equipment installed on all sites, and DNV used this list to verify that the electricity consumption is accurately calculated for each site within the project activity. Moreover, during the site visits DNV confirms that the list of equipment provided is correct.



3.5 Assessment of Data and Calculation of Emission Reductions

CH₄ and N₂O emissions in the project and the baseline scenario during the reporting period were correctly calculated based on reported livestock population data and using the validated calculation formulas and the validated IPCC default factors emission factors contained in the PDD. DNV performed control calculations to verify the application of the automated calculation procedure embedded in EnviroCert.

AM0016 requires that “the lower of the actual gas captured and flared or those estimated by equation 26 limits emissions reductions from the project activity”. However, AM0016 (version 02) does not provide any guidance on how to calculate emission reductions based on captured biogas. In the absence of any guidance, emission reductions for each month were calculated by multiplying the biogas volumes measured for each month with the CH₄ content of biogas. The CH₄ content of biogas was determined based on the measured CO₂ content, assuming that biogas consists of mainly CH₄ and CO₂ only, so that the CH₄ content is 100% minus the measured CO₂ content in volume %. In addition, the volume of CH₄ was converted to mass of CH₄ using the density of CH₄ at the average ambient temperature reported for each months (assuming the biogas has standard atmospheric pressure). This approach is in DNV’s opinion deemed appropriate.

The biogas meter readings are recorded at least once a month by a local AgCert. For practical reasons (long distances from one farm to another), it is not always feasible to read the biogas meters at all farms included in the project on exactly the starting date and the end date of the reporting period. Hence, meter reading dates do not necessarily fall on the exact date of the reporting period start and end dates. As a consequence, average daily biogas volumes for each site and for a specific month are determined in accordance with a well defined procedure /2/ using the last biogas meter reading in the month prior to that month, the reading(s) in the month itself and the first reading in the month after that month.

3.6 Management System and Quality Assurance

The monitoring and reporting of livestock population data is in accordance with well established operational procedures. The person in charge of the farm is responsible for livestock population data collection and recording. There is a daily count and the data is internally verified on a weekly basis. There are no written procedures for recording inventory data for the livestock population. Nonetheless, the audits of selected farm owner offices confirmed that monitoring and reporting are carried out consistently and in line with well established practises.

Data is collected and processed by AgCert according to well defined data collection and processing procedures:

- i) Data on livestock population is collected by the farm manager;
- ii) A local AgCert employee visits the farm owner office at least once a month to obtain a monthly livestock inventory and visits the farms to read the biogas flow meters and perform measurements of the CO₂ content of biogas;
- iii) Data is checked by employees of AgCert’s São Paulo office before being reported to AgCert’s data processing unit at Melbourne, Florida, USA;



- iv) Reported data is thoroughly checked prior to being entered into AgCert's EnviroCert database;
 - v) Data is processed using well-established procedures and automated processes.
- QA/QC for reported data and calculations is generally adequate.



4 CERTIFICATION STATEMENT

Det Norske Veritas Certification AS (DNV) has performed the verification of the emission reductions that have been reported for the “AWMS GHG Mitigation Project BR05-B-04, Paraná, Santa Catarina, and Rio Grande do Sul, Brazil” (UNFCCC Registration Reference No. 0411) for the period 1 December 2009 to 31 May 2010.

AgCert International is responsible for the collection of data in accordance with the validated monitoring plan and the reporting of GHG emissions reductions from the project.

It is DNV’s responsibility to express an independent verification statement on the reported GHG emission reductions from the project. DNV does not express any opinion on the selected baseline scenario or on the validated and registered PDD.

DNV conducted the verification on the basis of the monitoring methodology AM0016 (version 02), the revised monitoring plan, the PDD of the project and the monitoring report (MR06-BR05-B-04, V.3) dated 5 January 2011. The verification included i) checking whether the provisions of the monitoring methodology AM0016 and the revised monitoring plan were consistently and appropriately applied and ii) the collection of evidence supporting the reported data.

DNV’s verification approach draws on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. DNV planned and performed the verification by obtaining evidence and other information and explanations that DNV considers necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

In our opinion the GHG emissions reductions of the “AWMS GHG Mitigation Project BR05-B-04, Paraná, Santa Catarina, and Rio Grande do Sul, Brazil” (UNFCCC Registration Ref. No. 0411) for the period 1 December 2009 to 31 May 2010 are fairly stated in the monitoring report (MR06-BR05-B-04, V.3) dated 5 January 2011.

The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology AM00016 (version 02), the revised monitoring plan approved on 20 Aug 2007 and the validated PDD of 18 October 2005.

Det Norske Veritas Certification AS is able to certify that the emission reductions from the “AWMS GHG Mitigation Project BR05-B-04, Paraná, Santa Catarina, and Rio Grande do Sul, Brazil” during the period 1 December 2009 to 31 May 2010 amount to 18 679 tonnes of CO₂ equivalent.

Rio de Janeiro and Oslo, 24 February 2011

Andrea Teixeira Leiroz
CDM Verifier
DNV Rio de Janeiro, Brazil

Michael Lehmann
Director of Services and Technologies
Det Norske Veritas Certification AS



REFERENCES

Documents provided by the Project Participants that relate directly to the reporting of emission reductions.

- /1/ AgCert: *Monitoring Report for “AWMS GHG Mitigation Project BR05-B-04, Paraná, Santa Catarina, and Rio Grande do Sul, Brazil” for period 1 December 2009 to 31 May 2010.* Version 1 dated 12 July 2010 and version 3 dated 5 January 2011.
- /2/ AgCert: *How to Calculate Metered ERs (This document describes how the EnviroCert System calculates a month’s Metered ER from Biogas (based on meter readings), CO₂ (based on CO₂ readings), and Methane Density (based on monthly temperature).* Version of 20 October 2007
- /3/ AgCert: *Excel sheets documenting the emission reduction calculations:*
 - MR06-BR05-B-04 Envirocert output 071210.xls
 - 0411 - MR06-BR05-B-04 EnviroCert Calculations.xls
- /4/ Dresser ROOTS Meter and Instruments: *Installation, Operation & Maintenance - Seried B3 ROOTS Meters Models.*
- /5/ AgCert: *Project Design Document of “AWMS GHG Mitigation Project BR05-B-04, Paraná, Santa Catarina, and Rio Grande do Sul, Brazil”.* Version 3.0 of 18 October 2005.
- /6/ Landtec Biogas ✓ CDM Gas Analyser Manual.
- /7/ Landtec Biogas/CO₂/CH₄ Analyser calibration certificates:
Equipment # GM11379:
 - certificate 3/400 issued 21 January 2009
 - certificate 5/720 issued 17 August 2009
 - certificate 5/926 issued 5 March 2010Equipment # GM11594:
 - certificate 5/802 issued 5 November 2009

Background documents:

- /8/ CDM Executive Board: *Validation and Verification Manual.* Version 01.2
- /9/ TÜV Industries Service GmbH TÜV SÜD Group: *Validation Report for “AWMS GHG Mitigation Project BR05-B-04, Paraná, Santa Catarina, and Rio Grande do Sul, Brazil”.* Report No 674154, Revision 0 of 28 October 2005
- /10/ CDM EB: *Approved baseline and monitoring methodology AM0016 – Greenhouse gas mitigation from improved Animal Waste Management Systems in confined animal feeding operations.* Version 02.
- /11/ CDM EB: *Guidelines for assessing compliance with the calibration frequency requirements.* EB 52 Annex 60.



Persons interviewed during the verification, or persons who contributed with other information that are not included in the documents listed above.

/12/ Daniela Kurosaki Figueiredo , Monitoring Manager, AgCert Brazil

/13/ David Lawrence, Project Coordinator, AgCert Brazil

/14/ Michael Mosley, Director of Quality, AgCert Melbourne, USA

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APPENDIX A

LIST OF AUDITED AWMS

List of audited AWMS

Name of farm owner	Name of farm	Site identify- cation	Date of audit/ Auditor AA: Anali Araujo FP: Fabiana Philipi GB: Gabriel Baines	Conformity of audited AWMS with AMWS characteristics indicated in PDD	Destruction method	Farm office audited this verification
Mario Lanznaster	Master Site 1 FF	10618	9 August 2010 / GB	✓	Flare / Generator / Boiler	✓
	Master Site 2 NF	10617	9 August 2010 / GB	✓	Flare / Generator / Boiler	✓
COPERCAMPOS	Granja Ibicuí – Central Produtora de Leitoes (*)	10619	10 August 2010 / AA	✓	Flare / Boiler	✓
	Granja Ibicuí Sitio 2 (*)	26282	10 August 2010 / AA	N/A	Flare / Boiler	N/A
	Granja Floresta	10620	10 August 2010 / AA	✓	Flare / Boiler	✓
	Fazenda Otaciano	10621	10 August 2010 / AA	✓	Flare	✓
	Fazenda Lacerdópolis - Vitalino Zenaro	10660	No ERs reported (**)	N/A	N/A	N/A
	Granja Natalino Calegari	10657	11 August 2010 / AA	✓	Flare / Boiler	✓
	Fazenda Santa Clara	10658	10 August 2010 / AA	✓	Flare	✓
	Fazenda Santa Cruz	10659	11 August 2010 / AA	✓	Flare	✓
	Fazenda Papua – Vitalino Zenaro	10661	No ERs reported (***)	N/A	N/A	N/A
	Granja Amazonas Belló	10700	10 August 2010 / AA	✓	Flare	✓
	Triunfo II	10701	10 August 2010 / AA	✓	Flare	✓
	Granja Sergio Scalçavara	10702	No biogas was reported for the monitoring period and DNV did thus not visit this site. While baseline emissions are considered zero tCO ₂ e, leakage of 5 tCO ₂ e due the sites electricity consumption	N/A	Flare	N/A

Name of farm owner	Name of farm	Site identify- cation	Date of audit/ Auditor AA: Anali Araujo FP: Fabiana Philipi GB: Gabriel Baines	Conformity of audited AWMS with AMWS characteristics indicated in PDD	Destruction method	Farm office audited this verification
			was accounted for.			
	Granja José Ricardo Durigon	10703	11 August 2010 / AA	✓	Flare	✓
Neudi Pelizza	Granja Frei Plácido	10630	10 August 2010 / GB	✓	Flare/ Generator	✓
Pedro Carpenedo	Grana Ganedo	10633	11 August 2010 / GB	✓	Flare / Generator	✓
COPERIO	Granja Luzerna	10680	No ERs reported (***)	N/A	N/A	N/A
	Granja Água Doce	10681	No ERs reported (***)	N/A	N/A	N/A
	Granja Jabora	10682	No ERs reported (***)	N/A	N/A	N/A
Anélio Thomazzoni	Fazenda Thomazzoni	10683	10 August 2010 / GB	✓	Flare / Boiler	✓
Darci Sívieiro	Sítio Sívieiro	10684	10 August 2010 / GB	✓	Flare / Generator	✓
Edson Ricardo Gross	Granja Ipê	10741	11 August 2010 / GB	✓	Flare	✓
Antonio Cecatto	Granja Cecatto	29352	12 August 2010 / GB	✓	Flare / Generator	✓
Wybe de Jager	Fazenda Cercadinho	850061	3 August 2010 / FP	✓	Flare / Generator	✓

(*) At Granja Ibicuí, two digester systems (“Granja Ibicuí – Central Produtora de Leitoões” and “Granja Ibicuí Sítio 2”) were implemented instead of only one and data are reported separately for each system for this site. The number of animals at this site is as indicated in the PDD.

(**) Construction of site 10660 is not yet completed

(***) Per mutual contractual agreement between the farms owners and the project participant sites 10680, 10681, 10682, and 10661 are no longer monitored

Note: Where several farms belong to the same farm owner, DNV audited livestock population records of all farms managed by the farm owner.

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APPENDIX B

CORRECTIVE ACTION REQUESTS, CLARIFICATION REQUESTS AND FORWARD ACTION REQUESTS

Corrective action requests

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
	<i>No CAR was issued</i>		

Clarification requests

CL ID	Clarification request	Response by Project Participants	DNV's assessment of response by Project Participants
CL 1	During the site visit, DNV verified that the actual implementation of the project activity in Granja Cecatto (29352) was not according to the monitoring report MR06-BR05-B-04 (version 1 dated 12 July 2010). While the monitoring report does not identify the installation of a generator, it was checked that a generator was installed at this site.	Monitoring Report was modified to add Renewable Energy equipment to Site ID 29352, and resubmitted.	DNV reviewed the revised monitoring report and confirmed that information regarding the implementation of the project activity in Granja Cecatto (29352) is correct. This CL is closed.

Forward action requests from previous verification

FAR ID	Forward action request	Summary of how FAR has been addressed in this reporting period	Assessment of how FAR has been addressed
	<i>No pending FAR from previous verification</i>		

Forward action requests from this verification

FAR ID	Forward action request	Response by Project Participants	DNV's assessment of response by Project Participants
	<i>No FAR was issued</i>		

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APPENDIX C

CURRICULA VITAE OF THE VERIFICATION TEAM MEMBERS

Andrea Leiroz

Mrs. Andrea Leiroz holds a Bachelor's Degree in Chemical Engineering, Master Degree in Material Science and Doctor Degree in Mechanical Engineering having an overall experience of around thirteen years.

She has experience of around 4 years in validation and verification of numerous CDM projects in DNV, both in Brazil & abroad.

Her qualification, experience in CDM demonstrates her sufficient sectoral competence in Energy Generation from renewable energy sources, Waste handling and disposal and Animal waste management.

Luis Filipe Aboim Tavares

Mr. Luis Filipe Tavares holds a Technician's Degree in Chemistry and Bachelor's Degree in Metallurgical Engineering having an overall experience of thirty tree years.

Prior to joining DNV having around twenty tree years experience in steel production industry covering utilities (water, steam, wastewater treatment), environment control (atmosphere emissions, water emission and waste dumping).

His experience also covers the development of nitrification biological wastewater station as well as other activities as head of Utilities and Environmental Laboratory control.

He has also been actively involved in implementation of Management Systems such as ISO 9001 standard on coke oven department of steel industry as well as the ISO 140001 standard in all steel plant (the second steel company certified in the world) for more than three years.

He has experience of around 8 years in validation and verification of numerous CDM projects in DNV, both in Brazil & South America.

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in Iron and Steel; Metal production; Oil and Gas industry, CMM recovery and use; Generation from renewable energy sources; Waste handling and disposal and Animal waste management.

Gabriel Baines

Gabriel Baines holds a Bachelor's Degree in Environmental Engineering in the University of São Paulo (Brazil) and has done a short term course in the Environmental School of the University of Leeds (England), having an overall work experience of around 5 years. Prior to joining DNV, has had two and a half years experience in the aluminium industry covering the areas of production and environment. His experience also covers the fields of environmental management and management systems such as ISO 14.001.

He has experience of around 1 year in validation and verification of numerous CDM projects in DNV, both in Brazil and abroad.

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in 9.1. metal production.

Fabiana Philipi

Holds a bachelor degree in Environmental Engineering and has been working as a Greenhouse Gas – GHG Auditor in the Climate Change Services – CCS Business Area of Det Norske Veritas – DNV, since April 2009.

Prior to joining DNV, Fabiana has been working with Green House Gas reduction projects since 2006. Her first experience was in the Brazilian Mercantile and Future Exchange, where worked in the intern position doing researches of the UNFCCC methodologies. After it, she moved to SGS where she participated of the validation and verification of CDM projects, including hydro and wind energy and landfill. Then she moved to Voltalia developing PDDs (Project Design Documents) of small hydro projects, assisting them until registered in the UNFCCC.

Anali Araújo

Holds a bachelor in Chemical Engineering, a post-graduation in Urban Development and Environmental Management and a post-graduation on Safety Engineering, having an overall work experience of 12 years.

Prior to working with DNV, Anali has developed environmental and quality audits in several industries. Her working experience covers the fields of environmental management and management systems.

Michael Lehmann

Michael Lehmann holds a Master Degree in Environmental Sciences with a specialisation in environmental chemistry. He has an overall working experience of around 13 years.

Since 1999 he has worked in the climate change field and has closely followed the international response to the climate change challenge (UNFCCC, Kyoto Protocol) and the responses by national governments (EU ETS, UK ETS) and business. He has managed the validation and verification of many CDM and JI projects and has carried out the technical review of numerous climate change project validations and verifications.

Through his extensive work with validation and verification of CDM and JI projects, he has acquired sectoral competence within energy generation from renewable energy sources, electricity distribution, waste handling and disposal and animal waste management.

He has also experience with verifying corporate greenhouse gas emissions and emission reductions from verifying the emissions of the Norwegian process, paper & pulp and oil & gas industry.

Earlier, he has managed DNV Research's R&D activities with the objective to build and to enhance DNV's knowledge in the field of CO₂ capture and storage. He also conducted R&D to conclude on measuring systems and reporting formats necessary to accurately and trustworthy report greenhouse gas emission reductions, especially addressing uncertainties.

He also provided technical environmental advisory services to clients within the process industry, above all in the field of air emissions. Among others, he developed a methodology for Environmental Risk Assessment for accidental releases of chemicals.

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APPENDIX D

CHECKLISTS

Checklist 1: Management system/controls for data collection and recording

The data management system/controls are assessed to identify reporting risks and to assess the data management system's/control's ability to mitigate reporting risks. The GHG data management system/controls are assessed against expectations for best practice. A score is assigned as follows:

F: Full - all best practice expectations are implemented.

P: Partial - a proportion of the best practice expectations is implemented

L: Limited - this should be given if little or none of the system component is in place.

A Forward Action Request (FAR) is issued where the management system/controls need to be improved in order to assure that data is adequately collected and recorded during the subsequent monitoring and reporting period.

1) Livestock population data

Is there a clear allocation of responsibility and authority for data collection and recording and have persons assigned to specific tasks received sufficient training?

Is data collected and recorded in a consistent manner in terms of data collection frequency, data collection and recording practice, etc.?

Is there any QA/QC performed by farm owner with regard to data collection and recording?

Is there any QA/QC performed by local employees of AgCert with regard to data collection and recording?

Is the collection of data and QA/QC of reported data carried out in a consistent and systematic manner?

2) Data on average weight of livestock population data (if applicable)

Is there a clear allocation of responsibility and authority for data collection and recording and have persons assigned to specific tasks received sufficient training?

Is data collected and recorded in a consistent manner in terms of data collection frequency, data collection and recording practice, etc.?

Is there any QA/QC performed by farm owner with regard to data collection and recording?

Is there any QA/QC performed by local employees of AgCert with regard to data collection and recording?

3) Data on biogas volume and CO₂ content of biogas

Is there a clear allocation of responsibility and authority for data collection and recording and have persons assigned to specific tasks received sufficient training?

Is data collected and recorded in a consistent manner in terms of data collection frequency, data collection and recording practice, etc.?

Is there any QA/QC performed with regard to data collection and recording?

Is there any QA/QC performed by local employees of AgCert with regard to data collection and recording?

4) Data on electricity generation (if applicable)

Is there a clear allocation of responsibility and authority for data collection and recording and have persons assigned to specific tasks received sufficient training?

Is data collected and recorded in a consistent manner in terms of data collection frequency, data collection and recording practice, etc.?

Is there any QA/QC performed with regard to data collection and recording?

5) Data on electricity consumption

Is there a clear allocation of responsibility and authority for data collection and recording and have persons assigned to specific tasks received sufficient training?

Is data collected and recorded in a consistent manner in terms of data collection frequency, data collection and recording practice, etc.?

Is there any QA/QC performed by local employees of AgCert with regard to data collection and recording?

6) Data processing by AgCert

Is there a clear allocation of responsibility and authority for data processing and have persons assigned to specific tasks received sufficient training?

Is data processing carried out in a consistent manner?

Is there any QA/QC performed with regard to data processing?

Are there any written procedures for data processing and QA/QC of data processing?

Checklist 2: Project implementation and installation of monitoring equipment

It is assessed whether

- the project has been implemented as described in the Project Design Document
- the AWMS characteristics are as described in the Project Design Document and the monitoring report
- appropriate monitoring equipment has been installed and calibrated as required in the monitoring plan described in the Project Design Document

A forward action request (FAR) is issued where special attention has to be given in the subsequent monitoring and reporting period with regard to project implementation in order to ensure appropriate project performance maintenance and calibration of monitoring equipment to assure that relevant indicators are accurately measured

1) Project implementation and AWMS characteristics

Have anaerobic digesters been installed and is all manure produced at the farm treated in the anaerobic digesters before being treated in secondary lagoons?

Is biogas utilised for electricity generation and/or flared as described in the PDD?

Has the farm used the same or similar animal feed throughout the whole monitoring and reporting period?

Is the flush system as described in the PDD?

Have there been any significant changes to the flush volume during the selected monitoring and reporting period?

Is the land application of treated manure as described in PDD?

2) Digester performance

Is digester performance as anticipated?

Are the digesters' membranes regularly checked for possible leaks through visual checks? Are visual checks of the digesters' membrane integrity recorded?

3) Biogas handling system

Has the biogas handling system been tested and are the test results recorded?

Is the biogas handling system regularly checked for possible leaks through visual checks? Are visual checks of gas handling system recorded?

4) Electricity generation (if applicable)

Is the electricity generated from biogas measured with an electricity meter and recorded on a monthly basis?

Is the electricity meter used of adequate accuracy?

Has the electricity meter been calibrated in accordance with the meter producer's specifications for calibration?

5) Electricity consumption of project equipment

Has the electricity consumption of all equipment that needed to be installed as a consequence of the project been accounted?

6) Flare

Has the flare been tested as required by the flare's producer?

Has the flare been regularly inspected and has maintenance been carried out as required by the flare's producer and has flare inspections and maintenance been recorded?

7) Biogas flow meter

Has the biogas flow meter continuously monitored the biogas flow from the digesters to the generator and/or flare during the selected monitoring and reporting period?

Is the biogas flow meter used of adequate accuracy?

Has the biogas flow meter been tested as required by the flow meter's producer and have flow meter calibrations been recorded?

8) Measurements of CO₂ content of biogas

Has the CO₂ content of biogas been measured on a quarterly basis during the whole monitoring and reporting period?

Has the CO₂ content of biogas been accurately measured and have measurement results been recorded?

Checklist 3: Evidence and correctness of reported data

Data reported in the monitoring report (and if applicable, in more detailed data reports provided by AgCert) is assessed against data records kept at the farm owner office. Reported data may be verified by checking an adequate sample of data records kept at the farm owner office. The sample size may be selected based on the findings of the assessment of the management system/controls for data collection and recording. More data record samples should be verified if the assessment of the management system/controls indicated that there is a risk for misreporting due to inadequate management system/controls and lack of QA/QC procedures.

If deviations from reported data are observed, these deviations have to be documented below and all data records have to be verified in order to ensure that there are no other reporting errors.

A corrective action request (CAR) is issued where data reported in the monitoring report has to be corrected.

A forward action request (FAR) is issued where data evidence and archiving of records need to be improved in order to assure that adequate evidence for reported data is available for the subsequent monitoring and reporting period.

1) Livestock population data

Is there evidence for the reported data for the selected verification period?

Is the data collected in accordance with required data collection and recording frequency?

Is the data in the monitoring report sustained by data records kept at the farm owner office and has data been correctly transferred from the farm owner data management system to AgCert's data management system?

2) Data on average weight of livestock population data (if applicable)

Is there evidence for the reported data for the selected verification period?

Is the data collected in accordance with required data collection and recording frequency?

Is the data in the monitoring report sustained by data records kept at the farm owner office and has data been correctly transferred from the farm owner data management system to AgCert's data management system?

3) Data on biogas volume and CO₂ content of biogas

Is there evidence for the reported data for the selected verification period?

Is the data collected in accordance with required data collection and recording frequency?

4) Data on electricity generation (if applicable)

Is there evidence for the reported data for the selected verification period?

Is the data collected in accordance with required data collection and recording frequency?

Is the data in the monitoring report sustained by data records kept at the farm owner office and has data been correctly transferred from the farm owner data management system to AgCert's data management system?

5) Data on electricity consumption

Is the electricity consumption estimated using appropriate and conservative assumptions?

Checklist 4: Emission reduction calculations

Emission reduction calculations

It is assessed whether baseline and project emissions have been calculated correctly using correct emission factors

A Corrective Action Request (CAR) is issued where mistakes in the emission reduction calculations have to be corrected.

A Forward Action Request (FAR) is issued where special attention has to be given in the subsequent monitoring and reporting period with regard to

- the transparency of the emission reduction calculations
- reducing risks of calculation errors

1) Calculation of project and baseline emissions based on livestock population data (Note that the calculation of project and baseline emissions only differs with regard to the MCF selected for the project and the baseline scenario)

Has correct input data been used in the calculations?

Have correct emission factors been applied?

Are the calculations correct and transparently presented and the results correctly reported in the monitoring report?

2) Calculation of leakage

Has correct input data been used in the calculations?

Have correct emission factors been applied?

Are the calculations correct and transparently presented and the results correctly reported in the monitoring report?

3) Calculation of emission reductions based on measured biogas volumes

Has correct input data been used in the calculations?

Have correct emission factors been applied?

Are the calculations correct and transparently presented and the results correctly reported in the monitoring report?

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