
VERIFICATION AND CERTIFICATION REPORT

**Alto Tietê Biogás, Redução de
Emissões e Geração de Energia
Ltda.**

**Alto-Tietê landfill gas capture
project**

05/03/2009-31/05/2010

PA 1636

Date of Issue:		Project Number:		
12-07-2011		CDM.VER0752 MP2		
Project Title:				
Alto-Tietê landfill gas capture project				
Organisation:		Client:		
SGS United Kingdom Limited		Alto Tietê Biogás, Redução de Emissões e Geração de Energia Ltda.		
Publication of Monitoring Report:				
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Final Monitoring Version and Date:		Version 7, 16/06/2011		
Summary:				
<p>SGS United Kingdom Ltd has performed the second periodic verification of the CDM project Alto-Tietê landfill gas capture project, UNFCCC Reference Number 1636. The verification includes confirming the implementation of the monitoring plan of the registered PDD number 1636 (revised monitoring plan approved 23/12/2009) and the application of the monitoring methodology as per ACM0001, version 05, EB 28. A site visit was conducted to verify the data submitted in the monitoring report. SGS confirms the following has been reviewed;</p> <ul style="list-style-type: none"> (a) The registered PDD, including the monitoring plan and the corresponding validation report; (b) Monitoring report, previous verification reports, deviation requests, requests for revision of monitoring plan; (c) The applied monitoring methodology; (d) Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board; (e) All information and references relevant to the project activity's resulting in emission reductions <p>The project activity consists of extracting the landfill gas (LFG) produced at the Itaquaquecetuba landfill using a gas collection and gas flaring system. The project activity does not consider the energy (electricity and/or thermal energy) generation. The project only claims CERs from flaring of captured landfill gas.</p> <p>SGS confirms that the project is implemented in accordance with the validated and registered Project Design Document. The monitoring system is in place and the emission reductions are calculated without material misstatements. Our opinion relates to the projects GHG emissions and the resulting GHG emission reductions reported and related to the valid and registered project baseline and monitoring and its associated documents. Based on the information seen and evaluated we confirm that the implementation of the project has resulted in 280,265 tCO₂e emission reductions during period 05/03/2009 up to 31/05/2010.</p>				
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CDM Verification				
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Abbreviations

ACM	Approved Consolidated Methodology
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CL	Clarification
CER	Certified Emission Reduction
DNA	Designated National Authority
EF	Emission Factor
GHG	Greenhouse Gas(es)
LFG	Landfill Gas
LPG	Liquefied Petroleum Gas
MP	Monitoring Plan
PDD	Project Design Document
PLC	Power Line Communications
PP	Project Participants
SGS	Société Générale de Surveillance
UNFCCC	United Nations Framework Convention on Climate Change

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1. Introduction

1.1 Objective

SGS United Kingdom Ltd has been contracted by Alto Tietê Biogás, Redução de Emissões e Geração de Energia Ltda. to perform an independent verification of its CDM project "Alto-Tietê landfill gas capture project". CDM projects must undergo periodic audits and verification of emission reductions as the basis for issuance of Certified Emission Reductions (CERs).

The objectives of this verification exercise are, by review of objective evidence, to establish that:

- The emissions report conforms with the requirements of the monitoring plan in the registered PDD and the approved methodology; and
- The data reported are complete and transparent.

1.2 Scope

The scope of the verification is the independent and objective review and ex post determination of the monitored reductions in GHG emission by the project activity. The verification is based on the validated and registered project design document and the monitoring report. The project is assessed against the requirements of the Kyoto Protocol, the CDM Modalities and Procedures and related rules and guidance.

SGS has, based on the recommendations in the Validation and Verification Manual, employed a risk-based approach in the verification, focusing on the identification of significant reporting risks and the reliability of project monitoring.

The verification is not meant to provide any consulting towards the Client. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project design.

1.3 Project Activity and Period Covered

This engagement covers emissions and emission reductions from anthropogenic sources of greenhouse gases included within the project boundary of the following project and period.

Title of Project Activity:	Alto -Tietê landfill gas capture project
UNFCCC Registration Number:	1636
Monitoring Period Covered in this Report	05/03/2009 to 31/05/2010
Project Participants	Alto Tietê Biogás, Redução de Emissões e Geração de Energia Ltda. (Brazil-Host) Carbon Capital Markets Ltd.; Trading Emissions PLC. (UK)
Location of the Project Activity:	Itaquaquecetuba, São Paulo state, Brazil

The project activity consists of extracting the landfill gas (LFG) produced at the Alto Tietê landfill located in Itaquaquecetuba, São Paulo, Brazil, using a gas collection and gas flaring system. The project activity does not consider the energy (electricity and/or thermal energy) generation. The project results in greenhouse gas emission reductions by combusting of the recovered methane contained in the landfill gas. The whole process is managed by an electrical control system. This control system is provided with a PLC. The system relies on a system allowing process visualization on a personal computer.

The project activity consists in capturing and flaring the landfill gas involving the following components: pipeline to collect the LFG, manifolds, dryer, blower, one flare and meters. The project activity is in operation since 25th September 2008.

2. Methodology

2.1 General Approach

SGS' approach to the verification is a two-stage process.

In the first stage, SGS completed a strategic review and risk assessment of the projects activities and processes in order to gain a full understanding of:

- Activities associated with all the sources contributing to the project emissions and emission reductions, including leakage if relevant;
- Protocols used to estimate or measure GHG emissions from these sources;
- Collection and handling of data;
- Controls on the collection and handling of data;
- Means of verifying reported data; and
- Compilation of the monitoring report.

At the end of this stage, SGS produced a Periodic Verification Checklist which, based on the risk assessment of the parameters and data collection and handling processes for each of those parameters, describes the verification approach and the sampling plan.

Using the Periodic Verification Checklist, SGS verified the implementation of the monitoring plan and the data presented in the Monitoring Report for the period in question. This involved a site visit and a desk review of the monitoring report. This verification report describes the findings of this assessment.

2.2 Verification Team for this Assessment

Verification Team	Role
Fabian Gonçalves	Lead Assessor
Lucas Engelbrecht	Local Assessor
Lorna Guerrero Saldes	Sectoral Expert (Sectoral Scope 13)

Technical Review Team	Role
Alicia Fernandez	Technical Reviewer
Kaviraj Singh	Technical Reviewer and Sectoral Scope Expert

2.3 Means of Verification

2.3.1 Review of Documentation

The validated PDD, the monitoring report submitted by the client and additional background documents related to the project performance were reviewed. A complete list of all documents reviewed is attached in section 8 of this report.

2.3.2 Site Visits

As part of the verification, the following on-site inspections have been performed by members of the assessment team;

Location: Itaquaquecetuba, São Paulo state, Brazil	
Date: 18/08/2010 to 20/08/2010	
Coverage:	Source of Information / Persons Interviewed
The coverage of the site visit included inspections on the equipments installed, a review of performance records, interviews with project participants, operators and local stakeholders, collection of measurements, observations of established practices, QA/QC procedures and testing of the accuracy of monitoring equipment and monitoring management of the project activity.	<p>Rodrigo Almeida (Operational Coordinator - Alto Tietê Biogás)</p> <p>In summary, the OC;</p> <ul style="list-style-type: none"> • Receives and stores equipment calibration and maintenance certificates on site; • Manages the equipment operations and maintenance ensuring that these meet the monitoring requirements in the registered monitoring plan, the monitoring protocol and manufacturer's specifications; • Collects and stores the raw data, ensuring that these meet the monitoring requirements in the PDD and the monitoring protocol and trains the appropriate personnel on operational matters. <p>Alex Sandro dos Santos Ribeiro (Operator – Alto Tietê)</p> <p>In summary, the activities performed by the operator are:</p> <ul style="list-style-type: none"> • Reports to the Operations Coordinator on daily operations of the site; • Ensure that the site is operational and is able to respond in the eventuality of a flare shutdown; • Is able to operate on site and remote instruments. <p>Amauri Rodrigues Junior (Consultant - ENVIRON)</p> <p>Anderson Castanho Gatti (Consultant - ENVIRON)</p> <p>In summary, the consultants were responsible to elaborate the monitoring report, check the compliance with the UNFCCC – EB and respond to findings overview.</p>

2.4 Reporting of Findings

As an outcome of the verification process, the team can raise different types of findings

In general, where insufficient or inaccurate information is available and clarification or new information is required the team shall raise a Clarification Request (CL) specifying what additional information is required.

Where a non-conformance arises the team shall raise a Corrective Action Request (CAR). A 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.

The verification process may be halted until this information has been made available to comply with the requirements of the CDM Executive Board. Failure to address a CL may result in a CAR. Information or clarifications provided as a result of a CL may also lead to a CAR.

A clarification request (CL) will be raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. All CARs and CLs raised during verification shall be resolved prior to submitting a request for issuance.

Corrective Action Requests and Clarification requests are raised in the Periodic Verification Checklist. The Project Developer is given the opportunity to “close” outstanding CARs and respond to CLs and Observations.

Forward Action Requests (FARs) may be raised during verification for actions where the monitoring and reporting require attention and/or adjustment for the next verification period. Observations may be raised which are for the benefit of future projects and future verification actors. These have no impact upon the completion of the verification activity.

All CARs, CLs and FARs for this verification period are included in this report.

2.5 Internal Quality Control

Following the completion of the assessment process and a recommendation by the Assessment Team, all documentation will be forwarded to a Technical Reviewer. The task of the Technical Reviewer is to check that all procedures have been followed and all conclusions are justified. The Technical Reviewer will either accept or reject the recommendation made by the assessment team.

3. Verification Findings

3.1 Project Implementation - General

Project was implemented and equipment installed as described in the registered PDD;

In the first monitoring period a revision of the monitoring plan (ref. 1b) was proposed by SGS and it has been approved on 23rd December 2009 by CDM EB, the information is available on UNFCCC webpage (<http://cdm.unfccc.int/Projects/DB/RWTUV1204280292.23/view>). The project activity started its operation on 25th September 2008 which is the same date as the start of the crediting period.

Also, the assessment team verified that the project boundary in compliance with the approved PDD (ref. 1a) and applied methodology. It involves landfill gas capturing and on-site destruction and the electricity consumption due the project activity. The LPG consumption used to start up the flare is now included in the revised monitoring plan (ref. 1b) and the emissions related to the use of this source are discounted from the emissions reductions.

The **CL #3** was raised asking the PP to clarify the information provided in section B.1 of the monitoring report version 01 (ref. 3a) i.e. “during the monitoring period, the gas analyser AG-02 went out of work or provided inconsistent measurements, as registered in the calculation spreadsheets. In these situations when all the monitored parameters were registered and the flare system operated according to manufacturer’s specifications a flare efficiency of 90% was assumed, according to step 6 of the “Tool to determine project emissions from flaring gases containing methane”.

The PP responded by providing an explanation that section B.1 was rephrased to accurately reflect the condition of the gas analyzer, which was continuously on-line during the operation of the landfill gas capturing and flaring system, over the entire monitoring period. The gas analyzer was occasionally off-line during maintenance or calibration activities, but, in these situations, the flaring system was not operating and no ERs were claimed. AG-02 sometimes provided negative values. When the readings were lower than 0 and higher or equal to -13 ppmv they were assumed to be zero and thus the efficiency was calculated as 100%. When the readings were lower than -13 ppmv and when all other monitored parameters were registered and the flaring system operated according to manufacturer’s specifications (*), although calibration and maintenance procedures in place suggest that the gas analyzer was in good conditions, a flare efficiency of 90% was assumed, according to STEP 6 of the “Tool to determine project emissions from flaring gases containing methane”. The threshold limit of -13 ppmv was conservatively chosen as approximately 50% of the measurement error (1% of 2500ppmv, which equals 25 ppmv).

The DOE assessment team reviewed the manufacturer specification (ref. 14b) which provide that the lower temperature of the flare on proper operation is 700 °C and a minimum LFG flow rate of 1000 Nm³/h. In this way, the DOE assessment team collected a sample of three days of each month of this second monitoring period which have applied the 90% of the flare efficiency according to the tool (total of 30 days in 10 months), in order to check if the temperature was above 700 °C during those days, excluding the data which was already out of the ERs calculation (for eg. if the flare temperature is lower than 500 °C; LFG<1000 Nm³/h and no operation activity).

The DOE analysis presented that the system was stable and the flare temperature was met according to the Step 6 of the tool. Firstly, the temperature was more than 500 °C and secondly more than 700 °C. This was verified through percentile analysis which showed that in 99% of the operation hours the flare temperature was above 793 °C and a LFG flow rate of 3014 Nm³/h. Therefore, the DOE assessment team could conclude that the PP has correctly applied the 90% of the flare efficiency in accordance with step 6 of the “Tool to determine project emissions from flaring gases containing methane” (ref. 8).

In addition, the DOE assessment team has checked that the Gas Analyser (AG-02) was calibrated (ref. 21a-g) in accordance with the manufacturer's specification (ref. 9, page 4-4) which is in compliance with Section C para 8. of the EB 52 Annex 60 – Guidelines for Assessing Compliance with the Calibration Frequency Requirements (ref. 35). Moreover, the assessment team also analysed that the PP has made internal calibrations about twice a month (Ref. 22) with standard gases (ref. 23a-e).

Also, according to the revised approved monitoring plan (ref. 1b), for parameter fvCH₄,FG,h, an external analysis needs to be performed in the flare in accordance with the AM_CLA_0047 (ref. 34). This external analysis was performed by a third party company called Bioagri Ambiental which provided a report with a flare efficiency analysis N° 8368/10A dated 14/01/2010 (ref. 33). The result obtained in this report is a flare efficiency average (there is an average because of the different distances required per AM_CLA_0047) of 99,991%, demonstrating once more that the flare has efficiency higher than 90%.

Furthermore, the intrinsic error band of the equipment was obtained through the gas analyzer manufacturer's manual (ref. 9 – Gas analyzer manufacturer manual page 3-14 and 3-15) which is 1% of 2500 ppmv, which equals to 25 ppmv. The value of 13 ppmv is approx. 50% of the intrinsic error of the equipment (25 ppmv). Therefore, the DOE assessment team considered the adoption of the -13 ppmv (minus 13 ppmv) value as a conservative approach by the PP in the sense that the PP could have assumed a zero reading for measurements of the fvCH₄,FG,h down to – 25 ppmv (minus 25 ppmv), and therefore a 100% FE but instead considered 100% only until -13ppmv. Furthermore, with regards to the appliance of 100% FE the assessment team require to the PP to quantify the emissions reduction that would be using the quantity of FE obtained through the external FE analysis (99,991%) (ref. 33). In this analysis the conclusion is that no difference were found between the calculations (using 100% and 99,991%). For the readings of the fvCH₄,FG,h lower than -13 ppmv, a 90% FE value is applied in accordance with step 6 of the "Tool to determine project emissions from flaring gases containing methane", as described above.

To sum up, as per the several analysis explained and performed above the DOE assessment team considered the appliance of 100% and 90 % FE, as presented above in accordance with the applicable methodology and all applicable tools. The parameter was correctly monitored and calculated against the revised monitoring plan. The procedure followed when gas analyzer reported values under 0 ppmv is considered correct and it was verified it does not threaten the conservative criteria of the ER calculations.

Therefore, **CL #3 was closed out.**

To sum up, the error of the Gas Analyser instrument is 1% or 25ppmv (ref. 9 - Gas analyzer manufacturer manual), in this way values between zero and -25 ppmv could be interpreted as zero (Flare efficiency = 100%). For values below -25ppmv, the flare efficiency of 90% was used.

Instead of using the instrument error, half of the error was applied, to be more conservative, ie: 0.5% or 13ppmv. Therefore, values between zero and -13 ppmv was interpreted as zero (Flare Efficiency = 100%) and to values lower than -13 ppmv, the flare efficiency of 90% was applied.

As the PP has explained that the AG02 has not went out of work during the monitoring period and the information analysed in the discussion of the CL #3 presented above and the situation checked on the site visit, the assessment team concluded that the monitoring procedures are implemented in compliance with the revised monitoring plan (ref. 1b). For additional information please refer to Section 3.4 – Parameter Flare Efficiency and Section 9 – Findings Overview – CL#3.

CL #1 was raised to obtain from the PP discussion on the comparison of the actual emission reduction claimed in the monitoring period in the ERs spreadsheet (ref. 4) and Monitoring Report (ref. 3), with the estimate in the registered PDD, as per the EB 48, Annex 68.

In response to the clarification raised above, the PP has explained that in the PDD the forecasted ERs were 396,399 tCO₂e for 2009 and 438,048 tCO₂e for 2010. The adjusted forecasted ERs for the monitoring period from 05/03/2009 to 31/05/2010 are 509,199.30 tCO₂e, as shown in the revised spreadsheet Calculation_Summary_09-sep-2010_V02_ANAR.xls and described in the revised version of the MR, ATB_2nd_Report_on_GHG_UNFCCC_V03_09-sep-2010_AR.doc. Therefore, the monitored ERs correspond to approximately 55% of the forecasted ERs. The project shows an underperformance of approximately 45% in relation to the forecasted ERs.

The assessment team verified that according to the information provided in the revised ERs spreadsheet version 2 (ref. 4b), the PP has revised the comparison of the actual emission reduction claimed in the monitoring period with the estimate in the registered PDD (ref. 1a), being in accordance with the requirement of the EB 48, Annex 68.

In order to verify and check the comparison performed by the PP in the ERs Spreadsheet (ref. 4b) and in the Monitoring Report (ref. 3b), the assessment team, using the information provided in the registered PDD (ref. 1a) section A.4.4., could check and verify that the estimated value ERs for 302 days respective period of 2009 were 327,979 tonnes whereas for the 151 days respective period of 2010 were 181,219. Thus, the assessment team concluded that the total ERs forecasted in the PDD for this monitoring period were 509,199 tonnes, which is in accordance with what was presented in the monitoring report and ERs spreadsheet.

Therefore, as the ERs claimed for this monitoring period is 280,279 the assessment team concludes that this value represents a 45% underperformance in relation to what was forecasted in the registered PDD (ref. 1a), which is in accordance with what was presented in the ERs spreadsheet (ref. 4b).

To sum up, as the PP has correctly revised the comparison of the actual emission reduction claimed for this second monitoring period (what was not clear before) with the estimate in the registered PDD (ref. 1a).

Thus, the **CL #1 was closed out.**

During the site visit the assessment team observed that work was going on in the landfill (i.e. slopes) which has resulted in the repositioning of collection pipes, which in turn impacted in the collection of landfill gas, justifying the underperformance explained in the revised monitoring report (ref. 3c).

CAR #2 was raised because the monitoring report version 1 (ref. 3a) section C was not in accordance with the *Guidelines for Completing the Monitoring Report Form (EB 54 - Annex 34)* section C – Description of the Monitoring System. The PP was requested to be revised the monitoring report to be in accordance with the EB 54 – Annex 34 the section C.

In the Monitoring Report version 2 (ref. 3b), the PP has corrected section C and included a description of the monitoring system which is found inline with what has been verified by the assessment team during the site visit. However, the PP was further asked to include in the monitoring report the drawing DF-01-459-001 Fluxograma Processo 20ago08_MJ.pdf which is a requirement of section C of EB 54 – Annex 34, which specifically says that “line diagrams showing all relevant monitoring points” shall be included in this section of the Monitoring Report. The PP responded by including the line diagram in the section C of the revised monitoring report.

In this way, CAR #2 was closed out.

3.2 Remaining Issues, CAR's, FAR's from Previous Validation or Verification

Not applicable, there are no remaining issues from previous verification. This is the second monitoring period. The issuance of the CERs for the first monitoring period is pending with UNFCCC.

3.3 Compliance of the monitoring plan with the monitoring methodology.

The monitoring plan of the registered project is in accordance with the applied methodology. Also, the project was implemented and equipment installed as described in the registered PDD.

In the first monitoring period a revision of the monitoring plan (ref. 1b) was performed by SGS and it has been approved on 23rd December 2009, according to the UNFCCC webpage (<http://cdm.unfccc.int/Projects/DB/RWTUV1204280292.23/view>). Also, during the desk review and the site visit the DOE assessment team ascertained that the revised monitoring plan (ref. 1b) is in accordance with the applicable methodology ACM0001 Version 05 (ref. 2).

Photographic evidences of measuring instruments are included in section 11 of this report.

3.4 Completeness of Monitoring

Monitoring of reductions in GHG emissions to result from the registered project have been implemented in accordance with the revised monitoring plan (ref. 1b), approved on 23rd December 2009. The monitoring mechanism is effective and reliable.

The project activity consists of the installation of a landfill gas capture system (wells, pipelines, manifolds, dryer and blower) and destruction through a flare equipment to reduce the greenhouse gases emission (methane). The project was installed by the company Arquipélago and it is in operation since 25th September 2008.

It was verified that data of the parameters measured at the landfill are transferred automatically to the internal system (register) that has restricted access. The data is downloaded in the computer and inserted into the open spreadsheet (ref. 4d).

The **CAR #7 was raised**, because during the site visit the assessment team observed that in the month of “May 2010” on tab “min by min” of the open spreadsheet (ref. 4c) there was a mistake in the extraction of the data from the internal system (register) where the first line was not accounted for. The PP was requested to revise the open spreadsheet, accordingly.

In response to the corrective action raised, the PP has presented the revised calculation spreadsheet of the month of May 2010 (Calculation_201005_AR_Outubro). In order to check if the calculations made in the revised spreadsheet (Calculation_201005_AR_Outubro) were correctly applied, the DOE assessment team took a sample of ten minutes from the open revised spreadsheet of May 2010 and has checked against the data from the supervisory (the name of the computer system where the data is automatically sent from the field) which were found consistent, also the systematic of data treatment were checked by the assessment team and were found to be correct.

In this way, **CAR #7** was closed out. Please refer to section 9 of the findings overview CAR #7.

CAR #4 was raised because according to the Monitoring Report Version 1 (ref. 3a) (Annex B – Calibration Control) the PP has presented the calibration for the equipments TIT-01, TIT-02, PIT-01 and PIT-02, which are not the part of monitoring plan. The PP was requested to revise the Monitoring Report, so as to be in accordance with the approved revised monitoring plan (ref. 1b),

In response to the CAR the PP correctly revised the monitoring report version 02 (ref. 3b) excluding the calibration of the equipments TIT-01, TIT-02, PIT-01 and PIT-02 in accordance with the approved revised monitoring report (ref. 1b).

In this way, CAR #4 was closed out.

CAR #5 was raised because during the site visit the DOE assessment team observed that the value for the parameter $W_{O_2,y}$ on 05/03/2009 was an outlier from the others values presented in the spreadsheet tab called “Daily” (values showing in the Monitoring Report), which is the compilation of the data from the minutes in a day that comes from the tab “min by min” which is where the calculation of the Emission Reductions are performed minute by minute. The PP checked why this value was inconsistent and found that actually just for the day 05/03/2009 of the tab “Daily” the spreadsheet link was getting the wrong column of the tab “min by min”. The PP was required to revise this inconsistency and present a revised Monitoring Report.

In response to the CAR the PP corrected the link in the tab “Daily” of the ERs calculations spreadsheets (ref.4), in order to link it to the correct cell of the tab “min by min”. The PP also correctly revised the monitoring report version 2 (ref. 3b), which only shows the tab “Daily”, to show the correct average for the parameter $W_{O_2,y}$ for the 05/03/2009 recorded in the spreadsheet min by min (which is where the calculations of the ER are performed). Because the error was on the tab “Daily” and not on the tab min by min it did not impact the value of ERs calculated min by min or the daily values of the ERs reported.

Thus, CAR #5 was closed out.

The assessment team checked that in some spreadsheets provided by the PP referent to the tab “Daily” the dates in the months of March and June of 2009 were inconsistent (for example March of 2009 were presented as March of 2010, although the data was correct). In this way, the PP was requested to revise all the spreadsheet and correct the mistakes. **CAR #6 was raised.**

In response the PP provided the revised spreadsheets (ref. 4) with the dates revised in the “daily” tab which allowed the DOE assessment team to verify that the dates are now consistent with this monitoring period.

Thus, CAR #6 was closed out.

A summary of the monitored parameters are presented below:

<p>LFG_{total,y}// LFG_{flared,y}</p>	<p>Total amount of landfill gas captured from project wells / Total amount of landfill gas flared- Nm³</p>	<p>As all gas collected goes to the flared, the parameters LFG_{total,y} and LFG_{flared,y} are the same. There is a flow meter located before the flare and the equipment is identified as FIT-01.</p> <ul style="list-style-type: none"> ST 98 Flex MASSterTM, Serial Number 288577 (ref. 36a and 36b) <p>The parameters measured at the landfill are transferred automatically to the internal system (register) which is inviolable. The data is downloaded in the computer and inserted automatically into the spreadsheet (ref. 4 – Data from the register panel and ERs spreadsheet). In addition, all calculations, including the emission reduction calculus, are done automatically in the spreadsheet (ref. 4).</p> <p>The data from the register is also presented in the Annex A of the Monitoring Report (ref. 3).</p> <p>Regarding calibration, according to CDM VMM V. 1.2 para 184 a) and as per EB 52 Annex 60 para 8, in cases where neither the monitoring methodology, nor the monitoring plan specify any requirements for calibration frequency for measuring equipments, the DOE shall ensure that the equipments are calibrated either in accordance with the specifications of the local/national standards, or as per the manufacturer specification. If local/national standards or the manufacturer specification is not available, international standards may be used.</p> <p>In this way, the monitoring methodology (ref. 2) sets out that the flow meters should be subject to a regular maintenance and testing regime to ensure accuracy. Continuous with the analysis in accordance with EB 52 Annex 60 para 8 the assessment team checked that the same information was presented in the revised monitoring plan (ref. 1b), which does not refer to a specific period of calibration.</p> <p>In accordance with EB 52 Annex 60 para 8, the assessment team checked that the PP internal procedure P459/R04/V01/08 (ref. 6d) defines a calibration periodicity as annual, which is more conservative than the manufacturer specification which refers to a calibration period of 18 months (ref. 18 – Flow Meter Manufacturer Manual).</p> <p>The calibration certificates are presented in the Monitoring Report version 1 (ref. 3a) and the assessment team verified the following calibration certificates issued by:</p> <ul style="list-style-type: none"> GDD Montengel – N° RCBG 001/09, dated 18/02/2009 and valid until 18/02/2010 (ref. 17a); HC Service – N° 001, dated 06/03/2009, valid until 06/03/2010 (ref. 17b); GDD Montengel – N° RCBG 002/09, dated 06/07/2009, valid until 06/07/2010 (ref. 17c); GDD Montengel – N° RCBG 003/09, dated 22/10/2009, valid until 22/10/2010 (ref. 17d); GDD Montengel – N° RCBG 001/10, dated 12/01/2010, valid until 12/01/2011(ref. 17e);
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		<ul style="list-style-type: none"> Technoflow – N° Tech 0179, dated 08/02/2010, valid until 08/02/2011 (ref. 17f); GDD Montengel N° RCBG 003/10, dated 12/05/2010, valid until 12/05/2011 (ref. 17g) <p>The data is transferred automatically from the inviolable register to the ERs spreadsheet (ref. 4).</p> <p>Three samples per month of the open spreadsheet were checked against the data from the internal system (register) and were found consistent. The data presented in the monitoring report is the consolidation of the minutes of the day.</p>
PE_{flare,y}	Project emission from residual gas stream in year y – tCO ₂ e	<p>This parameter is calculated according to the “Tool to determine project emissions from flaring gases containing methane” (ref. 8).</p> <p>All the data was available and is presented below, the PP also provided the calibration certificates for the equipments used to monitor the parameters that are required by the “Tool to determine project emissions from flaring gases containing methane” (ref. 8).</p> <p>Also, the PP provided to the DOE assessment team the open spreadsheets containing the calculations (ref. 4) required by the tool and the calculations presented in the spreadsheets were found in accordance with the “Tool to determine project emissions from flaring gases containing methane (ref. 8)”.</p> <p>The data is exported from the PLC using software and the calculations are carried out in an Excel spreadsheet where the formulas and the data were available to the assessment team. In this way, the assessment team could verify and check that the data and formulas were applied in accordance with the required by the applicable tool. Also, three samples per month were taken of the open spreadsheet (ref. 4d) and were checked against the data from the internal system (register).</p>
W_{CH₄,y} // fv_{ch4,h}	Methane fraction in the landfill gas - m ³ CH ₄ /m ³ LFG // Volumetric fraction of component i in the residual gas in the hour h where i= CH ₄ , CO, CO ₂ , O ₂ , H ₂ , N ₂	<p>Both parameters are measured continuously using a gas analyser on a wet basis. The assessment team has verified during the site visit that no dry treatment was performed in the landfill gas, being in this way the LFG going to the flare on a wet basis.</p> <ul style="list-style-type: none"> Gas analyser, ULTRAMAT Siemens, AG 01, serial number N1-W1-961. <p>The parameters measured at the landfill are transferred automatically to the internal system (register) which is inviolable.</p> <p>The data is downloaded in the computer and inserted automatically into the spreadsheet (ref. 4 – Data from the register panel and ERs spreadsheet). In addition, all calculations, including the emission reduction calculus, are done automatically in the spreadsheet (ref. 4). The data from the register is also presented in the Annex A of the Monitoring Report (ref. 3).</p> <p>Regarding the calibration, according to CDM VMM V. 1.2 para 184 a) and as per EB 52 Annex 60 para 8, in cases where neither the monitoring methodology, nor the monitoring plan specify any requirements for calibration frequency for measuring equipments, the DOE shall ensure that the equipments are calibrated either in accordance with the specifications of the local/national standards, or as per the manufacturer specification. If local/national standards or the manufacturer specification is not available, international standards may be used.</p> <p>In this way, the monitoring methodology (ref. 2) sets out that the gas analyser should be subject to a regular maintenance and testing regime to</p>

		<p>ensure accuracy. Continuous with the analysis in accordance with the EB 52 Annex 60 para 8 the assessment team checked that the same information was presented in the revised monitoring plan (ref. 1b), which does not refer to a specific period of calibration.</p> <p>In accordance with EB 52 Annex 60 para 8, the assessment team checked that the manufactures manual (ref. 9, page 4-4), the equipment calibration should be repeated every six months to twelve months depending on the ambient conditions.</p> <p>In this way, the DOE assessment team verified the external calibration certificates:</p> <ul style="list-style-type: none"> ▪ Certificate issued by Arquipélago, N° 10/2008 dated on 22/09/2008, valid until 22/03/2009 (ref. 21a); ▪ Certificate issued by Arquipélago N° 12/2008 dated on 24/09/2008, valid until 24/03/2009 (ref. 21b); ▪ Certificate issued by Siemens n/i, dated 24/11/2008, valid until 24/05/2009 (ref. 21c); ▪ Certificate issued by Siemens n/i, dated 13/04/2009, valid until 13/10/2009 (ref. 21d); ▪ Certificate issued by Siemens n/i, dated 22/10/2009, valid until 22/04/2010 (ref. 21f) ▪ Certificate issued by Siemens n/i, dated 19/04/2010, valid until 22/10/2010 (ref. 21g) <p>According to the situation verified on site visit and the training certificates provided by the manufacturer's of the gas analyser (ref. 7a), the PP has trained all operators to handle and calibrate the equipments AG-01 (residual gas analyzer) and AG-02 (exhaust gas analyzer).</p> <p>In this way, it was also checked by the assessment team that the internal calibrations were done by the qualified personnel every 15 days (ref. 22 – Internal calibration of the of the gas analysers) utilizing the standard gases (ref. 23 – Calibration certificate of standard gases). The period from 13/10/2009 to 22/10/2009, when there is no valid external calibration, the calibration was covered by the internal calibrations.</p> <p>Furthermore, Siemens, the manufacturer of the gas analyser issued a letter on 11/01/2011 (ref. 43 - Siemens Technical Letter) certifying that the external calibrations are valid for one year and also included that the gas analyzers AG-01 and AG-02 were in perfect conditions during their visit to the site on 22/10/2009 and that the measured values from 13/10/2009 to 22/10/2009 were not compromised.</p> <p>It was provided to the assessment team the procedures regarding to the Maintenance Manual (ref. 6b), Monitoring Manual (ref. 6c) and the Operational Manual (ref. 6d). In addition, the values measured at the landfill are transferred automatically to the internal system (register) which has restricted access. The data from the register is also presented in the Annex A of the Monitoring Report (ref. 3).</p> <p>A complete set of data was available to the DOE assessment team and three samples per month of the open spreadsheet were checked against the data from the internal system (register) and were found consistent. The data presented in the monitoring report is the consolidation of the minutes of the day.</p>
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<p>EL_{IMP}</p>	<p>Total amount of electricity imported to meet project requirement - MWh/year</p>	<p>The electricity imported from the grid is measured by a third party company called Bandeirantes Energias do Brasil.</p> <p>There is an energy meter specific for the energy consumed at the biogas station. The energy meter is identified by:</p> <ul style="list-style-type: none"> ELO 2113 – Série 21 – Serial Number: 12526590 (ref. 40). <p>With regards to the calibration, according to CDM VMM V. 1.2 para 184 a) and as per EB 52 Annex 60 para 8, in cases where neither the monitoring methodology, nor the monitoring plan specify any requirements for calibration frequency for measuring equipments, the DOE shall ensure that the equipments are calibrated either in accordance with the specifications of the local/national standards, or as per the manufacturer specification. If local/national standards or the manufacturer specification is not available, international standards may be used.</p> <p>In this way, the monitoring methodology (ref. 2) presents the following information regarding to this parameter <i>“required to determine CO₂ emissions from use of electricity or other energy carries to operate the project activity. The records of any electricity imported in the baseline too should be recorded at the start of project”</i>.</p> <p>According to the revised monitoring plan the QA/QC procedures for this parameter is determined as <i>“Scope of the Utility Company”</i> and the description of the measurement methods and procedures to be applied are <i>“Measured and invoiced monthly by the utility company. Hard copies of the monthly invoices will be kept in files during the crediting period and two years after”</i>.</p> <p>Furthermore, according to the National Electricity System Operator (ONS – ref. 44), the Brazilian Electric Sector (BES) operates under concession, authorization or permission of the State providing public services on electricity to the population. While public service performed under concession, authorization or permission of the State, the operation of the BES is highly regulated, the regulatory framework extensively defining the powers, rights and duties of the Granting Authority, the Regulatory Agency, Sector Entities and Agents, all with the fundamental goal of ensuring management's commitment to safety of supply and low tariffs in the short, medium and long terms.</p> <p>In this matter the National Operator of the System (ONS – ref. 45) is responsible for coordinating and controlling the operation of facilities for generation and transmission of electricity in the Brazilian Interconnected Power System (BIPS), under the supervision and regulation of the Brazilian Energy Agency (ANEEL).</p> <p>In this way, the third party company which provide electricity energy for the project activity Bandeirante Energias do Brasil is regulated by ONS which in its turn has the procedure N° 12.3 – Measurement system maintenance for invoicing (ref. 46), which establishes the rules and the electricity meters maintenance procedures which Bandeirante Energias do Brasil shall report to ONS. Therefore, the energy utility company (Bandeirante Energias do Brasil) and not the project is responsible for calibration and maintenance of the energy meter.</p> <p>Furthermore, considering that the sales invoice is an official and fiscal document and also that the approved monitoring plan (ref. 1b) considered that the energy measurement is scope of the utility company (in this case Bandeirantes Energias do Brasil), which shall measure and invoice monthly the project activity the assessment team checked the energy consumed by</p>
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		<p>the project activity reported at the monitoring report against the invoices issued by the utility company – Bandeirante Energias do Brasil.</p> <p>In addition to all information presented above the PP provided a statement issued by the electricity company N° DCME 04210 dated 10th December 2010 (ref. 47), which confirms that the electricity meter installed at the installation N° 150261814 were calibrated at the date of installation on 14/10/2008. Also, according with the Calibration Certificated N° DCME – 42/10 – Installation N° 150261814 (ref. 48), which provides the procedures and tests performed in the electricity meter. The result presents that the electricity meter is under the accuracy class specified.</p> <p>In this way, the calibration of the electricity meter was under the precision class during the monitoring period as per the National Operator of the System (ONS – ref. 45), Annex 1 – Item (B), which establishes that the frequency for preventive maintenance of the agent responsible for the SMF(System of Measurement for Invoicing) is a maximum of 2 (two) years. This schedule may be changed based on the historical occurrence observed in all plants, considering the schedule of shutdowns.</p> <p>Therefore, the data presented for the period from 05/03/2009 to 31/05/2010, is the energy consumed by the project activity was monitored by an electricity meter which is controlled by a third party company (ref. 40 – Electricity Meter Photograph).</p> <p>The values presented in the monitoring report (ref. 3) regarding to the electricity consumption were checked against the invoices (ref. 24 – Energy invoices) issued by the electricity company responsible for selling the energy for the project activity.</p> <p>In this way the assessment team verified the following sales invoices:</p> <ul style="list-style-type: none"> ▪ Fiscal Invoice N° 002785688, Issued by Bandeirante Energias do Brasil, for the period from 04/03/2009 to 03/04/2009, regarding to the consumption of 26.193 MWh (ref. 24); ▪ Fiscal Invoice N° 002768955, Issued by Bandeirante Energias do Brasil, for the period from 03/04/2009 to 06/05/2009, regarding to the consumption of 31.412 MWh (ref. 24); ▪ Fiscal Invoice N° 002719031, Issued by Bandeirante Energias do Brasil, for the period from 06/05/2009 to 05/06/2009, regarding to the consumption of 33.855 MWh (ref. 24); ▪ Fiscal Invoice N° 002733477, Issued by Bandeirante Energias do Brasil, for the period from 05/06/2009 to 03/07/2009, regarding to the consumption of 37.594 MWh (ref. 24); ▪ Fiscal Invoice N° 001123959, Issued by Bandeirante Energias do Brasil, for the period from 03/07/2009 to 05/08/2009, regarding to the consumption of 48.864 MWh (ref. 24); ▪ Fiscal Invoice N° 002848930, Issued by Bandeirante Energias do Brasil, for the period from 05/08/2009 to 03/09/2009, regarding to the consumption of 44.442 MWh (ref. 24); ▪ Fiscal Invoice N° 001497607, Issued by Bandeirante Energias do Brasil, for the period from 03/09/2009 to 05/10/2009, regarding to the consumption of 53.222 MWh (ref. 24); ▪ Fiscal Invoice N° 001359554, Issued by Bandeirante Energias do Brasil, for the period from 05/10/2009 to 05/11/2009,
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		<p>regarding to the consumption of 42.602 MWh (ref. 24);</p> <ul style="list-style-type: none"> Fiscal Invoice N° 002200826, Issued by Bandeirante Energias do Brasil, for the period from 05/11/2009 to 04/12/2009, regarding to the consumption of 47.102 MWh (ref. 24); Fiscal Invoice N° 001368240, Issued by Bandeirante Energias do Brasil, for the period from 04/12/2009 to 06/01/2010, regarding to the consumption of 45.309 MWh (ref. 24); Fiscal Invoice N° 001368242, Issued by Bandeirante Energias do Brasil, for the period from 06/01/2009 to 03/02/2010, regarding to the consumption of 45.852 MWh (ref. 24); Fiscal Invoice N° 001269350, Issued by Bandeirante Energias do Brasil, for the period from 03/02/2009 to 05/03/2010, regarding to the consumption of 46.088 MWh (ref. 24); Fiscal Invoice N° 001510374, Issued by Bandeirante Energias do Brasil, for the period from 05/03/2010 to 06/04/2010, regarding to the consumption of 34.602 MWh (ref. 24); Fiscal Invoice N° 001326881, Issued by Bandeirante Energias do Brasil, for the period from 06/04/2010 to 05/05/2010, regarding to the consumption of 28.647 MWh (ref. 24); Fiscal Invoice N° 001349165, Issued by Bandeirante Energias do Brasil, for the period from 06/05/2010 to 04/06/2010, regarding to the consumption of 36.446 MWh (ref. 24); <p>The data uncertainty is low because it comes from a third party company called Bandeirantes Energias do Brasil which is controlled by the Brazilian Electricity Agencies and the landfill pays for the energy consumption.</p>
Landfill waste	waste disposal during a year in Alto-Tietê Landfill-metric tonnes	<p>The waste disposed in the landfill is weighted. The company PAJOAN is the responsible for the operation of the landfill and the waste disposal. This parameter is not used in the CERs calculation.</p> <p>There are two weighbridge, one principal - 60 tonnes (Perfecta brand) and one rearguard - 40 tonnes (Filizola brand). The scales are controlled by Pajoan (ref. 19 – Scales Calibration Certificates).</p> <p>Regarding calibration, according to CDM VMM V. 1.2 para 184 a) and as per EB 52 Annex 60 para 8, in cases where neither the monitoring methodology, nor the monitoring plan specify any requirements for calibration frequency for measuring equipments, the DOE shall ensure that the equipments are calibrated either in accordance with the specifications of the local/national standards, or as per the manufacturer specification. If local/national standards or the manufacturer specification is not available, international standards may be used.</p> <p>In this way, the monitoring methodology (ref. 2.a) does not have any information which regards to the calibrations of the scales. Continuous with the analysis in accordance with EB 52 Annex 60 para 8 the assessment team checked that the no information regarding to the calibration of the scales was presented in the revised monitoring plan (ref. 1b).</p> <p>In this way, the assessment team checked that according with the specifications of the local/national standards as per the Decree N° 236 dated 22nd December 1994 (ref. 39) of the National Institute of Metrology, Standardization and Industrial Quality, with regards to the weighing</p>

		<p>instruments for consumer protection, for ease of use and accuracy of mass measurements, for fraud prevention and influences to which these instruments can be subject. This decree sets that the periodicity of the calibration/verification is limited to 1 (one) year, except for special cases that can be defined by INMETRO.</p> <p>As the standard calibration established by INMETRO is yearly, the assessment team verified the following:</p> <p>Principal:</p> <ul style="list-style-type: none"> Calibration certificate issued by INMETRO, nº 823638 ref. 19a, dated 18/03/2009. <p>Rearguard:</p> <ul style="list-style-type: none"> Calibration certificate issued by INMETRO, nº 823637 ref. 19b, dated 18/03/2009. <p>PAJOAN sends data from the weighbridges and they are inserted directly into the internal system.</p> <p>During the site visit the DOE assessment team collected a spreadsheet from Pajoan (ref. 20) with the data referent of the waste received during the second monitoring period. The values presented in the Monitoring Report version 1 (ref. 1a) were checked against the Pajoan spreadsheet (ref. 20) and were found consistent.</p>
Regulatory requirements relating to landfill gas projects	Regulatory requirements relating to landfill gas projects	<p>The document review was based on the environmental installation license (ref. 16a-j) and the environmental operation license (ref. 16a-j) and those licenses are in compliance with this monitoring period.</p> <p>The regulatory requirements were analyzed through the environmental licenses issued to the landfill (ref. 16a-j) and do not change the baseline emissions of the project activity being in accordance with the registered PDD (ref. 1).</p>
FE	Combustion efficiency %	<p>During this Monitoring Period the flare efficiency was calculated according to the “Tool to determine project emissions from flaring gases containing methane” (ref. 8). The parameters involved in the calculation are continuously measured.</p> <p>The parameters required by the tool to be monitored are as following: $f_{vi,h}$; $FV_{RG,h}$; $t_{O2,h}$; $f_{VCH4,FG,h}$; T_{flare}.</p> <p>The DOE assessment team checked the open spreadsheets and has verified that the equations and formulae presented were applied in accordance with the “Tool to determine project emissions from flaring gases containing methane” (ref. 8).</p> <p>However, in some situations the gas analyzer was occasionally off-line during maintenance or calibration activities, but, in these situations, the flaring system was not operating and no ERs were claimed. AG-02 sometimes provided negative values. When the readings were lower than 0 and higher or equal to -13 ppmv they were assumed to be zero and thus the efficiency was calculated as 100%. When the readings were lower than -13 ppmv and when all other monitored parameters were registered and the flaring system operated according to manufacturer’s specifications, although calibration and maintenance procedures in place suggest that the gas analyzer was in good conditions, a flare efficiency of 90% was assumed, according to STEP 6 of the “Tool to determine project emissions from flaring gases containing methane”. The threshold limit of -13 ppmv was</p>

		<p>conservatively chosen as approximately 50% of the measurement error (1% of 2500ppmv, which equals 25 ppmv).</p> <p>In other to check the information presented the DOE assessment team analysed the manufacturer specification (ref. 14b) which provide that the lower temperature of the flare on proper operation is 700 °C and a minimum LFG flow rate of 1000 Nm³/h. In this way, the DOE assessment team collected a sample of three days of each month of this second monitoring period which have applied the 90% of the flare efficiency according to the tool (total of 30 days in 10 months), in order to check if the temperature was above 700 °C during those days, excluding the data which was already out of the ERs calculation (for eg. if the flare temperature is lower than 500 °C; LFG<1000 Nm³/h and no operation activity).</p> <p>The DOE analysis presented that the system was stable and the flare temperature was met according to the Step 6 of the tool. Firstly, the temperature was more than 500 °C and secondly more than 700 °C. This was verified through percentile analysis which showed that in 99% of the operation hours the flare temperature was above 793 °C and a LFG flow rate of 3014 Nm³/h. Therefore, the DOE assessment team could conclude that the PP has correctly applied the 90% of the flare efficiency in accordance with step 6 of the “Tool to determine project emissions from flaring gases containing methane” (ref. 8).</p> <p>In addition, the DOE assessment team has checked that the Gas Analyser (AG-02) was calibrated (ref. 21a-g) in accordance with the manufacturer’s specification (ref. 9, page 4-4) which is in compliance with the Section C para 8. of the EB 52 Annex 60 – Guidelines for Assessing Compliance with the Calibration Frequency Requirements (ref. 35). Moreover, the assessment team also analysed that the PP has made internal calibrations about twice a month (Ref. 22) with standard gases (ref. 23a-e).</p> <p>Also, according to the revised approved monitoring plan (ref. 1b), for parameter fvCH₄,FG,h, an external analysis needs to be performed in the flare in accordance with the AM_CLA_0047 (ref. 34). This external analysis was performed by a third party company called Bioagri Ambiental which provided a report with a flare efficiency analysis N° 8368/10A dated 14/01/2010 (ref. 33). The result obtained in this report is a flare efficiency average (there is an average because of the different distances required per AM_CLA_0047) of 99,991%, demonstrating once more that the flare has efficiency higher than 90%.</p> <p>In addition, three samples per month were taken of the open spreadsheet (ref. 4d) and were checked against the data from the internal system (register).</p> <p>In addition, the equipments used to measure the parameters applied in the calculus were calibrated and the data is transferred automatic. Formulas are correctly inserted into the spreadsheet.</p> <p>A complete set of data was available to the DOE assessment team and three samples per month of the open spreadsheet were checked against the data from the internal system (register) and were found consistent. The data presented in the monitoring report is the consolidation of the minutes of the day.</p>
T _{flare}	Temperature in the	The parameters measured at the landfill are transferred automatically to the internal system (register) which is inviolable.

	exhaust gas of the flare- °C	<p>The data is downloaded in the computer and inserted automatically into the spreadsheet (ref. 4 – Data from the register panel and ERs spreadsheet). In addition, all calculations, including the emission reduction calculus, are done automatically in the spreadsheet (ref. 4).</p> <p>The data from the register is also presented in the Annex A of the Monitoring Report (ref. 3).</p> <p>A complete set of data was available to the DOE assessment team and three samples per month of the open spreadsheet were checked against the data from the internal system (register) and were found consistent. The data presented in the monitoring report is the consolidation of the minutes of the day.</p> <p>According to the revised monitoring plan (ref. 1) the calibration of the thermocouples in the exhaust gas of the flare shall be done yearly.</p> <p>The assessment team has verified the following calibration certificates:</p> <p><u>TT 04:</u></p> <ul style="list-style-type: none"> ▪ Calibration certificate issued by Ecil - N° 6074/08, dated on 03/09/2008, valid until 03/09/2009 (ref. 25a); ▪ Calibration certificate issued by GDD Montengel - N° ATBG 008/09, dated on 18/02/2009, valid until 18/02/2010 (ref. 25b); ▪ Calibration certificate issued by GDD Montengel - N° ATBG 016/09, dated on 06/07/2009, valid until 06/07/2010 (ref. 25c); ▪ Calibration certificate issued by GDD Montengel - N° ATBG 020/09, dated on 22/10/2009, valid until 22/10/2010 (ref. 25d); ▪ Calibration certificate issued by GDD Montengel - N° ATBG 002/09, dated on 12/01/2010, valid until 12/01/2011 (ref. 25e); ▪ Calibration certificate issued by GDD Montengel - N° ATBG 012/09, dated on 12/05/2010, valid until 12/05/2011 (ref. 25f); <p><u>TT 05:</u></p> <ul style="list-style-type: none"> ▪ Calibration certificate issued by Ecil - N° 6075, dated on 03/09/2008, valid until 03/09/2009 (ref. 25g); ▪ Calibration certificate issued by GDD Montengel - N° ATBG 007/09, dated on 18/02/2009, valid until 18/02/2010 (ref. 25h); ▪ Calibration certificate issued by GDD Montengel - N° ATBG 015/09, dated on 06/07/2009, valid until 06/07/2010 (ref. 25i); ▪ Calibration certificate issued by GDD Montengel - N° ATBG 019/09, dated on 22/10/2009, valid until 22/10/2010 (ref. 25j); ▪ Calibration certificate issued by GDD Montengel - N° ATBG 001/09, dated on 12/01/2010, valid until 12/01/2011 (ref. 25l); ▪ Calibration certificate issued by GDD Montengel - N° ATBG 013/09, dated on 12/05/2010, valid until 12/05/2011 (ref. 25m); <p>The uncertainty is low due to the use of calibrated equipment (ref. 25a-m), automatic data and procedures presented to SGS (ref. 6b - Maintenance Manual, 6c Monitoring Manual and 6d – Operational Manual).</p>
Flare_n	Flare working	A complete set of data was available, The flare working hours are obtained

	hours- hours	<p>from the internal system (register) and controlled in the opened spreadsheet (ref. 4d). The spreadsheet with detailed data is consistent and the data are presented in hours, as required by the applicable methodology (ref. 2) and revised monitoring plan (ref. 1b).</p> <p>The data presented in the monitoring report are the sum of the minutes of the day.</p>
FV_{RG,h}	Volumetric flow rate of the landfill gas in dry basis at normal conditions in the hour h- m ³ /h	<p>The flow rate of the landfill gas is measured continuously in wet basis at normal conditions. The assessment team has verified during the site visit that no dry treatment was performed in the landfill gas, being in this way the LFG going to the flare on a wet basis.</p> <p>Regarding to the way that this parameter shall be monitored at the applicable methodology ACM0001 V.05 (ref. 2a) there is no information with regards to the measurement of this parameter as it is a parameter required to calculate the project emissions (PE).</p> <p>In this way, the assessment team checked that in the “Tool to determine project emissions from flaring gases containing Methane” (ref. 2b) the information regarding to FV_{RG,h} parameter is in accordance with the text presented in the revised monitoring plan (ref. 1b).</p> <p>In the text presented in the line regarding to the description of the parameter it is presented that “volumetric flow rate of the residual gas in dry basis at normal conditions in the hour (h)”, however, in the line presented below regarding to the measurements procedures the text presents the following: “ensure that the same basis (dry or wet) is considered for this measurement and the measurement of volumetric fraction of all components in the residual gas (fv_{i,h}) when the residual gas temperature exceeds 60 °C.</p> <p>Therefore, as the measurements of the fv_{i,h} - volumetric fraction of all components in the residual gas, is monitored in a wet basis and as the FV_{RG,h} shall be at the same basis of the fv_{i,h} (dry or wet) the assessment team considered that it was correctly monitored by the project activity on a wet basis.</p> <p>There is a flow meter located before the flare. The equipment is identified as FIT-01:</p> <ul style="list-style-type: none"> ST 98 Flex MASter™, serial number 288577 (ref. 36a,b). <p>Regarding calibration, according to CDM VMM V. 1.2 para 184 a) and as per EB 52 Annex 60 para 8, in cases where neither the monitoring methodology, nor the monitoring plan specify any requirements for calibration frequency for measuring equipments, the DOE shall ensure that the equipments are calibrated either in accordance with the specifications of the local/national standards, or as per the manufacturer specification. If local/national standards or the manufacturer specification is not available, international standards may be used.</p> <p>In this way, the monitoring methodology (ref. 2) sets out that the flow meters should be subject to a regular maintenance and testing regime to ensure accuracy. Continuous with the analysis in accordance with EB 52 Annex 60 para 8 the assessment team checked that the same information was presented in the revised monitoring plan (ref. 1b), which does not refer to a specific period of calibration.</p> <p>In accordance with the EB 52 Annex 60 para 8, the assessment team checked that the PP internal procedure P459/R04/V01/08 (ref. 6d) defines a calibration periodicity as annual, which is more conservative than the manufacturer specification which refers to a calibration period of 18 months</p>

		<p>(ref. 18 – Flow Meter Manufacturer Manual).</p> <p>In this way, the calibration certificates are presented in the Monitoring Report version 1 (ref. 3a) and the assessment team verified the following calibration certificates issued by:</p> <ul style="list-style-type: none"> ▪ GDD Montengel – N° RCBG 001/09, dated 18/02/2009 and valid until 18/02/2010 (ref. 17a); ▪ HC Service – N° 001, dated 06/03/2009, valid until 06/03/2010 (ref. 17b); ▪ GDD Montengel – N° RCBG 002/09, dated 06/07/2009, valid until 06/07/2010 (ref. 17c); ▪ GDD Montengel – N° RCBG 003/09, dated 22/10/2009, valid until 22/10/2010 (ref. 17d); ▪ GDD Montengel – N° RCBG 001/10, dated 12/01/2010, valid until 12/01/2011 (ref. 17e); ▪ Technoflow – N° Tech 0179, dated 08/02/2010, valid until 08/02/2011 (ref. 17f); ▪ GDD Montengel N° RCBG 003/10, dated 12/05/2010, valid until 12/05/2011 (ref. 17g) <p>The data is transferred automatically from the inviolable register to the ERs spreadsheet (ref. 4). The data is downloaded in the computer and inserted automatically into the spreadsheet (ref. 4 – Data from the register panel and ERs spreadsheet). In addition, all calculations, including the emission reduction calculus, are done automatically in the spreadsheet (ref. 4).</p> <p>Three samples per month of the open spreadsheet were checked against the data from the internal system (register) and were found consistent. The data presented in the monitoring report is the consolidation of the minutes of the day.</p> <p>The data is downloaded in the computer and inserted automatically into the spreadsheet (ref. 4 – Data from the register panel and ERs spreadsheet). In addition, all calculations, including the emission reduction calculus, are done automatically in the spreadsheet (ref. 4).</p> <p>The data from the register is also presented in the Annex A of the Monitoring Report (ref. 3).</p> <p>A complete set of data was available to the DOE assessment team and three samples per month of the open spreadsheet were checked against the data from the internal system (register) and were found consistent. The data presented in the monitoring report is the consolidation of the minutes of the day.</p>
$t_{O_2,h}$	Volumetric fraction of O_2 in the exhaust gas of the flare in the hour h	<p>The data is measured continuously using a gas analyser. This parameter is used to calculate the $PE_{flare,y}$ and FE.</p> <p>During the site visit, it was possible to verify that the gas analyser is located in the upper section of the flare as requested by the tool to determine project emissions from flaring gases containing methane.</p> <p>The flare project - P459 Projeto de captação de biogas (ref. 14) also presents that the gas analyser is located in the upper section of the flare.</p> <p>The details of the equipment used to measure the volumetric fraction of O_2</p>

		<p>in the exhaust gas is presented below:</p> <ul style="list-style-type: none"> Gas analyser, ULTRAMAT Siemens, AG 02, Serial Number N1-W1-027 (ref. 41a,b). <p>Regarding to the calibrations, according to CDM VMM V. 1.2 para 184 a) ii and as per EB 52 Annex 60 para 8, in cases where neither the monitoring methodology, nor the monitoring plan specify any requirements for calibration frequency for measuring equipments, the DOE shall ensure that the equipments are calibrated either in accordance with the specifications of the local/national standards, or as per the manufacturer specification. If local/national standards or the manufacturer specification is not available, international standards may be used.</p> <p>The monitoring methodology (ref. 2) does not have a specific requirement to monitor the $t_{O_2,h}$ as this parameter is required in the calculations to obtain the PE. In this way, the monitoring methodology parameter of the Project Emissions sets that <i>"the parameters used for determining the project emissions from flaring of the residual gas stream in year y ($PE_{flare,y}$) should use the QA/QC procedures as per the "Tool to determine project emissions from flaring gases containing Methane".</i> The assessment team checked the Tool to determine project emissions from flaring gases containing Methane (ref. 8), which sets that the <i>"analysers must be periodically calibrated according to the manufacturers recommendation. A zero check and a typical value check should be performed by comparison with a standard gas"</i>.</p> <p>In addition the revised monitoring plan (ref. 1b) is consistent with the tool setting a calibration periodicity for the $t_{O_2,h}$ as presented above.</p> <p>In accordance with EB 52 Annex 60 para 8, the assessment team checked that the the manufactures manual (ref. 9, page 4-4), which establishes that the equipment calibration should be repeated every six months to twelve months depending on the ambient conditions.</p> <ul style="list-style-type: none"> Certificate issued by Arquipelago, N° 11/2008 dated on 22/09/2008, valid until 22/03/2009 (ref. 21h); Certificate issued by Arquipelago, N° 13/2008 dated on 24/09/2008, valid until 24/03/2009 (ref. 21e); Certificate issued by Siemens, n/i dated on 24/11/2008, valid until 24/05/2009 (ref. 21c); Certificate issued by Siemens, n/i dated on 13/04/2009, valid until 13/10/2009 (ref. 21d); Certificate issued by Siemens, n/i dated on 22/10/2009, valid until 22/04/2010 (ref. 21f); Certificate issued by Siemens, n/i dated on 19/04/2010, valid until 19/10/2010 (ref. 21g); <p>According to the situation verified on site visit and the training certificates provided by the manufacturer's of the gas analyser (ref. 7a), the PP has trained all operators to handle and calibrate the equipments AG-01 (residual gas analyzer) and AG-02 (exhaust gas analyzer).</p> <p>In this way, it was also checked by the assessment team that the internal calibrations were done by the qualified personnel every 15 days (ref. 22 – Internal calibration of the of the gas analysers) utilizing the standard gases (ref. 23 – Calibration certificate of standard gases). The period from 13/10/2009 to 22/10/2009, when there is no valid external calibration, the</p>
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		<p>calibration was covered by the internal calibrations.</p> <p>Furthermore, Siemens, the manufacturer of the gas analyser issued a letter on 11/01/2011 (ref. 43 - Siemens Technical Letter) certifying that the external calibrations are valid for one year and also included that the gas analyzers AG-01 and AG-02 were in perfect conditions during their visit to the site on 22/10/2009 and that the measured values from 13/10/2009 to 22/10/2009 were not compromised.</p> <p>It was provided to the assessment team the procedures regarding to the Maintenance Manual (ref. 6b), Monitoring Manual (ref. 6c) and the Operational Manual (ref. 6d). In addition, the values measured at the landfill are transferred automatically to the internal system (register) which has restricted access. The data from the register is also presented in the Annex A of the Monitoring Report (ref. 3).</p> <p>A complete set of data was available to the DOE assessment team and three samples per month of the open spreadsheet were checked against the data from the internal system (register) and were found consistent. The data presented in the monitoring report is the consolidation of the minutes of the day.</p>
fv_{CH4,FG,h}	Concentration of methane in the exhaust gas of the flare in dry basis at normal conditions in the hour h-mg/m ³	<p>This parameter is used to calculate the PE_{flare,y} and FE. The data is measured continuously using a gas analyser on a wet basis.</p> <p>Regarding to the way that this parameter shall be monitored at the applicable methodology ACM0001 V.05 (ref. 2a) there is no information with regards to the measurement of this parameter as it is a parameter required to calculate the project emissions (PE).</p> <p>In this way, the assessment team checked that in the “Tool to determine project emissions from flaring gases containing Methane” (ref. 8) the information regarding to fv_{CH4,FG,h} parameter is in accordance with the text presented in the revised monitoring plan (ref. 1b).</p> <p>In the text presented in the line regarding to the description of the parameter it is presented that “concentration of methane in the exhaust gas of the flare in dry basis at normal conditions in the hour h”, however, in the line presented bellow regarding to the measurements procedures the text presents the following: “extractive sampling analysers with water and particulates removal devices or in situ analyser for wet basis determination.</p> <p>Therefore, in accordance with the RMP (ref. 2b) and with the “Tool to determine project emissions from flaring gases containing Methane” (ref. 8) in the point specific to the measurements procedures of the fv_{CH4,FG,h} – concentration of methane in the exhaust gas, this parameter can be measured in situ by a analyser for a wet basis determination the assessment team considered that it was correctly monitored by the project activity on a wet basis.</p> <p>Also, during site visit, it was possible to verify that the gas analyser is located in the upper section of the flare as requested by the tool to determine project emissions from flaring gases containing methane.</p> <p>The flare project - P459 Projeto de captação de biogas (ref. 14) also presents that the gas analyser is located in the upper section of the flare.</p> <p>The details of the equipment used to measure the volumetric fraction of O₂ in the exhaust gas is presented bellow:</p> <ul style="list-style-type: none"> Gas analyser, ULTRAMAT Siemens, AG 02, Serial Number N1-W1-027 (ref. 41a,b).

	<p>Regarding to the calibrations, according to CDM VMM V. 1.2 para 184 a) ii and as per EB 52 Annex 60 para 8, in cases where neither the monitoring methodology, nor the monitoring plan specify any requirements for calibration frequency for measuring equipments, the DOE shall ensure that the equipments are calibrated either in accordance with the specifications of the local/national standards, or as per the manufacturer specification. If local/national standards or the manufacturer specification is not available, international standards may be used.</p> <p>The monitoring methodology (ref. 2) does not have a specific requirement to monitor the $f_{\text{CH}_4, \text{FG}, h}$ as this parameter is required in the calculations to obtain the PE. In this way, the monitoring methodology parameter of the Project Emissions sets that <i>“the parameters used for determining the project emissions from flaring of the residual gas stream in year y ($PE_{\text{flare}, y}$) should use the QA/QC procedures as per the “Tool to determine project emissions from flaring gases containing Methane”.</i> The assessment team checked the Tool to determine project emissions from flaring gases containing Methane (ref. 8), which sets that the calibration of the gas analysers to monitor the $f_{\text{CH}_4, \text{FG}, h}$ <i>“analysers must be periodically calibrated according to the manufacturers recommendation. A zero check and a typical value check should be performed by comparison with a standard gas”.</i></p> <p>In addition the revised monitoring plan (ref. 1b) is consistent with the tool setting a calibration periodicity for the $f_{\text{CH}_4, \text{FG}, h}$ as presented above.</p> <p>In accordance with EB 52 Annex 60 para 8, the assessment team checked that the manufactures manual (ref. 9, page 4-4), the equipment calibration should be repeated every six months to twelve months depending on the ambient conditions.</p> <ul style="list-style-type: none"> ▪ Certificate issued by Arquipélago, N° 11/2008 dated on 22/09/2008, valid until 22/03/2009 (ref. 21h); ▪ Certificate issued by Arquipélago, N° 13/2008 dated on 24/09/2008, valid until 24/03/2009 (ref. 21e); ▪ Certificate issued by Siemens, n/i dated on 24/11/2008, valid until 24/05/2009 (ref. 21c); ▪ Certificate issued by Siemens, n/i dated on 13/04/2009, valid until 13/10/2009 (ref. 21d); ▪ Certificate issued by Siemens, n/i dated on 22/10/2009, valid until 22/04/2010 (ref. 21f); ▪ Certificate issued by Siemens, n/i dated on 19/04/2010, valid until 19/10/2010 (ref. 21g); <p>According to the situation verified on site visit and the training certificates provided by the manufacturer's of the gas analyser (ref. 7a), the PP has trained all operators to handle and calibrate the equipments AG-01 (residual gas analyzer) and AG-02 (exhaust gas analyzer).</p> <p>In this way, it was also checked by the assessment team that the internal calibrations were done by the qualified personnel every 15 days (ref. 22 – Internal calibration of the of the gas analysers) utilizing the standard gases (ref. 23 – Calibration certificate of standard gases). The period from 13/10/2009 to 22/10/2009, when there is no valid external calibration, the calibration was covered by the internal calibrations.</p> <p>Furthermore, Siemens, the manufacturer of the gas analyser issued a letter on 11/01/2011 (ref. 43 - Siemens Technical Letter) certifying that the</p>
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		<p>external calibrations are valid for one year and also included that the gas analyzers AG-01 and AG-02 were in perfect conditions during their visit to the site on 22/10/2009 and that the measured values from 13/10/2009 to 22/10/2009 were not compromised.</p> <p>It was provided to the assessment team the procedures regarding the Maintenance Manual (ref. 6b), Monitoring Manual (ref. 6c) and the Operational Manual (ref. 6d). In addition, the values measured at the landfill are transferred automatically to the internal system (register) which has restricted access. The data from the register is also presented in the Annex A of the Monitoring Report (ref. 3).</p> <p>A complete set of data was available to the DOE assessment team and three samples per month of the open spreadsheet were checked against the data from the internal system (register) and were found consistent. The data presented in the monitoring report is the consolidation of the minutes of the day.</p> <p>In addition, in accordance with the revised monitoring plan (ref. 1b) and the AM_CLA_0047 the PP has performed a measurement of the flare efficiency through the traversing measuring procedure.</p> <p>In this way, the measurement was performed on 14th January 2010 by a third party company called "Bioagri Ambiental" (ref. 33), and the results of the test presented that an average Flare Efficiency of 99,99%, which represents that the flare capacity is in line with the actual flow.</p>
LPG	Total amount of LPG consumed to start up the flare (kg)	<p>The LPG consumption used to start up the flare. This parameter is described in the revised monitoring plan (ref. 1b).</p> <p>A complete set of data was available. The consumption of LPG is monitored through the invoices of the cylinders (ref. 26) and are presented bellow:</p> <ul style="list-style-type: none"> ▪ Ultragaz N° 062118, 30th August 2008, referent to two cylinders of 45 kg each, totalizing 90kg (ref. 26); ▪ Ultragaz N° 018977, dated 23rd March 2009, referent to two cylinders of 45 kg each, totalizing 90kg (ref. 26); <p>The emissions are discounted from ERs in the ERs spreadsheet (ref. 4b). The equation regarding to the LPG consumption is presented bellow:</p> <ul style="list-style-type: none"> ▪ $\text{LPG emission} = 180 \text{ kg} * 10,990 \text{ kcal/kg} * 4186.8 \times 10^{-12} \text{ TJ/kcal} * 63.1 = \text{tCO}_2\text{e/TJ} = 0.52 \text{ tCO}_2\text{e}$
CEF_{elec,BL,y} (GRID)	CO ₂ e emissions conversion factor for electricity-tCO ₂ e/MWh	<p>The CO₂ Operating Margin emission factor of the grid (EF_{OM,y}) in tCO₂/MWh, CO₂ Build Margin emission factor of the grid (EF_{BM,y}) in tCO₂/MWh parameters were calculated using data information from ONS, the Brazilian electricity system manager.</p> <p>The data is available at the DNA web site (MCT - http://www.mct.gov.br/index.php/content/view/303076.html#ancora and http://www.mct.gov.br/index.php/content/view/321143.html#ancora) or at the reference 10 and 11.</p> <p>The Brazilian DNA publishes the emission factor operating margin and build margin calculated in compliance with the "Tool to calculate the emission factor for an electricity system" version 2.</p> <p>The ex-post emission factor provided by the DNA is calculated according to</p>

		<p>the Tool to calculate the emission factor for an electricity system.</p> <p>In this way, official data was used. The operating margin of the last ten months of 2009 (ref. 10) and the five first months of 2010 (ref. 11) was the applied to calculate the EF. The build margin used for the MP2, was the BM for the year of 2009, as it is the most recent BM at the time of the verification.</p> <p>As the operation margin data relies from the information obtained through the data monitored during the year and according to Step 3, page 6 of the Tool to calculate the emission factor for an electricity system, Version 02.1.0 (ref. 49), <i>"If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year y-2 may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods"</i>.</p> <p>In this way, the assessment team verified through the Brazilian DNA website that the most recent data available was only the five first months of 2010 (ref. 11 – Brazilian DNA Emission Factor 2010 – Screenshot Evidence) and as per the tool this year value could be applicable to this monitoring period of the project activity. Therefore, the assessment team verified that the remaining data applied were of the months of the year of 2009 which were representative for this monitoring period (i.e. from March 2009 to end and the five first months available of 2010).</p> <p>The calculations performed by the project participant were checked and verified by the assessment team.</p> <p>According to the Step 7 of the tool (ref. 49) the calculation of combined margin emission factor shall be calculated per the formula:</p> <ul style="list-style-type: none"> ▪ $EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM} \times w_{BM}$ <p>In this way, as calculated by the Brazilian DNA (ref. 17) we have:</p> <ul style="list-style-type: none"> ▪ Building Margin EF (2009 the most recent data available) (tCO₂/MWh) = 0.0794 ▪ Average of the Operating Margin (From March to December 2009 and from January to May of 2010) (tCO₂/MWh) = $(0.2639 + 0.2451 + 0.4051 + 0.3664 + 0.2407 + 0.1988 + 0.1622 + 0.1792 + 0.1810 + 0.1940 + 0.2111 + 0.2798 + 0.2428 + 0.2379 + 0.3405) / 15 = 0.2499$ <p>Also, as per the tool with exception from the wind and solar power generation project activities the values applied for the first crediting period are: $w_{OM} = 0.5$ and $w_{BM} = 0.5$.</p> <p>Therefore the combined EF is calculated:</p> <ul style="list-style-type: none"> ▪ $EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM} \times w_{BM} = 0.2499 \times 0.5 + 0.0794 \times 0.5 = 0.16465 \text{ tCO}_2/\text{MWh}$ <p>Hence, the assessment team considered conservative the rounded value by the project participant to 0.1647 tCO₂/MWh.</p>
CEF _{LPG}	Emission factor of the LPG	<p>External data:</p> <p>Emission factor of the LPG used to start up the flare.</p> <p>Official data was used. Verified the source of data through IPCC and</p>

		<p>CETESB (Environmental Agency) website.</p> <p>The data from CETESB are available at <a 2006gl="" 2_volume2="" href="http://sistemasinter.cetesb.sp.gov.br/produtos/ficha_completa1.asp?consult_a=GÁS (ES) DE PETRÓLEO, LIQÜEFEITO (S)&cod=GÁS (ES) DE PETRÓLEO, LIQÜEFEITO (S) and the screenshot with the information is available at reference 13.</p> <p>The data from IPCC is public available and were saved in the reference 12 (2006 IPCC Guidelines for national Greenhouse Gas Inventories, Volume 2, section 2, Page 16 or the weblink http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary Combustion.pdf).</p> <p>$CEF_{thermal,y} = 63.1 \text{ tCO}_2\text{e/TJ}$ (ref. 36)</p> <p>Lower Heating Value (LHV)_{LPG} = 10,990 kcal/kg (ref. 35)</p> <p>The emissions from this source are discounted from ERs in the ERs spreadsheet (ref. 4). The equation regarding to the LPG consumption is presented bellow:</p> <ul style="list-style-type: none"> $LPG \text{ emission} = 180 \text{ kg} * 10,990 \text{ kcal/kg} * 4186.8 \times 10^{-12} \text{ TJ/kcal} * 63.1 = \text{tCO}_2\text{e/TJ} = 0.52 \text{ tCO}_2\text{e}$
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3.5 Accuracy of Equipment

The reporting procedures reflect the content of the revised monitoring plan (ref. 1b) and/or IT02 - Instrument Maintenance and Calibration procedures (ref. 32), which in turn were according to (or more conservative than) manufacturers specifications. As the DOE assessment team checked all the calibration certificates for the equipments applied in the project monitoring and were found in accordance with the requirements presented above the assessment team conclude that the monitoring mechanism were effective and reliable.

3.6 Accuracy of Emission Reduction Calculations

The calculation of emission reductions is found to be correct. CAR #7 was raised because during the site visit the assessment team observed that in the month of "May 2010" on tab "min by min" of the open spreadsheet (ref. 4c) there was a mistake in the extraction of the data from the internal system (register) where the first line was not accounted for.

In response to the corrective action raised the PP has presented the revised calculation spreadsheet of the month of May 2010 (Calculation_201005_AR_Outubro). In this way, the response to the CAR was satisfactory and this was closed. The details of the reported and the verified values for all parameters are listed in section 4, 'Calculation of Emission Reductions' and the details of the corrective action raised are presented below in section 9 below.

All of the data from the parameters were available to the assessment team for the period from 05/03/2009 to 31/05/2010, apart from the cases where the biogas plant was not working (i.e. due to preventive maintenance, energy supply problems). In addition, the data were monitored in accordance with the revised monitoring plan (ref. 1b).

The assessment team performed a cross-check of the reported data through the internal system (register), tests performed by Third Party Company. Furthermore, the calculations performed by the PP were in accordance with the requirements by the approved methodology (ACM0001 - Version 05) and the applicable tools and all the assumptions, emission factors and default values applied in the calculations were correctly justified.

3.7 Quality of Evidence to Determine Emission Reductions

Critical parameters and evidences used for the determination of the Emission Reductions are discussed in section 3.4 above. All the data is recorded in compliance with the monitoring report. We further confirm that all monitoring procedures are followed and well implemented at the project site. The emission reduction calculations are performed inline with the applied methodology ACM 0001 version 05.

3.8 Management System and Quality Assurance

The companies involved in the project have quality assurance system implemented as per the Monitoring Manual (ref. 6c), Operations Manual (ref. 6d) and the Quality Assurance and Quality Control procedures (ref. 30) therefore we can affirm that the management system the CDM project is in place; with the responsibilities properly identified and in place.

In order to verify data quality, the company involves in the project works in accordance with a quality assurance procedure (Procedure for Monitoring Plan Implementation), which establishes the operational and management structure implemented.

3.9 Data from External Sources

The CO₂ Operating Margin emission factor of the grid (EF_{OM,y}) in tCO₂/MWh, CO₂ Build Margin emission factor of the grid (EF_{BM,y}) in tCO₂/MWh parameters were calculated using data information from ONS, the Brazilian electricity system manager.

The data is available at the DNA web site (MCT - <http://www.mct.gov.br/index.php/content/view/303076.html#ancora> and <http://www.mct.gov.br/index.php/content/view/321143.html#ancora>) or at the reference 10 and 11.

The Brazilian DNA publishes the emission factor operating margin and build margin calculated in compliance with the "Tool to calculate the emission factor for an electricity system" version 2.

The ex-post emission factor provided by the DNA is calculated according to the "Tool to calculate the emission factor for an electricity system".

In this way, official data was used. The operating margin of the last ten months of 2009 (ref. 10) and the five first months of 2010 (ref. 11) was the applied to calculate the EF. The build margin used for the MP2, was the BM for the year of 2009, as it is the most recent BM at the time of the verification.

The emission factor of the LPG was obtained from IPCC web site: http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf (ref. 12 - page 16).

The Lower Heating Value was obtained through the São Paulo State Environmental Agency, available at (<http://www.cetesb.sp.gov.br>) and reference 13.

4. Calculation of Emission Reductions

Parameter	Reported Value	Verified Value
$LFG_{total,y} / LFG_{flared,y}$	49,618,817 Nm ³	49,673,903 Nm ³
$PE_{flare,y}$	1871.72 tCO ₂ e	1870.34 tCO ₂ e
$WCH_{4,y} // fvch_{4,h}$	Values reported in MR were checked against plant records	Correct values in line with the plant records are reported in MR and ER spreadsheet..
EL_{IMP}	602.230 MWh	602.230 MWh
Landfill waste received	564,762.52 ton	564,762.52 ton
Regulatory requirements relating to landfill gas projects	It is not required to change the baseline. The AD remains 20% as described in the registered PDD.	It is not required to change the baseline. The AD remains 20% as described in the registered PDD.
FE	Values reported in MR were checked against plant records	Correct values in line with the plant records are reported in MR and ER spreadsheet..
T_{flare}	Values reported in MR were checked against plant records	Correct values in line with the plant records are reported in MR and ER spreadsheet..
$Flare_h$	10.359,9 hours	10.359,4 hours
$FV_{RG,h}$	Values reported in MR were checked against plant records	Correct values in line with the plant records are reported in MR and ER spreadsheet..
$t_{O_2,h}$	Values reported in MR were checked against plant records	Correct values in line with the plant records are reported in MR and ER spreadsheet..
$fv_{CH_4,FG,h}$	Values reported in MR were checked against plant records	Correct values in line with the plant records are reported in MR and ER spreadsheet..
LPG	180 Kg	180 Kg
$CEF_{elec,BL,y} (GRID)$	0.1647 tCO ₂ e/MWh	0.16465 tCO ₂ e/MWh
CEF_{LPG}	63.1 tCO ₂ e/TJ	63.1 tCO ₂ e/TJ

$ERY = LFG_{flared,y} * w_{CH_4,y} * FE * D_{CH_4} * (1-EAF) * GWP_{CH_4}$ (without considering emission from electricity and LPG consumption)

The formula is inserted directly in the system spreadsheet. Three samples per month of the open spreadsheet were checked against the data from the internal system (register) and were found consistent. Data is automatically measured and calculated. Open spreadsheets with formulas were presented to the DOE assessment team. These have been assessed and found OK.

In addition, the emission reduction calculation was performed every minute during this monitoring period (from 05/03/2009 to 31/05/2010), which is more conservative than the calculation in hours as per the requirement by the “Tool to determine project emissions from flaring gases containing methane” (ref. 8).

Also, in order to provide a overview and facilitate the visualization of the information provided in the ERs calculation spreadsheet (which is made “min by min”), the PP provided a summarized spreadsheet (ref. 4f) which has the information that was manually fed from the ERs spreadsheet containing the average and/or total values of the parameters monitored, consolidate by day and month.

In this way, the emission reduction without discounting of project emissions from electricity and LPG consumption: **280,365.68 tCO₂e**.

Project emissions from electricity imported:

Electricity consumption:

$$EL_{IMP} \times CEF_{electricity} = 0.1647 \text{ tCO}_2/\text{MWh} \times 602.230 \text{ MWh} = 99.19 \text{ tCO}_2\text{e}$$

Project emissions from fossil fuel consumption (LPG):

$$CEF_{thermal,y} = 63.1 \text{ tCO}_2\text{e}/\text{TJ}$$

$$\text{Lower Heating Value (LHV)}_{LPG} = 10,990 \text{ kcal/kg}$$

$$LPG_{emission} = 180 \text{ kg} \times 10,990 \text{ kcal/kg} \times 4186.8 \times 10^{-12} \text{ TJ/kcal} \times 63.1 \text{ tCO}_2\text{e}/\text{TJ} = 0.52 \text{ tCO}_2\text{e}$$

The final Emissions Reduction are calculated:

$$ER = 280365.68 \text{ tCO}_{2e} - (99.19 \text{ tCO}_2\text{e} + 0.52 \text{ tCO}_2\text{e}) = \mathbf{280,265.97 \text{ tCO}_{2e}}$$



5. Recommendations for Changes in the Monitoring Plan

In our opinion registered monitoring plan is inline with the applied methodology ACM 0001 version 05 and well implemented at project site. There is no recommendation for changes in the monitoring plan.

6. Overview of Results

Assessment Against the Provisions of Decision 17/CP.7:

Is the project documentation in accordance with the requirements of the registered PDD and relevant provision of decision 17/CP.7, EB decisions and guidance and the COP/MOP?

Yes. The results of the compliance assessment are recorded in the verification checklist which is used as an internal report only.

Have on-site inspections been performed that may comprise, inter alia, a review of performance records, interviews with project participants and local stakeholders, collection of measurements, observations of established practices and testing of the accuracy of monitoring equipment?

Yes. Members of the assessment team visited the site and undertook interviews, collected data, audited the implementation of procedures, checked calibration certificates and checked data, inter alia.

The results of the site visit are recorded in the verification checklist which is used as an internal report only.

The evidences have been checked and collected. The revised monitoring report is attached with this verification report.

Has data from additional sources been used? If yes, please detail the source and significance.

The project uses additional source for the electricity emission factor (ex-post EF) and for the LPG consumption.

Emission Factor of the Brazilian Grid (EF) = 0,16465 tCO₂e/MWh, this data comes from official sources, provided by ONS, calculated and published by the Brazilian DNA (ref. 10 and 11);

The emission factor of the LPG (EFLPG) = 63.1 tCO₂e/TJ was obtained from IPCC web site: http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf (ref. 12 - page 16).

The Lower Heating Value (LHV)_{LPG} = 10,990 kcal/kg was obtained through the São Paulo State Environmental Agency: [http://www.cetesb.sp.gov.br/emergencia/produtos/ficha_completa1.asp?consulta=GÁS%20\(ES\)%20DE%20PETRÓLEO,%20LIQÜEFEITO%20\(S\)&cod=1075](http://www.cetesb.sp.gov.br/emergencia/produtos/ficha_completa1.asp?consulta=GÁS%20(ES)%20DE%20PETRÓLEO,%20LIQÜEFEITO%20(S)&cod=1075) or at reference 13.

Please review the monitoring results and verify that the monitoring methodologies for the estimation of reductions in anthropogenic emissions by sources have been applied correctly and their documentation is complete and transparent.

Yes. The monitoring methodology has been correctly applied and the monitoring report and supporting references are complete and transparent.

Have any recommendations for changes to the monitoring methodology for any future crediting period been issued to the project participant?

No.

Determine the reductions in anthropogenic emissions by sources of greenhouse gases that would not have occurred in the absence of the CDM project activity, based on the data and information using calculation procedures consistent with those contained in the registered project design document and the monitoring plan.

The data used in anthropogenic emission reduction calculation is lower than those contained in the registered PDD and monitoring plan. The emission reductions were

estimated to be 509,199 tCO₂e for the period 05/03/2009 to 31/05/2010 as per the estimation made in the registered PDD. The actual emission reduction has been verified as 280,265 tCO₂e for the same period. The reason of this difference is explained in above sections of the report.

Identify and inform the project participants of any concerns related to the conformity of the actual project activity and its operation with the registered project design document. Project participants shall address the concerns and supply relevant additional information.

No such non conformity of the actual project activity and its operation with the registered project design document has been observed.

Post monitoring report on UNFCCC website

Yes, the monitoring report is available at ref. 1636 on UNFCCC website:
<http://cdm.unfccc.int/Projects/DB/RWTUV1204280292.23/view>

7. Verification and Certification Statement

SGS United Kingdom Ltd has been contracted by Alto Tietê Biogás, Redução de Emissões e Geração de Energia Ltda. to perform the verification of the emission reductions reported for the CDM project "Alto-Tietê landfill gas capture project" in the period 05/03/2009 to 31/05/2010.

The verification is based on the validated and registered project design document and the monitoring report for this project. Verification is performed in accordance with section I of Decision 3/CMP.1, and relevant decisions of the CDM EB and CoP/MoP. The scope of this engagement covers the verification and certification of greenhouse gas emission reductions generated by the above project during the above mentioned period, as reported in Monitoring Report Version 07 dated 16/06/2011.

The management of the Alto Tietê Biogás, Redução de Emissões e Geração de Energia Ltda is responsible for the preparation, calculation and determination of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project Monitoring Report version 07, dated 16/06/2011. The development and maintenance of records and reporting procedures are in accordance with the monitoring report.

It is our responsibility to express an independent GHG verification opinion on the GHG emissions and on the calculation of GHG emission reductions from the project for the period 05/03/2009 to 31/05/2010 based on the reported emission reductions in the Monitoring Report version 07, dated 16/06/2011 for the same period.

Based on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these, SGS planned and performed our work to obtain the information and explanations that we considered necessary to provide sufficient evidence for us to give reasonable assurance that this reported amount of GHG emission reductions for the period is fairly stated.

SGS confirms that the project is implemented as described in the validated and registered project design documents. Based on the information we have seen and evaluated, we confirm the following:

Project Title:	Alto-Tietê landfill gas capture project
UNFCCC Reference Number:	1636
Registered PDD and Approved Used for Verification:	PDD version 6, 13/12/2007 and the revised monitoring plan approved by the CDM EB on 23/12/2009.
Methodology Used for Verification:	ACM0001, version 05, EB 28
Applicable Period:	05/03/2009 to 31/05/2010
Total GHG Emission Reductions Verified:	280,265 tCO ₂ e

Signed on behalf of the Verification Body by Authorized Signatory

Signature:



Name: Siddharth Yadav

Date: 20th July 2011

8. Document References

/1/	<p>Registered PDD and Revised Monitoring Plan:</p> <ul style="list-style-type: none"> a) Alto –Tietê landfill gas capture project, Version 06, 13/12/2007 b) Approved Revised Monitoring Plan, 23/12/2009 c) Validation and Verification Manual, Version 1.2 d) Validation Report, dated 13/12/2007
/2/	<p>Approved Methodology:</p> <ul style="list-style-type: none"> ▪ ACM0001 Version 05: “Consolidated baseline methodology for landfill gas project activities”
/3/	<p>Monitoring Report d.v., d.d.:</p> <ul style="list-style-type: none"> a) ATB_2nd_Report_on_GHG_UNFCCC_V01_20-jul-2010_AR1; b) ATB_2nd_Report_on_GHG_UNFCCC_V02_09-sep-2010_AR; c) ATB_2nd_Report_on_GHG_UNFCCC_V03_04-oct-2010_AR_PF_final; d) ATB_2nd_Report_on_GHG_UNFCCC_V04_05-nov-2010_AR e) ATB_2nd_Report_on_GHG_UNFCCC_V05_18-jan-2011_AR[1] f) ATB_2nd_Report_on_GHG_UNFCCC_V06_03-mar-2011_AR g) ATB_2nd_Report_on_GHG_UNFCCC_V07_16-jun-2011_AR1
/4/	<p>Data from the register panel and Ers spreadsheet:</p> <ul style="list-style-type: none"> a) Ers Spreadsheet version 01, dated 16/07/2010, file name: Calculation_Summary_16-jul-2010_AR b) Ers Spreadsheet version 02, dated 09/09/2010, file name: Calculation_Summary_09-sep-2010_V02_ANAR c) Data from the Internal System n.d., n.v., file name: Calculation_200903_AR; Calculation_200904_AR; Calculation_200905_AR; Calculation_200906_AR; Calculation_200907_AR; Calculation_200908_AR; Calculation_200909_AR; Calculation_200910_AR; Calculation_200911_AR; Calculation_200912_AR; Calculation_201001_AR; Calculation_201002_AR; Calculation_201003_AR; Calculation_201004_AR; Calculation_201005_AR. d) Data from the Internal System Revised n.d., n.v., file name: Calculation_200903_ANAR; Calculation_200904_ANAR; Calculation_200905_ANAR; Calculation_200906_ANAR; Calculation_200907_ANAR; Calculation_200908_ANAR; Calculation_200909_ANAR; Calculation_200910_ANAR; Calculation_200911_ANAR; Calculation_200912_ANAR; Calculation_201001_ANAR; Calculation_201002_ANAR; Calculation_201003_ANAR; Calculation_201004_ANAR; Calculation_201005_ANAR; e) Data from the internal system of the spreadsheet of May 2010: Calculation_201005_AR1_Outubro; f) Data from the internal system: Calculation_Summary_05-nov-2010_V03_AR ; g) Summary of the information presented in the data of the internal system:

	<p>Calculation_Summary_02-dec-2010_V04_AR.</p> <p>h) CEF_Calculation_30-nov-2010_AR</p> <p>i) Calculation_Summary_03-mar-2011_V08_ANAR</p>
/5/	Screenshot Evidence of the UNFCCC Project Activity
/6/	<p>Internal Procedures:</p> <p>a) Monitoring Protocol – 20090109</p> <p>b) Maintenance Manual – 20081013</p> <p>c) Monitoring Manual – 20081013</p> <p>d) Operations Manual – 20081013</p>
/7/	<p>Training Certificates:</p> <p>a) ATB – Simiens Certificates – 20090109</p> <p>b) ATB – ARQ Certificates – 20090109</p>
/8/	Tool to determine project emissions from flaring gases containing methane
/9/	Gas Analyser Fabrication Manual AG-01 & AG-02 -20081013
/10/	Brazilian DNA Emission Factor 2009 – Screenshot Evidence
/11/	Brazilian DNA Emission Factor 2010 – Screenshot Evidence
/12/	IPCC Guidelines for National Gas Inventories, Vol 2, Section 2, Page 16
/13/	Screenshot Evidence of the CETESB website – LPG LHV
/14/	<p>Flare Specifications:</p> <p>a) DME-13-459-021-FLARE_CONJUNTO_05junho09_MB</p> <p>b) Certificate of Guarantee – Flare Efficiency Specifications</p>
/15/	Tool to determine project emissions from flaring gases containing methane
/16/	<p>Environmental Licenses d.v., d.d.:</p> <p>a) Operation License: ATB LOTP N° 26001467, Dated 21/06/2010</p> <p>b) Operation License: ATB LOTP N° 26001321, Dated 30/04/2009</p> <p>c) Operation License: ATB LOTP N° 26001366, Dated 26/08/2009</p> <p>d) Operation License: ATB LOTP N° 26001412, Dated 23/12/2009</p> <p>e) Operation License: ATB LOTP N° 26001412, Dated 25/03/2009</p> <p>f) Operation License: ATB LOTP N° 26001234, Dated 26/09/2008</p> <p>g) Previous Installation License: ATB LPLI N° 26000094, Dated 13/08/2008</p> <p>h) Operation License: Landfill LO N° 26001310, Dated 24/03/2009</p> <p>i) Operation License: Landfill LO N° 26001392, Dated 26/10/2009</p> <p>j) Operation License: Landfill LO N° 26001436, Dated 22/02/2010</p>
/17/	<p>Flow Meter (FIT01) Calibration Certificates d.d.:</p> <p>a) Certificate FIT-01 N° RCBG 001.09 Dated 18/02/2009</p> <p>b) Certificate FIT-01 N° 001 dated 06/03/2009</p> <p>c) Certificate FIT-01 N° RCBG 002.09 dated 06/07/2009</p>

	<ul style="list-style-type: none"> d) Certificate FIT-01 N° RCBG 003.10 dated 22/10/2009 e) Certificate FIT-01 N° RCBG 001.10 dated 12/01/2010 f) Certificate FIT-01 N° Tech 0179 dated 08/02/10 g) Certificate FIT-01 N° RCBG 003.10 dated 12/05/2010
/18/	Flow Meter Manufacturer Specifications
/19/	<p>Scale Calibration Certificate</p> <ul style="list-style-type: none"> a) Principal Scale Certificate Issued by Inmetro N° 823638, Dated 18/03/2009 b) Auxiliary Scale Certificate Issued by Inmetro N° 823637, Dated 18/03/2009
/20/	Waste Acceptance Spreadsheet
/21/	<p>Calibration Certificate AG01 and AG02 d.d.:</p> <ul style="list-style-type: none"> a) Certificate AG-01 N° 010.2008 Dated 22/09/2008; b) Certificate AG-01 N° 012.2008 Dated 24/09/2008; c) Certificate AG-01 and AG-02 n.i. Dated 13/04/2009; d) Certificate AG-01 and AG-02 n.i. Dated 13/04/2009; e) Certificate AG-02 N° 013.2008 Dated 25/09/2008 f) Certificate AG-01 and AG-02 Dated 22/10/2009; g) Certificate AG-01 and AG-02 Dated 19/04/2010; h) Certificate AG-02 N° 011.2008 Dated 22/09/2008;
/22/	Occurrence Diary AG01 and AG02 and Internal Calibrations
/23/	<p>Calibration Certificate of the Standard Gases</p> <ul style="list-style-type: none"> a) Internal Gas test CH4 70% - Dated 26/11/2008; b) Internal Gas test CO2 70% - Dated 18/03/2009; c) Internal Gas test Nitrogen – Dated 31/08/2009; d) Internal Gas tests O2 – Dated 02/01/2009; e) Internal Gas tests PPM – Dated 03/11/2008;
/24/	Electricity Consumption Invoices
/25/	<p>Calibration Certificate TT04 and TT05:</p> <ul style="list-style-type: none"> a) Certificate TT-04 N° 6074, Dated 03/09/2008; b) Certificate TT04 N° 008.09, Dated 18/02/2009; c) Certificate TT04 N° 016.09, Dated 06/07/2009; d) Certificate TT04 N° 020.09, Dated 22/10/2009; e) Certificate TT04 N° 002.10, Dated 12/01/2010; f) Certificate TT04 N° 012.10, Dated 12/05/2010; g) Certificate TT-05 N° 6075, Dated 03/09/2008; h) Certificate TT05 N° 007.09, Dated 18/02/2009; i) Certificate TT05 N° 015.009, Dated 06/07/2009;

	<p>j) Certificate TT05 N° 019.09, Dated 22/10/2009;</p> <p>l) Certificate TT05 N° 001.10, Dated 12/01/2010;</p> <p>m) Certificate TT05 N° 013.10, Dated 12/05/2010;</p>
/26/	<p>LPG Invoices d.d.:</p> <ul style="list-style-type: none"> ▪ Ultragaz N° 062118, 30th August 2008, referent to two cylinders of 45 kg each, totalizing 90kg (ref. 26); ▪ Ultragaz N° 018977, dated 23rd March 2009, referent to two cylinders of 45 kg each, totalizing 90kg (ref. 26);
/27/	<p>Risk Analysis Study:</p> <ul style="list-style-type: none"> ▪ P459R06V0008_EAR_ATB
/28/	<p>Emergency Plan</p> <ul style="list-style-type: none"> ▪ P459R02V0108_PAE_ATB
/29/	<p>Data Download and Backup</p> <ul style="list-style-type: none"> ▪ IT01 – Procedures for download and back up of the data from register;
/30/	<p>Quality Assurance and Quality Control Procedures:</p> <ul style="list-style-type: none"> ▪ IT03 – Emergency procedures for the case of failure or unavailability of instruments; ▪ IT04 – Internal Audit;
/31/	<p>Program of Risk Management:</p> <ul style="list-style-type: none"> ▪ P459R01V0108_PGR_ATB
/32/	IT02 – Instrument Maintenance and Calibration Procedure
/33/	<p>External Flare Efficiency Analysis</p> <ul style="list-style-type: none"> ▪ Bioagri Ambiental N° 8368.10^a, Dated 14/01/2010
/34/	<p>Methodology Clarification:</p> <ul style="list-style-type: none"> ▪ AM_CLA_0047 version 1.1, Dated 17/07/2007
/35/	EB 52 Annex 60 – Guidelines for Assessing Compliance with Calibration Frequency Requirements
/36/	<p>Flow Meter (FIT01) photography:</p> <ul style="list-style-type: none"> a) Equipment: Flow Meter – FIT01 photograph; b) Serial Number: Flow Meter – FIT01 photograph;
/37/	Assessment team and projects participants photograph;
/38/	<p>Scale photograph:</p> <ul style="list-style-type: none"> a) Scale photograph: b) Serial Number photograph:
/39/	<p>Gas Analyser (AG-01) photography:</p> <ul style="list-style-type: none"> a) Equipment: Gas Analyser (AG-01) photograph; b) Serial Number: Gas Analyser (AG-01) photograph;
/40/	Electricity Meter photograph
/41/	<p>Gas Analyser (AG-02) photography:</p> <ul style="list-style-type: none"> a) Equipment: Gas Analyser (AG-02) photograph;

	b) Serial Number: Gas Analyser (AG-02) photograph;
/42/	LPG photography
/43/	Siemens Technical Letter
/44/	ONS website screenshot information - Dated 11/05/2011
/45/	About ONS - Screenshot Website Information - Dated 11/05/2011
/46/	ONS Procedure N° 12.3 – Maintenance of the measurement system for invoice
/47/	Electricity Company Supplier Attested, Installation N° 150261814
/48/	Certification of Calibration - DCME -42-10, Installation N° 150261814
/49/	Tool to Calculate the Emission Factor for an Electricity System

Discuss the key changes in the final monitoring report against the version published at the UNFCCC website.

MR Version	Date of Revision	Main changes reason for Revision
Version 02	09/09/2010	Corrections were made in sections A.4, A.7, B.1, Section C, E.2 and E.5, mainly due to the corrections to be in accordance with EB 54 Annex 34 – Guidelines for Completing the Monitoring Report. Also others changes were made due to the corrections regarding to the site visit. For additional information regarding to the changes, please refer to section 9 – Findings Overview.
Version 03	04/10/2010	Inclusion of a line diagram to present the relevant monitoring points in Section C, in accordance with the required by the EB 54 Annex 34 – Guidelines for Completing the Monitoring Report. For additional information regarding to the change, please refer to section 9 – Findings Overview.
Version 04	05/11/2010	Sections A.1, B.1, E.2, E.5 were revised in the Monitoring Report in consequence of a review in the Ers spreadsheet. For additional information regarding to the change, please refer to section 9 – Findings Overview.
Version 05	18/01/2011	Sections A.1, A.3, A.4, B.1, Section C, Section D, E.2, E.5 were revised in the Monitoring Report in response to the issues raised by the technical review.
Version 06	03/03/2011	Sections A.1, B.1 of the Monitoring Report in order to be in accordance with the completeness check stage.
Version 07	16/06/2011	Sections C, D, E.2 of the Monitoring Report were changed in order to be in accordance with the revisions raised during the Incompleteness raised by UNFCCC.

9. Findings Overview

Findings Overview Summary

	CARs	CLs	FARs
Total Number raised	5	2	0

Date:	21/07/10	Raised by:	Assessment Team		
Type:	CL	Number:	#1	Reference:	AU4 - Section 2
Lead Assessor Comment:			Date: 21/07/10		
The clarification was raised to PP explain how the comparison of the actual emission reduction claimed in the monitoring period with the estimate in the registered PDD was made in the ERs spreadsheet (ref. 4) and Monitoring Report (ref. 3), as per the EB 48, Annex 68.					
Project Participant Response:			Date: 08/09/2010		
The PDD forecasted ERs were 396,399 tCO2e for 2009 and 438,048 tCO2e for 2010. The adjusted forecasted ERs for the monitoring period from 05/03/2009 to 31/05/2010 are 509,199.30 tCO2e, as shown in the revised spreadsheet Calculation_Summary_09-sep-2010_V02_ANAR.xls and described in the revised version of the MR, ATB_2nd_Report_on_GHG_UNFCCC_V02_09-sep-2010_AR.doc. Therefore, the monitored ERs correspond to approximately 55% of the forecasted ERs. The project shows an underperformance of approximately 45% in relation to the forecasted ERs.					
Documentation Provided as Evidence by Project Participant:					
ATB_2nd_Report_on_GHG_UNFCCC_V02_09-sep-2010_AR					
Calculation_Summary_V02_09-sep-2010_V02_ANAR					
Information Verified by Lead Assessor:					
ATB_2nd_Report_on_GHG_UNFCCC_V02_09-sep-2010_AR					
Calculation_Summary_V02_09-sep-2010_V02_ANAR					
Reasoning for not Acceptance or Acceptance and Close Out:					
According to the information provided in the revised ERs spreadsheet version 2 (ref. 4b), the PP has revised the comparison of the actual emission reduction claimed in the monitoring period with the estimate in the registered PDD (ref. 1a) which is in accordance with the requirement of the EB 48, Annex 68. In order to verify and check the comparison performed by the PP in the ERs Spreadsheet (ref. 4b) and in the Monitoring Report (ref. 3b) , the assessment team, using the information provided in the registered PDD (ref. 1a) section A.4.4., could check and verify that the estimated value ERs for 302 days respective period of 2009 were 327,979 tonnes whereas for the 151 days respective period of 2010 were 181,219. Thus, the assessment team concluded that the total ERs forecasted in the PDD for this monitoring period were 509,199 tonnes, which is in accordance with what was presented in the monitoring report and ERs spreadsheet.					
Therefore, as the ERs claimed for this monitoring period is 280,279 the assessment team concludes that this value represents a 45% underperformance in relation to what was forecasted in the registered PDD (ref. 1a), which is in accordance with what was presented in the ERs spreadsheet (ref. 4b).					
To sum up, as the project participant has correctly amended a comparison of the actual emission reduction claimed for this second monitoring period (what was not clear before) with the estimate in the registered PDD (ref. 1a).					
Thus, the CL #1 was closed out.					
Acceptance and Close out by Lead Assessor:			Date: 19/09/2010		

Date:	21/07/10		Raised by:	Assessment Team		
Type:	CAR	Number:	#2		Reference:	AU4 – Section 2
Lead Assessor Comment:				Date: 21/07/10		

The monitoring report version 1 (ref. 3a) section C is not in accordance with the <i>Guidelines for Completing the Monitoring Report Form (EB 54 - Annex 34)</i> section C – Description of the Monitoring System. The PP shall revise the monitoring report to be in accordance with the EB 54 – Annex 34 the section C.	
Project Participant Response:	Date: 04/10/2010
Section C calls the drawing DF-01-459-001_Fluxograma_Processo_20ago08_MJ.pdf, which contains detailed information about the LFG capturing and flaring system. A text description of the main monitoring devices was added to the revised version of the MR, ATB_2nd_Report_on_GHG_UNFCCC_V02_09-sep-2010_AR.doc. The drawing DF-01-459-001 was inserted in Section C of the revised version of the MR, ATB_2nd_Report_on_GHG_UNFCCC_V03_04-oct-2010_AR.doc.	
Documentation Provided as Evidence by Project Participant:	
ATB_2nd_Report_on_GHG_UNFCCC_V02_09-sep-2010_AR	
ATB_2nd_Report_on_GHG_UNFCCC_V03_04-oct-2010_AR	
Information Verified by Lead Assessor:	
ATB_2nd_Report_on_GHG_UNFCCC_V02_09-sep-2010_AR	
ATB_2nd_Report_on_GHG_UNFCCC_V03_04-oct-2010_AR	
Reasoning for not Acceptance or Acceptance and Close Out:	
According to the revised monitoring report version 2 (ref. 3b) the PP has corrected section C and included a description of the monitoring system which was verified by the assessment team during the site visit. However, the PP has not included in the monitoring report the drawing DF-01-459-001 Fluxograma Processo 20ago08_MJ.pdf which is a requirement of section C of EB 54 – Annex 34, which specifically says that “line diagrams showing all relevant monitoring points” shall be included in this section of the Monitoring Report. CAR #2 remains outstanding. The PP provided the Monitoring Report version 3 (ref. 3c), with the inclusion of the line diagrams in the Section C of the monitoring report. In this way, CAR #2 was closed out.	
Acceptance and Close out by Lead Assessor:	Date: 18/10/2010

Date:	22/07/2010	Raised by:	Assessment Team
Type:	CL	Number:	#3
		Reference:	AU4 - Section 2
Lead Assessor Comment:		Date: 21/07/10	
The PP is required to clarify the information provided in the Monitoring Report Version 01 (ref. 3a) section B.1 that “during the monitoring period, the gas analyser AG-02 <u>went out of work</u> or provided inconsistent measurements, as registered in the calculation spreadsheets. In these situations when all the monitored parameters were registered and the flare system operated according to manufactured specifications a flare efficiency of 90% was assumed, according to step 6 of the “Tool to determine project emissions from flaring gases containing methane”.			
Project Participant Response:		Date: 04/10/2010	

Section B.1 was rephrased to accurately reflect the condition of the gas analyzer, which was continuously on-line during the operation of the landfill gas capturing and flaring system, over the entire monitoring period. The gas analyzer was occasionally off-line during maintenance or calibration activities, but, in these situations, the flaring system was not operating and no ERs were claimed.

AG-02 sometimes provided negative values. When the readings were lower than 0 and higher or equal to -13 ppmv they were assumed to be zero and thus the efficiency was calculated as 100%. When the readings were lower than -13ppmv and when all other monitored parameters were registered and the flaring system operated according to manufacturer's specifications(*), although calibration and maintenance procedures in place suggest that the gas analyzer was in good conditions, a flare efficiency of 90% was assumed, according to STEP 6 of the "Tool to determine project emissions from flaring gases containing methane".

The threshold limit of -13 ppmv was conservatively chosen as approximately 50% of the measurement error (1% of 2500ppmv, which equals 25 ppmv).

(*) Flare specifications are described as follows (according to the Certificate of Warranty issued by ARQUIPÉLAGO SOLUÇÕES TECNOLÓGICAS LTDA.):

- Minimum LFG flow rate: 1,000 Nm³/h
- Maximum LFG flow rate: 8,000 Nm³/h
- Minimum LFG methane content: 35%
- Maximum LFG methane content: 55%
- Minimum exhaust gas temperature: 700°C
- Maximum exhaust gas temperature: 1,050°C

Documentation Provided as Evidence by Project Participant:

ATB_2nd_Report_on_GHG_UNFCCC_V02_09-sep-2010_AR

Information Verified by Lead Assessor:

ATB_2nd_Report_on_GHG_UNFCCC_V02_09-sep-2010_AR

Reasoning for not Acceptance or Acceptance and Close Out:

According to the revised Monitoring Report version 2 (ref. 3b) section B.1, the information provided regarding to the gas analyzer AG-02 is now in accordance with the situation verified on site.

However, as required by the “Tool to determine project emissions from flaring gases containing methane”, to apply 90% of the flare efficiency the temperature of the exhaust gas of the flare (T_{flare}) is 500 °C for more than 40 minutes during the hour h and the manufacturer’s specifications on proper operation of the flare are met continuously during the hour h .

In this way, the PP is required to provide to the DOE assessment team the manufacturer’s specifications on proper operation of the flare, in order to check if the 90% are correctly applied in the calculations in accordance with the “Tool to determine project emissions from flaring gases containing methane”.

CL #3 remains outstanding.

15/10/10 – Assessment Team.

According to the manufacturer specification (ref. 14b) the lower temperature of the flare on proper operation is 700 °C and a minimum LFG flow rate of 1000 Nm³/h. In this way, the DOE assessment team collected a sample of three days of each month, of this second monitoring period which have applied the 90% of the flare efficiency according to the tool (total of 30 days in 10 months), in order to check if the temperature was above 700 °C during those days, excluding the data which was already out of the ERs calculation, due to for example to temperatures lower than 500 °C; LFG<1000 Nm³/h and no operation activity.

The DOE analysis presented that the system was stable and the flare temperature was met according to the Step 6 of the tool. Firstly, the temperature was more than 500 °C and secondly more than 700 °C. This was verified through percentile analysis which showed that in 99% of the operation hours the flare temperature was above 793 °C and a LFG flow rate of 3014 Nm³/h. Therefore, the DOE assessment team could conclude that the PP has correctly applied the 90% of the flare efficiency in accordance with step 6 of the “Tool to determine project emissions from flaring gases containing methane” (ref. 8).

In addition, the DOE assessment team has checked that the Gas Analyser (AG-02) was calibrated (ref. 21a-g) in accordance with the manufacturer’s specification (ref. 9, page 4-4) which is in compliance with the Section C para 8. of the EB 52 Annex 60 – Guidelines for Assessing Compliance with the Calibration Frequency Requirements (ref. 35). Moreover, the assessment team also analysed that the PP has made internal calibrations about twice a month (Ref. 22) with standard gases (ref. 23a-e).

Also, according to the revised approved monitoring plan (ref. 1b) parameter fvch4, an external analysis needs to be performed in the flare in accordance with the AM_CLA_0047 (ref. 34). This external analysis was performed by a third party company called Bioagri Ambiental which provided a report with a flare efficiency analysis N° 8368/10A dated 14/01/2010 (ref. 33). The result obtained in this report is a flare efficiency average (there is an average because of the different distances required per AM_CLA_0047) of 99,991%, demonstrating once more that the flare has efficiency higher than 90%.

Furthermore, the intrinsic error band of the equipment was obtained through the gas analyzer manufacturer’s manual (ref. 9 – Gas analyzer manufacturer manual page 3-14 and 3-15) which is 1% of 2500 ppmv, which equals to 25 ppmv. The value of 13 ppmv is aprox. 50% of the intrinsic error of the equipment (25 ppmv). Therefore the DOE assessment team considered the adoption of the -13 ppmv value a conservative approach by the project participant in the sense that the PP could have assumed a zero reading for measurements down to – 25 ppmv, and therefore a 100% FE but instead considered 100% only until -13ppmv. For readings lower than -13ppmv a 90% FE value is applied in accordance with step 6 of the “Tool to determine project emissions from flaring gases containing methane”, as described above.

This was also found conservative by the expert of the team which says “Given the limits of error to 25 ppmv can be zero. Therefore, if the project -13 ppmv is more conservative”.

Therefore, CL #3 was closed out.

Acceptance and Close out by Lead Assessor:	Date: 18/10/2010
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Date:	22/07/2010	Raised by:	Assessment Team		
Type:	CAR	Number:	#4	Reference:	AU4 - Section 2
Lead Assessor Comment:				Date: 21/07/10	
According to the Monitoring Report Version 1 (ref. 3a) Annex B – Calibration Control the PP has presented the calibration for the equipments TIT-01, TIT-02, PIT-01 and PIT-02. The PP is required to review the Monitoring Report (ref. 3a) to be in accordance with the approved revised monitoring plan (ref. 1b), and revise it if necessary.					
Project Participant Response:				Date: 08/09/2010	

Annex B was revised. TIT-01, TIT-02, PIT-01 and PIT-02 were removed from the spreadsheet. All calibration dates were revised. Calibration data covers only the monitoring period.	
Documentation Provided as Evidence by Project Participant:	
ATB 2nd Report on GHG UNFCCC V02 09-sep-2010 AR	
Information Verified by Lead Assessor:	
ATB 2nd Report on GHG UNFCCC V02 09-sep-2010 AR	
Reasoning for not Acceptance or Acceptance and Close Out:	
The PP has correctly revised monitoring report version 02 (ref. 3b) excluding the parameters TIT-01, TIT-02, PIT-01 and PIT-02 in accordance with the approved revised monitoring report (ref. 1b).	
In this way, CAR #4 was closed out.	
Acceptance and Close out by Lead Assessor:	Date: 19/09/2010

Date:	31/08/2010	Raised by:	Assessment Team		
Type:	CAR	Number:	#5	Reference:	AU4 - Section 2
Lead Assessor Comment:				Date: 21/07/10	
During the site visit the DOE assessment team observed that the value for the parameter $W_{O_2,y}$ on 05/03/2009 was an outlier from the others values presented in the spreadsheet tab called “Daily” (values showing in the Monitoring Report), which is the compilation of the data from the minutes in a day that comes from the tab “min by min” which is where the calculation of the Emission Reductions are performed minute by minute. The PP checked why this value was inconsistent and found that actually just for the day 05/03/2009 of the tab “Daily” the spreadsheet link was getting the wrong column of the tab “min by min”. The project participant is required to revise this inconsistency and present a revised Monitoring Report.					
Project Participant Response:				Date: 10/08/2010	
The inconsistency in the spreadsheet was corrected. The change did not influence ER calculations and, therefore, there was no need to revise the Monitoring Report due to this issue.					
Documentation Provided as Evidence by Project Participant:					
ATB 2nd Report on GHG UNFCCC V02 09-sep-2010 AR					
Information Verified by Lead Assessor:					
ATB 2nd Report on GHG UNFCCC V02 09-sep-2010 AR					
Reasoning for not Acceptance or Acceptance and Close Out:					
The PP corrected the link in the tab “Daily” of the ERs calculations spreadsheets (ref.4), in order to link it to the correct cell of the tab “min by min”. The PP also correctly revised the monitoring report version 2 (ref. 3b), which only shows the tab “Daily”, to show the correct average for the parameter $W_{O_2,y}$ for the 05/03/2009 recorded in the spreadsheet min by min (which is where the calculations of the ER are performed). Because the error was on the tab “Daily” and not on the tab min by min it did not impact the value of ERs calculated min by min or the daily values of the ERs reported.					
Thus, CAR #5 was closed out.					
Acceptance and Close out by Lead Assessor:				Date: 19/09/2010	

Date:	31/08/2010		Raised by:	Assessment Team		
Type:	CAR	Number:	#6	Reference:	AU4 - Section 5	
Lead Assessor Comment:				Date: 21/07/10		
The DOE assessment team checked that in some spreadsheets provided by the PP referent to the tab “Daily” the dates in the months of March and June of 2009 were inconsistency (for example March of 2009 were presented as March of 2010, although the data was correct). In this way, the PP is required to revise all the spreadsheet and correct the mistakes.						
Project Participant Response:				Date: 10/08/2010		
All the spreadsheets were revised and all inconsistencies were corrected.						
Documentation Provided as Evidence by Project Participant:						

Calculation_200903_ANAR, Calculation_200904_ANAR, Calculation_200905_ANAR, Calculation_200906_ANAR, Calculation_200907_ANAR, Calculation_200908_ANAR Calculation_200909_ANAR, Calculation_200910_ANAR, Calculation_200911_ANAR Calculation_200912_ANAR, Calculation_201001_ANAR, Calculation_201002_ANAR Calculation_201003_ANAR, Calculation_201004_ANAR, Calculation_201005_ANAR Calculation_Summary_09-sep-2010_V02_ANAR	
Information Verified by Lead Assessor:	
Calculation_200903_ANAR, Calculation_200904_ANAR, Calculation_200905_ANAR, Calculation_200906_ANAR, Calculation_200907_ANAR, Calculation_200908_ANAR Calculation_200909_ANAR, Calculation_200910_ANAR, Calculation_200911_ANAR Calculation_200912_ANAR, Calculation_201001_ANAR, Calculation_201002_ANAR Calculation_201003_ANAR, Calculation_201004_ANAR, Calculation_201005_ANAR Calculation_Summary_09-sep-2010_V02_ANAR	
Reasoning for not Acceptance or Acceptance and Close Out:	
The PP provided the revised spreadsheets (ref. 4) with the dates revised in the “daily” tab which allowed the DOE assessment team to verify that the dates are now consistent with this monitoring period. Thus, CAR #6 was closed out.	
Acceptance and Close out by Lead Assessor:	Date: 19/09/2010

Date:	22/10/2010	Raised by:	Assessment Team		
Type:	CAR	Number:	#7	Reference:	AU4 - Section 3 and Section 5
Lead Assessor Comment:			Date: 22/10/10		
During the site visit the assessment team observed that in the month of “May 2010” on tab “min by min” of the open spreadsheet (ref. 4c) there was a mistake in the extraction of the data from the internal system (register) where the first line was not accounted for. The PP is required to revise the open spreadsheet, accordingly.					
Project Participant Response:			Date: 08/09/2010		
The spreadsheet Calculation_201005_ANAR and the monitoring report ATB_2nd_Report_on_GHG_UNFCCC_V02_09-sep-2010_AR.doc were revised. 05/11/2010: The revised spreadsheet Calculation_201005_ANAR contained a systematic error and was revised. The spreadsheet Calculation_201005_AR_Outubro, the spreadsheet Calculation_Summary_31-out-2010_V03_AR and the monitoring report ATB_2nd_Report_on_GHG_UNFCCC_V04_05-nov-2010_AR are presented.					
Documentation Provided as Evidence by Project Participant:					
Calculation_201005_ANAR ATB_2nd_Report_on_GHG_UNFCCC_V02_09-sep-2010_AR					
Information Verified by Lead Assessor:					
Calculation_201005_ANAR ATB_2nd_Report_on_GHG_UNFCCC_V02_09-sep-2010_AR Calculation_201005_AR_Outubro ATB_2nd_Report_on_GHG_UNFCCC_V04_05-nov-2010_AR					
Reasoning for not Acceptance or Acceptance and Close Out:					

In order to close CAR#07 the PP provided a revised open spreadsheet for the month of May 2010 (ref.4d Calculation_201005_ANAR) and version 2 of the Monitoring Report (ref. 3b ATB_2nd_Report_on_GHG_UNFCCC_V02_09-sep-2010_AR).

The assessment team reviewed the revised open spreadsheet for the month of May 2010 (ref. 4d) and found that the minute which had previously been missed during data extraction and transfer from the internal system (register) to the open spreadsheet was included. However, it was also noticed that in doing so the systematic of data treatment had been lost and needs correction.

CAR#07 remains open.

05/11/2010 Lucas Engelbrecht / Fabian Gonçalves

In response to the corrective action raised the PP has presented the revised calculation spreadsheet of the month of May 2010 (Calculation_201005_AR_Outubro). In order to check if the calculations made in the revised spreadsheet (Calculation_201005_AR_Outubro) were correct applied, the DOE assessment team took a ten samples from the open revised spreadsheet of May 2010 and has checked against the data from the supervisory which were found consistent, also the systematic of data treatment were checked by the assessment team and were found to be correct.

In this way, CAR#07 was closed out.

Acceptance and Close out by Lead Assessor:

Date: 06/11/2010

10. Statement of Competence

Statement of Competence

Name: **Goncalves, Fabian.**

Status

- Lead Assessor	x	- Expert	
- Assessor	x	- Financial Expert	
- Local Assessor	Brazil	- Technical Reviewer	

Scopes of Expertise

1. Energy Industries (renewable / non-renewable)	
<i>Sub scope(s):</i>	
2. Energy Distribution	
<i>Sub scope(s):</i>	
3. Energy Demand	
<i>Sub scope(s):</i>	
4. Manufacturing	
<i>Sub scope(s):</i>	
5. Chemical Industry	
<i>Sub scope(s):</i>	
6. Construction	
<i>Sub scope(s):</i>	
7. Transport	
<i>Sub scope(s):</i>	
8. Mining/Mineral Production	
<i>Sub scope(s):</i>	
9. Metal Production	
<i>Sub scope(s):</i>	
10. Fugitive Emissions from Fuels (solid, oil and gas)	
<i>Sub scope(s):</i>	
11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride	
<i>Sub scope(s):</i>	
12. Solvent Use	
<i>Sub scope(s):</i>	
13. Waste Handling and Disposal	
<i>Sub scope(s):</i>	
14. Afforestation and Reforestation	
<i>Sub scope(s):</i>	
15. Agriculture	
<i>Sub scope(s):</i>	

Approved Member of Staff by:

Siddharth Yadav

Date:

25/10/2009

Statement of Competence

Name: Engelbrecht, Lucas

Status

- Lead Assessor		- Expert	
- Assessor	x	- Financial Expert	
- Local Assessor	Brazil	- Technical Reviewer	

Scopes of Expertise

1. Energy Industries (renewable / non-renewable)	
<i>Sub scope(s):</i>	
2. Energy Distribution	
<i>Sub scope(s):</i>	
3. Energy Demand	
<i>Sub scope(s):</i>	
4. Manufacturing	
<i>Sub scope(s):</i>	
5. Chemical Industry	
<i>Sub scope(s):</i>	
6. Construction	
<i>Sub scope(s):</i>	
7. Transport	
<i>Sub scope(s):</i>	
8. Mining/Mineral Production	
<i>Sub scope(s):</i>	
9. Metal Production	
<i>Sub scope(s):</i>	
10. Fugitive Emissions from Fuels (solid, oil and gas)	
<i>Sub scope(s):</i>	
11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride	
<i>Sub scope(s):</i>	
12. Solvent Use	
<i>Sub scope(s):</i>	
13. Waste Handling and Disposal	
<i>Sub scope(s):</i>	
14. Afforestation and Reforestation	
<i>Sub scope(s):</i>	
15. Agriculture	
<i>Sub scope(s):</i>	

Approved Member of Staff by:

Siddharth Yadav

Date:

10/11/2010

Statement of Competence

Name: Lorna Guerrero

Status

-	Lead Assessor	<input type="checkbox"/>	-	Expert	<input checked="" type="checkbox"/>
-	Assessor	<input type="checkbox"/>	-	Financial Expert	<input type="checkbox"/>
-	Local Assessor	<input type="checkbox"/>	-	Technical Reviewer	<input type="checkbox"/>

Scopes of Expertise

1. Energy Industries (renewable / non-renewable)	<input type="checkbox"/>
Technical Area(s):	
2. Energy Distribution	<input type="checkbox"/>
Technical Area(s):	
3. Energy Demand	<input type="checkbox"/>
Technical Area(s):	
4. Manufacturing	<input type="checkbox"/>
Technical Area(s):	
5. Chemical Industry	<input type="checkbox"/>
Technical Area(s):	
6. Construction	<input type="checkbox"/>
Technical Area(s):	
7. Transport	<input type="checkbox"/>
Technical Area(s):	
8. Mining/Mineral Production	<input type="checkbox"/>
Technical Area(s):	
9. Metal Production	<input type="checkbox"/>
Technical Area(s):	
10. Fugitive Emissions from Fuels (solid, oil and gas)	<input type="checkbox"/>
Technical Area(s):	
11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride	<input type="checkbox"/>
Technical Area(s):	
12. Solvent Use	<input type="checkbox"/>
Technical Area(s):	
13. Waste Handling and Disposal	<input checked="" type="checkbox"/>
Technical Area(s): TA 13.1: Waste handling and disposal TA 13.2: Animal waste management	
14. Afforestation and Reforestation	<input type="checkbox"/>
Technical Area(s):	
15. Agriculture	<input checked="" type="checkbox"/>
Technical Area(s): TA 15.2: Animal waste management	

Approved Member of Staff by:

Siddharth
Yadav

Date:

21/01/2011

Statement of Competence

Name: Kaviraj Singh

Status

- Lead Assessor	<input checked="" type="checkbox"/>	- Expert	<input checked="" type="checkbox"/>
- Assessor	<input type="checkbox"/>	- Financial Expert	<input type="checkbox"/>
- Local Assessor	<input type="checkbox"/>	- Technical Reviewer	<input checked="" type="checkbox"/>

Scopes of Expertise

5. Energy Industries (renewable / non-renewable)	<input type="checkbox"/>
Technical Area(s):	
6. Energy Distribution	<input type="checkbox"/>
Technical Area(s):	
7. Energy Demand	<input type="checkbox"/>
Technical Area(s):	
8. Manufacturing	<input type="checkbox"/>
Technical Area(s):	
16. Chemical Industry	<input type="checkbox"/>
Technical Area(s):	
17. Construction	<input type="checkbox"/>
Technical Area(s):	
18. Transport	<input type="checkbox"/>
Technical Area(s):	
19. Mining/Mineral Production	<input type="checkbox"/>
Technical Area(s):	
20. Metal Production	<input type="checkbox"/>
Technical Area(s):	
21. Fugitive Emissions from Fuels (solid, oil and gas)	<input type="checkbox"/>
Technical Area(s):	
22. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride	<input type="checkbox"/>
Technical Area(s):	
23. Solvent Use	<input type="checkbox"/>
Technical Area(s):	
24. Waste Handling and Disposal	<input checked="" type="checkbox"/>
Technical Area(s): TA 13.1: Waste handling and disposal	
25. Afforestation and Reforestation	<input type="checkbox"/>
Technical Area(s):	
26. Agriculture	<input type="checkbox"/>
Technical Area(s):	

Approved Member of Staff by:

Siddharth
Yadav

Date:

04/04/2011

Statement of Competence

Name: Fernandez, Alicia

Status

- Lead Assessor	<input checked="" type="checkbox"/>	- Expert	<input type="checkbox"/>
- Assessor	<input checked="" type="checkbox"/>	- Financial Expert	<input type="checkbox"/>
- Local Assessor	<input checked="" type="checkbox"/>	- Technical Reviewer	<input checked="" type="checkbox"/>

Scopes of Expertise

1. Energy Industries (renewable / non-renewable)	<input type="checkbox"/>
Technical Area(s):	
2. Energy Distribution	<input type="checkbox"/>
Technical Area(s):	
3. Energy Demand	<input type="checkbox"/>
Technical Area(s):	
4. Manufacturing	<input type="checkbox"/>
Technical Area(s):	
5. Chemical Industry	<input type="checkbox"/>
Technical Area(s):	
6. Construction	<input type="checkbox"/>
Technical Area(s):	
7. Transport	<input type="checkbox"/>
Technical Area(s):	
8. Mining/Mineral Production	<input type="checkbox"/>
Technical Area(s):	
9. Metal Production	<input type="checkbox"/>
Technical Area(s):	
10. Fugitive Emissions from Fuels (solid, oil and gas)	<input type="checkbox"/>
Technical Area(s):	
11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride	<input type="checkbox"/>
Technical Area(s):	
12. Solvent Use	<input type="checkbox"/>
Technical Area(s):	
13. Waste Handling and Disposal	<input type="checkbox"/>
Technical Area(s):	
14. Afforestation and Reforestation	<input type="checkbox"/>
Technical Area(s):	
15. Agriculture	<input type="checkbox"/>
Technical Area(s):	

Approved Member of Staff by:

Siddharth Yadav

Date:

02/03/2011

11. Photographic Evidence



Unique reference number: 288577 (Ref. 36a,b) Parameter: $LFG_{total,y}$; $Fv_{RG,h}$
Name of equipment: Flow Meter – ST 98 Flex Date: 18/08/2010



Unique reference number: N1-W1-961(ref. 39a,b). Parameter: $W_{CH_4,y}$, $fv_{CH_4,h}$
Name of equipment: Gas Analyser – ULTRAMAT Siemens AG01 Date: 18/08/2010



Unique reference number: 12526590 (ref. 40) Parameter: EL_{IMP}
Name of equipment: Electricity Meter - ELO 2113 Date: 18/08/2010



Unique reference number: AG02 – N1-W1-027 Parameter: to2,h, fvch4,FG,h,
(ref. 41a,b).

Name of equipment: Gas Analyser ULTRAMAT Date: 18/08/2010
Siemens AG02



Unique reference number: N/A (ref. 42) Parameter: Mass_{LPG}

Name of equipment: LPG Cylinders of 45kg Date:18/08/2010
each.

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