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# **VERIFICATION AND CERTIFICATION REPORT**

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**Gestión Integral de Residuos S.A.**

**El Molle – Landfill gas (LFG)  
capture project**

**UN PA 0170**

**24/02/2010 to 31/07/2011**

**(Both days inclusive)**

<b>Date of Issue:</b>		<b>Project Number:</b>	
19/11/2012		CDM.VER0118 MP5	
<b>Project Title:</b>			
El Molle – Landfill gas (LFG) capture project			
<b>Organisation:</b>		<b>Client:</b>	
SGS United Kingdom Limited		Gestión Integral de Residuos S.A. (GIRSA)	
<b>Publication of Monitoring Report:</b>			
<b>Monitoring Period:</b>		Fifth monitoring period: 24/02/2010 – 31/07/2011	
First Monitoring Version and Date:		Version 1, dated 16/08/2011	
Final Monitoring Version and Date:		Version 5, dated 07/11/2012	
<b>Summary:</b>			
<p>SGS United Kingdom Ltd has performed the fifth periodic verification of the CDM project “El Molle – Landfill gas (LFG) capture project”, with UNFCCC reference number of 0170, registration date of 19/02/2006 and crediting period from 15/12/2006 until 14/12/2013. The verification includes confirming the implementation of the monitoring plan of the registered PDD version 10 dated 12/03/2005, the revised monitoring plan approved on 02/07/2012 and the application of the monitoring methodology as per ACM0001 version 2, dated 30/09/2005. 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"> <li>(a) The registered PDD, including the monitoring plan and the corresponding validation report;</li> <li>(b) Monitoring Report, emission reduction spreadsheet, previous verification reports, revised monitoring plan (approved 02/07/2012) and corresponding validation report ;</li> <li>(c) The applied monitoring methodology;</li> <li>(d) Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board;</li> <li>(e) All information and references relevant to the project activity’s resulting in emission reductions.</li> </ul> <p>The project involves the collection and flaring of landfill gas of the El Molle landfill, located near Valparaíso in Chile. All the landfill gas extracted is combusted, converting the methane from the landfill gas in CO<sub>2</sub>, thus decreasing the global warming potential of the gas released to the atmosphere.</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 125,179 tCO<sub>2</sub>e emission reductions during period 24/02/2010 up to 31/07/2011.</p>			
<b>Subject:</b>			
CDM Verification			
<b>Verification Team:</b>			
Paulina Kellenberger – Lead Assessor		<input checked="" type="checkbox"/> No Distribution (without permission from the Client or responsible organisational unit)	
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<b>Technical Review:</b>		<input type="checkbox"/> Limited Distribution	
Date: 20-11-2012 Name: Joe Sun			
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Name: Siddharth Yadav Date: 14/12/2012			
<b>Revision Number:</b>	<b>Date:</b>		
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## Abbreviations

AF	Adjustment Factor
CAR	Corrective Action Request
CDEC-SIC	Grid administrator
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CH <sub>4</sub>	Methane
CL	Clarification Request
CO <sub>2</sub> e	Carbon Dioxide Equivalent
COP/MOP	Conference of the Parties serving as the Meeting of the Parties
CNE	National Energy Commission
DNA	Designated National Authority
DOE	Designated Operational Entities
EC	Electricity Consumption
EF	Emission Factor
ERs	Emission Reductions
FAR	Forward Action Request
FE	Flare Efficiency
GEF	Grid Emission Factor
GHG	Greenhouse Gas(es)
FAR	Forward Action Request
IPCC	Intergovernmental Panel for Climate Change
MP	Monitoring Plan
MR	Monitoring Report
PA	Project Activity
PDD	Project Design Document
PLC	Programmable Logic Controller
PE	Project Emissions
PP	Project Participant
PS	CDM Project Standard version 01.0
QA	Quality Assurance
QC	Quality Control
RMP	Revised Monitoring Plan
SGS	SGS United Kingdom Ltd
UNFCCC	United Nations Framework Convention on Climate Change
VVM	Validation and Verification Manual version 01.2
VVS	CDM Validation and Verification Standard version 02.2

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## 1. Introduction

### 1.1 Objective

SGS United Kingdom Ltd has been contracted by Gestión Integral de Residuos S.A. (one of the project participants of the project) to perform an independent verification of its CDM project El Molle – Landfill gas (LFG) 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 Standard, employed a risk-based approach in the verification, focusing on the identification of significant reporting risks and the reliability of project monitoring.

Due professional care has been exercised and ethical conduct has been followed by the assessment team during the verification process. The verification report is a fair presentation of the verification activity.

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:	El Molle – Landfill gas (LFG) capture project
UNFCCC Registration Number:	0170
Monitoring Period Covered in this Report:	24/02/2010 to 31/07/2011
Project Participants:	Host Country: Chile Annex I Country: Japan Gestión Integral de Residuos S.A. (Chile - host) The Tokyo Electric Power Company, Inc. (Japan)

Location of the Project Activity:	Camino La Pólvora s/n, Valparaíso, Valparaíso Region, Chile
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The project activity is located in the “El Molle” landfill, an operational landfill near the city of Valparaíso, in Chile. The project activity comprises of a system that collects the gas from the landfill and pumps it to a flaring station, where the gas is combusted in two enclosed flares. GHG emissions are reduced by converting the methane generated in the landfill into CO<sub>2</sub>, which has a lower global warming potential, thus reducing the GHG emissions to the atmosphere.

## 2. Methodology

### 2.1 General Approach

SGS performs the verification work using a Periodic Verification Checklist prepared following the VVS. The Periodic Verification Checklist describes the verification approach and the sampling plan.

The checklist gives the assessment team 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.

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.

Only verification activities undertaken after the publication of the Monitoring Report on the UNFCCC CDM website were used as a basis for SGS to conclude our verification and submit a request for issuance of CERs to the Board.

### 2.2 Verification Team for this Assessment

A team of competency has been selected to perform the verification of the project.

Name	Role
Paulina Kellenberger	Lead Assessor
Pablo Osorio	Local Assessor
María Teresa Varnero	Technical Area expert scope 13.1

### 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

<b>Location:</b> El Molle Landfill site, Valparaiso - Chile	
<b>Date:</b> 26/09/2011	
<b>Coverage:</b>	<b>Source of Information / Persons Interviewed</b>
Visit to the flaring station to check the implementation and operation of the project activity as per the registered PDD and the RMP (approved 02/07/2012)	Laura Landeta – CDM project chief
Check of the monitoring equipment, including pictures of the serial numbers and relevant information, calibration performance and observations of monitoring practices against the registered PDD and the RMP (approved 02/07/2012)	Luis Estivil – Plant Operator
Check of information flows for generating, aggregating and reporting the parameters monitored; implementation of QA/QC procedures to prevent or identify and correct any error or omission in the monitoring parameters and review of ER calculations.	Jaime Vidal – Plant Chief
Interviews with the staff of the project activity to determine if the operational and data collection procedures are implemented as per the applicable monitoring plan.	
Cross check between the information provided in the monitoring report and data from other sources such as plant logbooks and external reports.	

### 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-compliance with the monitoring plan or methodology are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;
- II. Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;
- III. Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;
- IV. Issues identified in a FAR during validation to be verified during verification or previous verification(s) 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.

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, which are for the benefit of future projects and future verification activities. 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.

The final version of the Monitoring Report (MR) is dated 07/11/2012. This final version covers all the changes made to the previous versions of the MR. The present report mentions the different versions of the MR where the specific comments or requirements were closed (not necessarily the latest version of the MR).

## **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 Review Team. The task of the Technical Review Team 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.

### **Technical Review Team**

<b>Name</b>	<b>Role</b>
Joe Sun	Technical Reviewer
Yi Liao	Technical Area expert scope 13.1

### 3. Verification Findings

#### 3.1 Project Implementation

The project consists of the capture and destruction of methane from the landfill site El Molle in order to reduce the global warming potential of the LFG released into the atmosphere. The project involves a landfill gas capture and flaring system, composed by two lobular blowers that extract the LFG and two flares where all the gas collected is combusted.

The project activity meets the applicability criteria of the methodology ACM0001 version 2 (ref. 3); it is classifiable under option a) of the methodology ACM0001 v2, since the baseline scenario is the partial or total atmospheric release of the gas, and in the project activity the captured gas is flared in two enclosed flares.

The project was implemented and equipment installed as described in the registered PDD.

- (a) The project has been implemented as described in the registered PDD (ref. 1) and Revised Monitoring Plan (ref. 2b). As it was verified during this monitoring period, the project is operational and fully implemented. The project activity consists of two blowers for biogas suction with a maximum suction capacity of 2,000 Nm<sup>3</sup>/h each, a continuous measuring station at one point which measures flow, temperature, pressure and methane content of the gas and two enclosed flares, where the landfill gas is combusted. Each flare has a backup measuring point for landfill gas temperature, pressure and flow, and exhaust gas temperature is also measured. The burning capacity of the plant is limited by a valve that allows a maximum burning flow of 1,200 Nm<sup>3</sup>/h of landfill gas to each flare. An emergency diesel generator is installed on site.
- (b) All the systems are in place and the PP is operating the landfill gas capture and flaring system according to the registered PDD (ref. 1) and RMP (ref. 2b). In this monitoring period (MP5, 24/02/2010 – 31/07/2011) the verification was started under VVM v01.2 (ref. 5) and during the site visit carried out on 26/09/2011 it was verified that an emergency diesel generator was installed in the plant between 27/03/2010 and 31/03/2010 (ref. 55) and started to operate on 01/04/2010. In order to include the monitoring of emissions from the generator in the monitoring plan, a Revision of the Monitoring Plan was deemed necessary, so the verification was put on standby. The RMP was approved on 02/07/2012, and an emission factor of 1.3 tCO<sub>2</sub>e/MWh was included for the diesel generator (please also see section 3.2.1). The entire monitoring equipment installed is detailed in the Monitoring Report (ref. 6h); these are in line with the registered PDD (ref. 1) and RMP (ref. 2b).
- (c) The information provided in the Monitoring Report (ref. 6h) and reviewed during the site visit is in line with the registered PDD (ref. 1) and RMP (ref. 2b). No data provided has caused an increase in estimates of the emission reductions in the current monitoring period or is highly likely to increase the estimates of emission reductions in the future monitoring periods. During this monitoring period a *“temporary deviation from the registered monitoring plan or applied methodology”* has been identified (see section 3.2.1 for further information), which has caused a decrease in the emission reductions of this monitoring period. In addition, 6,241 CERs were voluntarily discounted in this monitoring period; please refer to section 3.2.1 for further details.
- (d) Emissions reduction achieved in this verification are 37.7% below the estimations in the PDD for this period and 34.6% below if the voluntary discount from MP1 to MP4 is not considered. In this monitoring period a total of 125,179 CERs were verified (131,420 CERs without considering the voluntary discount from MP1 to MP4). According to the registered PDD the expected emissions reduction for 2010 and 2011 are 201,047. These estimations were based on the following considerations:

#### Project activity

Landfill gas flow: 18,863,765.10 Nm<sup>3</sup> LFG for the entire monitoring period

Flare efficiency: 99.038% average

w<sub>CH<sub>4</sub></sub>, methane fraction in LFG: 52.17% average

PE<sub>ECy</sub> Project emissions from electricity: 3,011.28 tCO<sub>2</sub>e for the entire monitoring period (not considering emissions discounted from previous monitoring periods)

#### PDD estimation

Landfill gas flow: 25,948,125 m<sup>3</sup>LFG per year

Flare efficiency: 98%

w<sub>CH4</sub>, methane fraction in LFG: 50.0%

PE<sub>ECy</sub>, Project emissions from electricity: 522 tCO<sub>2</sub>e per year

CERs 2010: 137,110 tCO<sub>2</sub>e (116,825 tCO<sub>2</sub>e applicable to this MP5)

CERs 2011: 145,004 tCO<sub>2</sub>e (84,222 tCO<sub>2</sub>e applicable to this MP5)

During the document review it was found that in the MR v1, page 21 (ref. 6a), the emission reductions estimated in the PDD for this monitoring period were calculated on 223,305 tCO<sub>2</sub>e; however, calculating the expected emissions reduction based on twelve months of equal duration, and 30 days per month in the case of February 2010, the result is 200,748 tCO<sub>2</sub>e. **CAR 03 was raised** asking the PP to recalculate the expected emissions reductions. In response, along with the MR v2 VVS (ref. 6d), the PP provided an additional sheet in the ER calculation spreadsheet v3 (ref. 7d). In this updated document (ref. 7d), the ER estimations are calculated according to the ER estimations from the PDD for 2010 and 2011, based on a daily average. Calculations were verified to be accurate, and by this approach the ERs expected in the PDD were calculated as 201,047 tCO<sub>2</sub>e for the fifth monitoring, so **CAR 3 was closed**.

The verification was resumed under the VVS v02.2 track (ref. 5b) after the RMP approval on 02/07/2012. The PP provided an updated version of the Monitoring Report under VVS (ref. 6c), and **CL 9 was raised** asking the PP to modify the following issues found in the MR v1 VVS (ref. 6c) to be in line with the EB 66 annex 20 (ref. 60) and the Project Standard (ref. 61 - EB65 annex 5):

- To include information regarding the post-registration changes in the relevant sub-section of section B.2
- To provide a diagram of the monitoring system, in section C of the MR
- To include in section D.2 information on type, accuracy class, serial number, calibration frequency and date of last calibration of each monitoring equipment
- To include information about the diesel generator in section D.2

The PP provided the MR v2 (VVS) (ref. 6d) including the requested information, in compliance with the Guidelines for completing the Monitoring Report (ref. 60). **CL 9 was closed**.

As it was previously mentioned, during this monitoring period the emergency diesel generator was installed and started operation (01/04/2010). This equipment is also equipped with an hour counter to register the electricity generated by the equipment and with this counter and the electricity meter, the PP identified that a misconnection in the electricity meter that affected the accuracy of the equipment has occurred. This was corrected on 22/07/2011 (ref. 32) by personnel authorized by the Superintendence of Electricity and Fuels (SEC). As per provisions in VVS v02.2, the PP included in this Monitoring Report a temporary deviation from the monitoring plan/ applied methodology, in order to estimate in a conservative manner the electricity consumption throughout the monitoring period. Please refer to section 3.2.1 for further details on how this post registration change was verified.

As it was identified in the previous monitoring period (ref. 9d), the PLC was set by the manufacturer to register LFG temperatures between -10°C and 60°C only. For this reason a letter from the manufacturer (JEAN FRANCOIS BRADFER AS&D CONSULTORES EIRL) was provided indicating that on 17/06/2010 (ref. 41) the equipment was modified to register temperatures between -10°C and 100°C, but **CAR 05a was raised** requesting to confirm if the equipment can operate correctly in this updated temperature range.

The PLC manufacturer (AS&D Consultores EIRL) provided a letter dated 24/10/2011 which clarifies the reasons for the increase of the LFG temperature and confirmed that *"the rescaling of the temperature instrument and the upper temperature conditions of the biogas does not affect the burning conditions inside the flare"*. Based on this information **CAR 05a was closed**.

Based on above mentioned information **CAR 05b was raised** because the temperature meter used between 24/02/2010 until 28/07/2010 (C2J401275-912) was calibrated in the operational range of 0°C to 60°C, so the data recorded above 60°C could not be assured. As a corrective action, the PP discarded all the registers for ER calculations until 28/07/2010 where LFG temperature equal or above 60°C were recorded. Furthermore, the PP provided the calibration certificates of the temperature meters used between 28/07/2010 – 30/07/2010 (C2F305205) (ref. 42) and 30/07/2010 - 31/07/2011 (C2J401275-912) (ref. 33) and it was confirmed that these equipment were calibrated in an operational range between 0°C and 100°C. **CAR 05b was closed**. Please see section 3.5.1.7 for further details.

### 3.2 Post registration changes

In this period a “temporary deviation from registered monitoring plan or applied methodology” without prior approval is being requested together with the request for issuance (ref. 61, Appendix 1). The temporary deviation is further explained below in section 3.2.1.

A revision of the monitoring plan (applying VVM v01.2) was also requested during the verification of this fifth monitoring period, and it was previously approved by the CDM EB on 02/07/2012.

#### 3.2.1 Temporary deviations from registered monitoring plan or applied methodology

A temporary deviation from the registered monitoring plan has been included in this verification, because the electricity meter used to measure the electricity consumed by the project activity was not working correctly, as it was reported in the MR v1 (ref. 6a, pp7-8). VDF Electricidad Ltda (a company specializes in industrial electric installations) checked the electricity meter and provided a letter dated 23/07/2011, indicating that the equipment was incorrectly installed and that the bobbins of the electricity meter had to be changed. Due to the above mentioned reason, the readings from the meter are unreliable up until 22/07/2011, and only 9 days in the fifth monitoring period have accurate data from the meter.

The approach initially adopted by the PP in the MR v1 in page 8 (ref. 6a) considered a daily consumption average, calculated from the days when the meter was working correctly, and extrapolated to calculate the monthly consumption within the complete monitoring period. This represents a deviation from the monitoring plan, which states that this parameter should be measured so **CAR 1 was raised**. This CAR 1 was raised in the first assessment with **VVM** (ref. 5a), and as per **VVS** (ref. 5b) accepts temporary deviations in the monitoring period (without prior approval if are in line with PS (ref. 61) Appendix 1), this was modified accordingly and the documents were updated to address this deviation.

After the RMP was approved by the CDM EB (ref. 2b), the verification was resumed under the VVS track, in order to address CAR 1 as a temporary deviation from the RMP and applied methodology. In MR v1 VVS (ref. 6g) the PP considered estimating the electricity consumption until the correction of the electricity meter (22/07/2011) as the maximum theoretical consumption of the plant, adding a 10% for distribution losses. This approach is in compliance with the Appendix 1 of the Project Standard (ref. 61) and it is classifiable as a change that do not require prior approval by the board, since Paragraph 3 states the following:

*“If project participants have temporarily not monitored parameters related to project GHG emissions or are unable to produce evidence related to such monitoring, prior approval by the Board is not required if project participants estimate these parameters assuming that the source of the GHG emissions operated at maximum capacity for the full period of the missing data. In the case of project GHG emissions related to the consumption of electricity, the estimate shall include an addition of 10% to account for transmission and distribution losses.”*

Following the above mentioned approach, the Monitoring Report, and the ER calculations were modified to include the corrected values (ref. 7c). With the purpose of illustrating the maximum consumption of the plant, a table was included in section B.2.1. of the MR v1 VVS (ref. 6c), showing the quantity, unit capacity and total electricity consumption of the equipment in the plant; however, the name of each equipment, backup information regarding the electricity consumption of each piece of equipment was not provided and also the instrumentation and the 220V devices such as computers were not considered, so **CAR 1a was raised**.

In response, the PP provided “CAR 1 - Respaldo consumo electrico” (ref. 66a), “Consumo Electrico Planta de gas 220V 2012 08 08” (ref. 66c), “Foto CPU” (ref. 70a) and “Foto Monitor Flatron” (ref. 70b); including a set of photos showing the ID plate of the equipment installed in the plant and the electricity consumption of equipment not specified in ref. 66a, like 4 desk computers, 4 CRT monitors, one laser printer, monitoring equipments and illuminations. The calculation of the EC was included in the ER calculation spreadsheet (ref. 7h) and informed in the MR v5 VVS (ref. 6h) accordingly. The electricity consumption of the plant is summarized in the table below:

Voltage	Device	Brand	Serial Number	Energy consumption [kWh]
380V	Motor 1 Lobular Blower	WEQ	16MAI06 BW37784	30
	Motor 2 Lobular Blower	ABB motors	50007038005001	30
	Motor 3 (in Standby)	WEQ	16MAI06 BW37783	30
	Motor 1 antorcha 1	WEQ	15MAI06 BW35606	11
	Motor 2 antorcha 2	WEQ	BM10094	15
	Motor 3 (in standby)	WEQ	15MAI06 BW35607	11
	Compressor 1	Ingersoll Rand	19451 GDBA AG H	11
	Compressor 2	Ingersoll Rand	19446 GDBA AG H	11
	Centrifugal pump	Leroy Somer	253883	2.2
	Centrifugal pump	n/a	130646255	3
220V	Air conditioning (4 x 2200W)	n/a	n/a	8.8
	Light bulb (3 x 500W)	n/a	n/a	1.5
	Light bulb (3 x 400W)	n/a	n/a	1.2
	Computer (4 x 365 W)	n/a	n/a	1.46
	Monitor (4 x 330)	n/a	n/a	1.32
	Laser Printer	n/a	n/a	0.55
	Main line flow meter	n/a	n/a	0.001
	Flare 1 and 2 line flow meters	n/a	n/a	0.0018
	Temperature transducers for main line, 2 flares and 2 exhaust gases	n/a	n/a	0.0045
	Pressure meter for main line and 2 flares	n/a	n/a	0.0036
	Gases Analyzer	n/a	n/a	0.55
<b>Total</b>				<b>169.5909</b>

It was verified that the consumption of the plant was estimated conservatively, and an additional 10% was considered for transmission losses, as per Appendix 1, paragraph 3 of the Project Standard (ref. 61). Hence, the temporary deviation from the monitoring plan is in compliance with the Validation and Verification Standard, as it ensures that emission reductions will not be over-estimated. **CAR 1a was closed.**

In addition, the electricity consumption after the deviation was calculated as the difference between the reading of the electricity meter between 23/07/2011 and 01/08/2011, but the reading on the meter on 01/08/2011 is not available. **CAR 1b was raised** asking the PP to provide such information.

The PP provided “CAR 1-Toma de estado AGOSTO 2011” (ref. 66b). According to said spreadsheet, it was verified that the accumulated electricity consumption registered on August 1<sup>st</sup> 2011 was 806.95 MWh, and the LPG meter was on 38.756 m<sup>3</sup>. This information was verified to be consistent with the values used for ER calculations in ref. 7d, and MR v2 VVS (ref. 6d). **CAR 1b was closed.**

**CAR 1 was closed.**

In order to correct the electricity consumption that was not accurately measured in previous monitoring periods, the PP has proposed to voluntarily discount CERs in this period by using the same approach that was used to address the temporary deviation. Neither VVS nor other UN guidance informs or mandates any provisions for discounting the emission reductions in current monitoring periods due to the issues/mistakes in the previous monitoring periods; this discounting of the CERs is a voluntary action by the PP and verified by SGS.

Since project emissions were already discounted in the previous monitoring period, the total amount of CERs discounted in the present period was calculated as the difference between the maximum theoretical consumption of the landfill gas plant from 15/12/2006 to 23/02/2010 (including 10% to account for transmission and distribution losses), and the project emissions from electricity consumption registered during the same period.

$$PE_{(MP1-MP4)}[tCO_2e] = PC[kW] \cdot \Delta t[h] \cdot EF_{elec} \left[ \frac{tCO_2e}{MWh} \right] \cdot 0.001 \left[ \frac{MWh}{kWh} \right] \cdot TDL [\%] - \sum_{i=1}^4 PE_{EC,i} [tCO_2e]$$

Where

$PE_{(MP1-MP4)}$ :	Project emissions due to electricity consumption (tCO <sub>2</sub> e)
$\Delta T$ :	Total time elapsed from the beginning of the operation of the plant until the end of the fourth monitoring period, in hours
PC:	Total plant capacity (kW)
$EF_{elec}$ :	CO <sub>2</sub> emission factor of the grid (1.3 tCO <sub>2</sub> /MWh, approved in the RMP)
TDL:	Transmission and distribution losses (10%, based in the PS, appendix 1, paragraph 3)
$PE_{EC,i}$ :	Project emissions from electricity consumption, measured in verification period <i>i</i> (tCO <sub>2</sub> e)

The table below summarizes the theoretical electricity consumption from MP1 to MP4:

Parameter	Value
Total plant capacity [kW]	169.59
Operating days (15/12/2006 – 23/02/2010, both days inclusive)	1,167
Operational hours	28,008
Total energy consumption [MWh] (adding 10% due to transmission and distribution losses)	5,224.89
Emission factor [tCO <sub>2</sub> e/MWh]	1.3
Theoretical project emissions from 15/12/2006 to 23/02/2010 (both days inclusive)	6,792.36

The total plant capacity is the same that was used to address the deviation; it has to be noted that this is conservative, since a blower that is kept in stand-by is also considered as operative. The emission factor approved in the RMP was used (1.3 tCO<sub>2</sub>/MWh), which is also conservative, as in MP1 and MP2 an emission factor of 1 tCO<sub>2</sub>/MWh was used to calculate project emissions from electricity consumption.

The following values for project emissions from electricity consumption were measured in previous verifications.

Period	Electricity consumption [MWh]	Emission factor [tCO <sub>2</sub> /MWh]	Project emissions [tCO <sub>2</sub> e]
MP1	121	1	121
MP2	165	1	162
MP3	75	1.3	97
MP4	132.31	1.3	172
Total	490.31		552

Hence,

$$PE_{(MP1-MP4)}[tCO_2e] = 6,792 - 552 = 6,240 tCO_2e$$

The resulting amount of ERs to be discounted was rounded up to 6,241 tCO<sub>2</sub>e. By way of comparison, the EC measured after the meter was corrected was 14.91 MWh for the period 23/07/2011 – 31/07/2011, giving an average of 1.66 MWh/day; as per the approach used, the average electricity consumption is (6,241/1,167) 5.35 MWh/day (around 322% higher than the measured consumption per day).

### 3.2.2 Corrections

No corrections have been identified during this monitoring period.

### 3.2.3 Permanent changes from registered monitoring plan or applied methodology

No permanent changes from the registered monitoring plan or applied methodology were identified during this monitoring period. A Revision of the monitoring plan (RMP Ref 02) was approved by the CDM EB on 29/07/2010 and then a second RMP (Ref 02b) was submitted for registration during this monitoring period, to include a diesel gen-set into the project. This last RMP was approved on 02/07/2012, and no further changes have occurred in the PA.

### 3.2.4 Changes to project design of registered project activity

There have been no changes to the project design of the PA in this Monitoring Report.

### 3.2.5 Changes to start date of crediting period

The crediting period goes from 15/12/2006 to 14/12/2013. There have been no changes to the start date of the crediting period in this monitoring period, but this was changed before the first monitoring period. The prior crediting period was considered 01/04/2006 to 31/03/2013, as it can be seen on the UNFCCC website <http://cdm.unfccc.int/Projects/DB/DNV-CUK1134475476.36/view>.

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

No FAR remains open from previous verifications or the validation report. Two FARs were raised in the verification report of the third monitoring period (1<sup>st</sup> May 2008 to 30<sup>th</sup> December 2008) (ref. 9c):

- FAR 1 was raised because the registered MP indicated that the LFG<sub>flared</sub> was calculated annually instead of measured continuously.
- FAR 2 was raised requesting the PP to submit a revised monitoring plan to request the approval of using a default value of the grid emission factor instead of calculating it.

In response to these two FARs, a revision of the monitoring plan was carried out by GIRSA, which was approved by the CDM EB on 29/07/2010 (ref. 2). The RMP approved on 02/07/2012 (ref. 2b) replaces this previous version (ref. 2) and also addresses the above mentioned issues.

There are no pending issues neither from the previous monitoring period (MP4 between 31<sup>st</sup> December 2008 to 23<sup>rd</sup> February 2010) nor from the validation of the revised monitoring plan.

### 3.4 Compliance of the monitoring plan with the monitoring methodology.

The revised monitoring plan (approved on 02/07/2012) of the registered project activity is in accordance with the applied methodology ACM0001 version 2. The monitoring report (ref. 6h) is also consistent with the applicable methodology (ref. 3). The project boundary was verified during the site visit and it was found to be in compliance with the registered PDD Version 10 (ref. 1) and the applicable methodology. According to the methodology, the project boundary is the site of the project activity where the gas is captured and destroyed.

According to ACM0001 version 2, no leakage effects need to be accounted. The parameters and the monitoring approach discussed in the Monitoring Report (ref. 6h) and verified on site are consistent with the revised monitoring plan (ref. 2b) and the applied monitoring methodology ACM0001 version 2.

It is worth mentioning that a deviation regarding the use of one flow meter to account for the landfill gas volume that is only burned in two flares was submitted confidentially and approved by the EB (ref. 8d) on February 2008 (*Deviation of registered PDD and approved methodology regarding the measurement of landfill gas flow and clarification of the flaring lay out and monitoring plan using two flares*). The deviation also clarifies the operation conditions of the flare station (automatically) and specifies the controls that the flaring system has to avoid risks and LFG venting, these conditions were included in the first and second revised monitoring plan. The use of one flow meter to measure the LFG flow of project activities that only burn LFG was approved by the EB in clarification 28 [http://cdm.unfccc.int/UserManagement/FileStorage/AM\\_CLAR\\_3QVWE5JTOPYA4AAKIW15NGXAO5DDYP](http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_3QVWE5JTOPYA4AAKIW15NGXAO5DDYP)

#### 3.4.1 Total amount of landfill gas captured ( $LFG_{total,y}$ )

Registered PDD/RMP (ref.2b) Approved Methodology	Requirement in the applicable methodology and relevant EB documents	Requirement in the revised monitoring plan	Conclusion on the compliance of the monitoring plan in the RMP with the methodology
<b>Data/Parameter</b>	1.- $LFG_{total,y}$	1.- $LFG_{total,y}$	In compliance
<b>Description</b>	Total amount of landfill gas captured	Total amount of landfill gas captured	In compliance
<b>Measured/Calculated /Default</b>	Measured	Measured	In compliance
<b>Source of data</b>	N/A	N/A	N/A
<b>Monitoring equipment</b>	Measured by a flow meter	Measured by a flow meter	In compliance
<b>Measuring/Reading/ Recording frequency</b>	Continuously/periodically	Continuously	In compliance
<b>Calculation method (if applicable)</b>	N/A	N/A	N/A
<b>QA/QC procedures</b>	Flow meters should be subject to a regular maintenance and testing regime to ensure accuracy	Flow meters will be subject to regular maintenance and testing regime to ensure accuracy	In compliance

### 3.4.2 Amount of landfill gas flared ( $LFG_{flare,y}$ )

Registered PDD/RMP (ref.2b) Approved Methodology	Requirement in the applicable methodology and relevant EB documents	Requirement in the revised monitoring plan	Conclusion on the compliance of the monitoring plan in the RMP with the methodology
<b>Data/Parameter</b>	2. $LFG_{flare,y}$	2. $LFG_{flare,y}$	In compliance
<b>Description</b>	Amount of landfill gas flared	Amount of landfill gas captured	In compliance
<b>Measured/Calculated /Default</b>	Measured	Measured	In compliance
<b>Source of data</b>	N/A	N/A	N/A
<b>Monitoring equipment</b>	Measured by a flow meter	Measured by a flow meter (As LFG is only flared, the flow meter for parameter 1 and 2 is the same )	In compliance
<b>Measuring/Reading/ Recording frequency</b>	Continuously/periodically	Continuously	In compliance
<b>Calculation method (if applicable)</b>	N/A	N/A	N/A
<b>QA/QC procedures</b>	Flow meters should be subject to a regular maintenance and testing regime to ensure accuracy	Flow meters will be subject to regular maintenance and testing regime to ensure accuracy	In compliance

### 3.4.3 Flare/combustion efficiency (FE)

Registered PDD/RMP (ref.2b) Approved Methodology	Requirement in the applicable methodology and relevant EB documents	Requirement in the revised monitoring plan	Conclusion on the compliance of the monitoring plan in the RMP with the methodology
<b>Data/Parameter</b>	5. FE	3. FE	In compliance
<b>Description</b>	Flare/combustion efficiency, determined by the operation hours (1) and the methane content in the exhaust gas (2)	Flare/combustion efficiency, determined by the operation hours (1) and the methane content in the exhaust gas (2)	In compliance
<b>Measured/Calculated /Default</b>	Measured and calculated	Measured and calculated	In compliance
<b>Source of data</b>	(1) Continuous measurement of operation time of flare (e.g. with temperature) (2) Periodic measurement of methane content of flare exhaust gas.	(1) Continuous measurement of operation time of flare (e.g. with temperature) (2) Periodic measurement of methane content of flare exhaust gas	In compliance

<b>Monitoring equipment</b>	Not reported	(1) PLC (Thermocouples) (2) Gas quality analyser (inlet methane), laboratory	N/A
<b>Measuring/Reading/Recording frequency</b>	Operating hours (1) measured continuously.  Methane content (2) measured quarterly, monthly if it is unstable	Operating hours (1) measured continuously.  Methane content (2) measured quarterly, monthly if it is unstable	In compliance
<b>Calculation method (if applicable)</b>	Not reported	Please see D.2.2.2 of the second RMP (ref. 2b)	N/A
<b>QA/QC procedures</b>	Regular maintenance should ensure optimal operation of flares. Flare should be checked quarterly, with monthly checks if the efficiency shows significant deviations from previous values.	Regular maintenance will ensure optimal operation of flares. Flare efficiency should be checked quarterly, with monthly checks if the efficiency shows significant deviations from previous values.	In compliance

#### 3.4.4 Methane fraction in the landfill gas ( $w_{CH_4,y}$ )

Registered PDD/RMP (ref.2b) Approved Methodology	Requirement in the applicable methodology and relevant EB documents	Requirement in the revised monitoring plan	Conclusion on the compliance of the monitoring plan in the RMP with the methodology
<b>Data/Parameter</b>	6. $w_{CH_4,y}$	4. $w_{CH_4,y}$	In compliance
<b>Description</b>	Methane fraction in the landfill gas	Methane fraction in the landfill gas	In compliance
<b>Measured/Calculated /Default</b>	Measured	Measured	In compliance
<b>Source of data</b>	N/A	N/A	N/A
<b>Monitoring equipment</b>	Preferably measured by continuous gas quality analyser	Continuous Gas quality analyzer	In compliance
<b>Measuring/Reading/Recording frequency</b>	Continuously/periodically	Continuous	In compliance
<b>Calculation method (if applicable)</b>	N/A	N/A	N/A
<b>QA/QC procedures</b>	The gas analyser should be subject to a regular maintenance and testing regime to ensure accuracy.	The gas analyzer should be subject to regular maintenance and testing regime to ensure accuracy	In compliance

### 3.4.5 Temperature of the landfill gas ( $LFG_{temp}$ )

Registered PDD/RMP (ref.2b) Approved Methodology	Requirement in the applicable methodology and relevant EB documents	Requirement in the revised monitoring plan	Conclusion on the compliance of the monitoring plan in the RMP with the methodology
<b>Data/Parameter</b>	7. T	5. $LFG_{temp}$	In compliance
<b>Description</b>	Temperature of the landfill gas	LFG temperature	In compliance
<b>Measured/Calculated /Default</b>	Measured	Measured	In compliance
<b>Source of data</b>	Not reported	Thermometer	N/A
<b>Monitoring equipment</b>	Not reported	Not reported	N/A
<b>Measuring/Reading/Recording frequency</b>	Continuously/periodically	Continuously	In compliance
<b>Calculation method (if applicable)</b>	N/A	N/A	N/A
<b>QA/QC procedures</b>	Not reported	Equipment will be held on maintenance periodically	N/A

### 3.4.6 Pressure of the landfill gas ( $LFG_{press}$ )

Registered PDD/RMP (ref.2b) Approved Methodology	Requirement in the applicable methodology and relevant EB documents	Requirement in the revised monitoring plan	Conclusion on the compliance of the monitoring plan in the RMP with the methodology
<b>Data/Parameter</b>	8. p	6. $LFG_{press}$	In compliance
<b>Description</b>	Pressure of the landfill gas	LFGpressure	In compliance
<b>Measured/Calculated /Default</b>	Measured	Measured	In compliance
<b>Source of data</b>	N/A	Barometer	In compliance, measured with a pressure meter
<b>Monitoring equipment</b>	Not reported	Not reported	N/A
<b>Measuring/Reading/Recording frequency</b>	Continuously/periodically	Continuous	In compliance
<b>Calculation method (if applicable)</b>	N/A	N/A	N/A
<b>QA/QC procedures</b>	Not reported	Equipment will be held on maintenance periodically	In compliance

**3.4.7 Total amount of electricity and/or other energy carriers used in the project for gas pumping and heat transport (not derived from the gas)**

Registered PDD/RMP (ref.2b) Approved Methodology	Requirement in the applicable methodology and relevant EB documents	Requirement in the revised monitoring plan	Conclusion on the compliance of the monitoring plan in the RMP with the methodology
<b>Data/Parameter</b>	9.	7.	In compliance
<b>Description</b>	Total amount of electricity and/or other energy carriers used in the project for gas pumping and heat transport (not derived from the gas)	Total amount of electricity and/or other energy used in the project for gas pumping and heat transport (not derived from the gas)	In compliance
<b>Measured/Calculated /Default</b>	Measured	Measured	In compliance
<b>Source of data</b>	N/A	N/A	N/A
<b>Monitoring equipment</b>	---	(1) Energy-meter (2) LPG meter	In compliance, not specified in the methodology
<b>Measuring/Reading/ Recording frequency</b>	Continuously	Continuously Electricity measured continuously and recorded daily  LPG measured as demand occur and recorded monthly	In compliance
<b>Calculation method (if applicable)</b>	N/A	N/A	N/A
<b>QA/QC procedures</b>	Not reported	Energy-meters should be subject to regular maintenance and testing regime to ensure accuracy. The meters will be calibrated each 5 years and the accuracy class is 1 %, according to manufacturer specification.  LPG invoices will be kept as a back up to the LPG meter records.	In compliance

### 3.4.8 CO<sub>2</sub> emission intensity of the electricity and/or other energy carriers

Registered PDD/RMP (ref.2b) Approved Methodology	Requirement in the applicable methodology and relevant EB documents	Requirement in the revised monitoring plan	Conclusion on the compliance of the monitoring plan in the RMP with the methodology
<b>Data/Parameter</b>	10.	8.	In compliance
<b>Description</b>	CO2 emission intensity of the electricity and/or other energy carriers in ID 9	CO2 emission intensity of the electricity and/or other energy carriers in ID 7  (1) Emission factor for electricity consumption from the grid and from the diesel generator  (2) Emission factor for LPG consumption	In compliance
<b>Measured/Calculated /Default</b>	Calculated	Estimated	In compliance. This was approved on RMP (ref. 2, 2b)
<b>Source of data</b>	Not reported	(1) Default value obtained from EB 39 Report annex 7 (2) Last default value obtained from IPCC	In compliance
<b>Monitoring equipment</b>	N/A	N/A	N/A
<b>Measuring/Reading/Recording frequency</b>	Annually	Annually	In compliance
<b>Calculation method (if applicable)</b>	Can be calculated using ACM0002	Default values	N/A
<b>QA/QC procedures</b>	-	The figure used was EB 39 Report annex 7 (1.3 t CO <sub>2</sub> /MWh) for electricity and last default value obtained from IPCC for LPG. Both will be under regular monitoring.	In compliance

### 3.4.9 Regulatory requirements relating to landfill gas projects

Registered PDD/RMP (ref.2b)2 Approved Methodology	Requirement in the applicable methodology and relevant EB documents	Requirement in the revised monitoring plan	Conclusion on the compliance of the monitoring plan in the RMP with the methodology
Data/Parameter	11. AF	9. AF	In compliance
Description	Regulatory requirements relating to landfill gas projects Required for any changes to the adjustment factor (AF) or directly MD <sub>reg,y</sub>	Regulatory Mandate (Adjustment Factor)	In compliance, established as 8% in the PDD, page 8 (ref. 1)
Measured/Calculated /Default	N/A	N/A	N/A
Source of data	Not reported	Legal text	N/A
Monitoring equipment	N/A	N/A	N/A
Measuring/Reading/ Recording frequency	Annually	Annually	In compliance
Calculation method (if applicable)	N/A	N/A	N/A
QA/QC procedures	N/A	N/A, since this is a given data, there is no place for uncertainty	N/A

### 3.4.10 Amount of landfill gas combusted in power plant (LFG<sub>electricity,y</sub>)

Registered PDD/RMP (ref.2b) Approved Methodology	Requirement in the applicable methodology and relevant EB documents	Requirement in the revised monitoring plan	Conclusion on the compliance of the monitoring plan in the RMP with the methodology
Data/Parameter	LFG <sub>Electricity,y</sub>	N/A	N/A. The PA does not consider electricity generation using LFG
Description	Amount of landfill gas combusted in power plant	N/A	N/A. The PA does not consider electricity generation using LFG
Measured/Calculated /Default	Measured	N/A	N/A. The PA does not consider electricity generation using LFG
Source of data	Flow meter	N/A	N/A. The PA does not consider electricity generation using LFG
Monitoring equipment	N/A	N/A	N/A. The PA does not consider electricity generation using LFG
Measuring/Reading/ Recording frequency	Continuously/periodically	N/A	N/A. The PA does not consider electricity generation using LFG

Calculation method (if applicable)	N/A	N/A	N/A. The PA does not consider electricity generation using LFG
QA/QC procedures	Flow meters should be subject to a regular maintenance and testing regime to ensure accuracy	N/A	N/A. The PA does not consider electricity generation using LFG

### 3.4.11 Amount of methane combusted in boiler ( $LFG_{thermal,y}$ )

Registered PDD/RMP (ref.2b) Approved Methodology	Requirement in the applicable methodology and relevant EB documents	Requirement in the revised monitoring plan	Conclusion on the compliance of the monitoring plan in the RMP with the methodology
Data/Parameter	$LFG_{thermal,y}$	N/A	N/A. The PA does not consider a boiler
Description	Amount of methane combusted in boiler	N/A	N/A. The PA does not consider a boiler
Measured/Calculated /Default	Measured	N/A	N/A. The PA does not consider a boiler
Source of data	Flow meter	N/A	N/A. The PA does not consider a boiler
Monitoring equipment	N/A	N/A	N/A. The PA does not consider a boiler
Measuring/Reading/Recording frequency	Continuously/periodically	N/A	N/A. The PA does not consider a boiler
Calculation method (if applicable)	N/A	N/A	N/A. The PA does not consider a boiler
QA/QC procedures	Flow meters should be subject to a regular maintenance and testing regime to ensure accuracy	N/A	N/A. The PA does not consider a boiler

## 3.5 Completeness and accuracy of Monitoring

### 3.5.1 Verification of monitoring of parameters

Monitoring of reductions in GHG emissions resulting from the registered project have been implemented in accordance with the monitoring plan contained in the revised monitoring plan, approved on 02/07/2012 (ref. 2b). The monitoring mechanism, including the data collection system, is effective and reliable.

#### 3.5.1.1 Total amount of landfill gas captured, $LFG_{total,y}$ and Amount of landfill gas flared, $LFG_{flare,y}$

In this project activity the landfill gas is only flared in two enclosed flares, for this reason  $LFG_{total,y}$  and  $LFG_{flare,y}$  are the same parameter. These parameters are measured by one flow meter located in the main pipeline, this main pipeline divides into two lines and each of these secondary pipelines goes to one flare. Independent flow, pressure and temperature meters are located immediately at the entrance of each flare; these are used as back-up equipments, as the CERs are calculated with the information of the equipment located in the main pipeline.

Through the review of the documents and the onsite inspection it can be confirmed that the implementation of the monitoring system and procedures for this parameter comply with the monitoring system and procedures described in the revised monitoring plan (ref. 2b) and applied methodology (ref. 3).

The entire data for this monitoring period with minute by minute records for flow, pressure and temperature was provided by the PP and raw data was checked during the site visit from the onsite computer.

The flow meter measures the LFG flow continuously and it is recorded in m<sup>3</sup>/h by the PLC every minute. The PLC of the flare station automatically normalizes the gas flow to Nm<sup>3</sup>/h, using the LFG temperature and pressure measured also in the main pipeline. This normalized flow (Nm<sup>3</sup>/h) is converted then to Nm<sup>3</sup>/min by multiplying by 1/60, then it is multiplied by the related methane fraction in the landfill gas (%), also measured minutely. The Nm<sup>3</sup>CH<sub>4</sub>/min is added to obtain the total Nm<sup>3</sup>CH<sub>4</sub>/day. These daily values obtained in the excel spreadsheet "Datos quema month.xls" (ref. 12c) are transferred to the final spreadsheet "CERs calculation v5 2012 11 07.xlsx" (ref. 7h). In this spreadsheet the Nm<sup>3</sup> CH<sub>4</sub>/day are converted to kgCH<sub>4</sub>/day with the methane density informed by the methodology ACM0001 version 2 page 11 and finally accumulated monthly to be reported in terms of tCH<sub>4</sub>/month. Every day at midnight, the PLC sends a daily report which contains the entire data recorded every day. These files are protected against edition and can be verified in the computer located at the flare station. This data is stored in the computer located in the plant and in the compact flash (back-up system); additionally the Project Chief elaborates weekly and monthly reports with the data collected (ref. 12c) to inform the manager about the plant performance.

It was confirmed in the site visit that all the measuring equipments are in good condition and show no sign of corrosion or damage. The tables below summarize the meters that were installed in the plant during the fifth monitoring period, as the project counts with equipments with the same characteristics that are rotated between them in order to comply with the calibration frequency requirements. For the temperature and pressure meter used for normalization and back-up, please see section 3.5.1.4 and 3.5.1.5.

#### Flow meters - Main pipe:

Period of use	Model	Serial number	Calibration date	Certificate valid until
From 4 <sup>th</sup> verification to 30/08/2010	DY 150-EBMBA1-2D/FS1/L2	6183B004 2006	08/09/2008	07/09/2010
From 31/08/2010 until 31/07/2011 (end of MP5)	DY150-EBLBA1-2D/FS1	S5K106065	12/01/2010	11/01/2012

#### Flow meters - Flare #1 pipe

Period of use	Model	Serial number	Calibration date	Certificate valid until
From 4 <sup>th</sup> verification to 04/05/2011	DY100-EBLBA1-2D/FS1/L3	S5J401066-912	05/05/2009	04/05/2011
From 05/05/2011 until 31/07/2011 (end of MP5)	DY100-EBMBA1-2D/FS1	7213B033	04/05/2011	03/05/2013

#### Flow meters - Flare #2 pipe

Period of use	Model	Serial number	Calibration date	Certificate valid until
From 4 <sup>th</sup> verification to 25/04/2011	DY100-EBMBA1-2D/FS1	7213B033	19/05/2009	18/05/2011
From 26/04/2011 until 31/07/2011 (end of MP5)	DY100-EBMBA1-2D/FS1	7213B035	19/04/2011	18/04/2013

Changes were noticed regarding the equipment used to measure this parameter. Flow, pressure and temperature meters have back up units, and meters installed in flare 1 and 2 may be rotated and installed in the main pipeline whenever the meters in the main pipeline need to be removed for calibrations. Some units were changed during the monitoring period for this purpose, but such events were not described in the Monitoring Report version 1. In the previous verification period three flow meters were included in the

monitoring report (main line and flares #1 and #2 lines), but only one flow meter is indicated in the MR of this monitoring period. In addition, the flow meter indicated in the MR (DY 150-EBMBA1-2DFS1) does not match the information verified in the site visit (DY 150-EBLBA1-2D /FS1). **CL 7 was raised** asking the PP to provide accurate information about the meters that were installed in the plant throughout the monitoring period.

The PP provided the MR version 4 VVS (ref. 7g), in which all the information about the changes in the equipment was included on the relevant parameters in section D.2, including model, serial number, calibration date and validity of the calibration. The applicable calibration certificates were provided by the PP (ref. 68c), as well as copies of logbooks referring to the change of the equipments (ref. 71, 72 and 73).

Since the entire information reported in the MR v4 VVS (ref. 6g) was verified to be consistent with the evidence provided by the PP, **CL 7 was closed**.

In order to confirm the staff knowledge on the project activity, one operator and the plant chief were interviewed during the site visit. It was verified they were trained and understand what they are doing, all the explanations were clear and in line with the internal procedures (ref. 52).

GIRSA has ISO9001:2008 certification (ref. 64c). The plant is operated according to the latest version of the internal management system, dated 09/11/2011, which comprises a procedure for data collection and processing (ref. 52d), procedure in case of failure (ref. 52e) and a procedure for calibrations (ref. 52f).

All the people that begin working in the project activity sign a training register that contains the following activities (ref. 63):

- Principles of the plant functions
- Optimization of resources
- Interpretation of the HMI screen
- Collection of data from the computer storage system
- Use of the monitoring software
- Use of the monitoring equipments

During this monitoring period the operators involved in the PA have not changed and are the same of the previous verification (MP4).

The raw data from the following days was checked on site:

Month – Year Verified	Days Verified
February 2010	24, 25, 26, 27
March 2010 – December 2010	27, 28, 29, 30
January 2011 - July 2011	1, 2, 3, 4,

All the data checked from the raw data was found to be identical to the data provided by the PP (ref. 12c) for ER calculations. As the data downloaded from the system is protected against edition, it can be confirmed that the data used for the ERs calculation is the data measured on site.

Monitoring Report, onsite checks  RMP (ref.2b) & Approved Methodology	Requirement in the revised monitoring plan	Implementation of the project	Conclusion on the compliance of the implementation with the revised monitoring plan
<b>Data/Parameter</b>	1.- LFG <sub>total,y</sub>	LFG <sub>total,y</sub>	In compliance
<b>Description</b>	Total amount of landfill gas captured	Total amount of landfill gas captured	In compliance
<b>Measured/Calculated /Default</b>	Measured	Measured. Normalized gas flow is calculated using data from Pressure and Temperature meters	In compliance
<b>Source of data</b>	N/A	Flow meter on the main pipeline	In compliance
<b>Monitoring equipment</b>	Measured by a flow meter	Flow meter Yokogawa DY150 /DY100, 1 on the main pipeline plus 1 on each flare. The data of the main meter is used for the ERs calculations and the other are back-ups equipment	In compliance
<b>Measuring/Reading/ Recording frequency</b>	Continuously	Continuous measurement and recording each minute. Aggregated monthly for ER calculations	In compliance
<b>Calculation method (if applicable)</b>	N/A	N/A	N/A
<b>QA/QC procedures</b>	Flow meters will be subject to regular maintenance and testing regime to ensure accuracy	Flow meters are calibrated every 2 years (ref. 20a)	In compliance

Monitoring Report, onsite checks  RMP (ref.2b) & Approved Methodology	Requirement in the revised monitoring plan	Implementation of the project	Conclusion on the compliance of the implementation with the revised monitoring plan 2
<b>Data/Parameter</b>	2. LFG <sub>flare,y</sub>	LFG <sub>flare,y</sub>	In compliance
<b>Description</b>	Amount of landfill gas captured	Amount of landfill gas flared	In compliance
<b>Measured/Calculated /Default</b>	Measured	Measured. Normalized gas flow is calculated using data from Pressure and Temperature meters	In compliance
<b>Source of data</b>	N/A	Flow meter installed on the main pipeline	In compliance

<b>Monitoring equipment</b>	Measured by a flow meter (As LFG is only flared, the flow meter for parameter 1 and 2 is the same )	Flow meter Yokogawa DY150 /DY100, 1 on the main pipeline plus 1 on each flare. The data of the meter in the main pipeline is used for the ERs calculations and the other are back-ups equipment	In compliance
<b>Measuring/Reading/ Recording frequency</b>	Continuously	Continuous measurement and recording each minute. Aggregated monthly for ER calculations	In compliance
<b>Calculation method (if applicable)</b>	N/A	N/A	N/A
<b>QA/QC procedures</b>	Flow meters will be subject to regular maintenance and testing regime to ensure accuracy	Flow meters are calibrated every 2 years (ref. 20a)	In compliance

### 3.5.1.2 Flare/combustion efficiency (FE)

Through the review of the documents and the onsite inspection it can be confirmed that the implementation of the monitoring system and procedures for this parameter comply with the monitoring system and procedures described in the revised monitoring plan (ref. 2b) and applied methodology (ref. 3).

According to the Revised Monitoring plan(ref. 2b) and methodology ACM0001 version 2 (ref. 3) the FE needs to be calculated quarterly or monthly if it is unstable. As a conservative approach, since both flares are in operation, the lowest flare efficiency value of either flare throughout the operation period is used to calculate the ERs. Quarterly values were registered on 25/02/2010, 31/05/2010, 03/08/2010, 11/11/2010, 22/02/2011 and 24/05/2011, being the lowest flare efficiency registered that of 25/02/2010 in flare 1 (99.038%). Monthly analyses were performed for both flares, and flare efficiency was verified to be stable; all the registered values were within 99.672% and 94.637% and the average was 99.26% with a standard deviation of 0.89%.

Date of sampling	Flare Efficiency [%]	
	Flare 1	Flare 2
25/02/2010	99.038%	99.278%
31/05/2010	99.667%	99.227%
03/08/2010	99.669%	99.607%
11/11/2010	99.254%	99.641%
22/02/2011	99.224%	99.626%
24/05/2011	99.613%	99.605%

Temperature of the flare exhaust gases is continuously monitored to account the operation time of the flare and recorded each minute by the PLC, in line with the requirements of the applicable methodology (ref. 3) and revised monitoring plan (ref. 2b).

The calculations to determine the Flare efficiency are performed in an excel spreadsheet (ref. 11d) same as the previous verification. Although the methodology ACM0001 version 2 do not require to apply the "Tool to determine project emissions from flaring gases containing methane" the calculation in the spreadsheet are carried out according the calculation steps in this tool (ref. 4). It shall be noted though that the exhaust temperature is lower than 500°C, as required in the abovementioned Tool; this situation was already explained by SGS in response o the request for review number 1 raised and closed during the third periodic verification,  
<http://cdm.unfccc.int/Projects/DB/DNV-CUK1134475476.36/iProcess/SGS-UKL1231861425.44/view>.

Methane content in the exhaust gas, needed to calculate the flare efficiency, is determined by an external laboratory. The samples of the exhaust gases of each flare are taken by the operators of GIRSA and conducted by the laboratory of the school of Chemistry of the Universidad Técnica Federico Santa María, where the analysis are performed. The reports from the laboratory include the amount of methane, carbon dioxide, nitrogen and oxygen in the exhaust gas; the complete set of reports for this monitoring period was provided by the PP (ref. 10). While taking the samples, all the operational conditions of the flare are recorded and later provided in a different report, also including the results of the analysis made by the external laboratory (ref. 14); this data is later used for ER calculations in “CAR 4 -Flair efficiency 5th Verification v3 2012 08 08 FES.xlsx” (ref. 11d).

This laboratory is mainly for academics and research, so it is not accredited, but the technical analysts have vast experience (ref. 53) and the Universidad Técnica Federico Santa María is ranked in the top 6 Universities in Chile. [http://www.emol.com/especiales/infografias/ranking\\_universidad/index.htm#](http://www.emol.com/especiales/infografias/ranking_universidad/index.htm#)

The data collection procedure remains the same as in previous verifications.

The laboratory uses two methodologies to perform the analysis required to measure CH<sub>4</sub>, CO<sub>2</sub>, N<sub>2</sub> and O<sub>2</sub> fractions: one methodology used is the ASTM D1945 Standard Test Method for Analysis of Natural Gas by Gas Chromatography and the other one is the UOP 603-88 Trace CO and CO<sub>2</sub> in Hydrogen and Light Gaseous Hydrocarbons by Gas Chromatography. During MP4, the installations of the laboratory were verified to confirm this information and all the procedures were found to be correct (ref. 9d). The situation remains the same as MP4; the analyses are still performed by the laboratory of the Universidad Técnica Federico Santa María.

By the review of the flare efficiency calculation sheet (ref. 11a), it was found that the values in the sheet titled “Step 1” (specifically cells N24, Q22, and W24) were different than those included in the onsite records of the data collected during sampling, so **CAR 04 was raised**. The PP provided a reviewed version of the Flare efficiency calculation spreadsheet (ref. 11b) where the aforementioned differences were corrected. When the verification was resumed under the VVS track, after the RMP was approved, CAR 04 remained open due to the following reasons:

- On Step 1, cell W24 (volumetric fraction of CH<sub>4</sub> in the residual gas) of the flare spreadsheet has a value of 52% (ref.11b), but the onsite record for this parameter is 41% (ref.14). **CAR 04a was raised**. In response the updated spreadsheet was provided “Flair efficiency 5th Verification v3 (ref. 11c); where the methane content in cell W24 was changed to 41%, thus in accordance to the information in the flare efficiency reports (ref. 14). This change had no impact on the ER calculations, since the lowest flare efficiency registered in the monitoring period is used for ER calculations, and this was registered on 25/02/2010 (99.037%). **CAR 04a was closed**.
- In the Flare efficiency calculation spreadsheet, on step 1 and 2, the N<sub>2</sub> content in the raw gas is calculated as per the simplified approach in EB28 Annex13. Despite this, it was found that from October 2010 and on, the N<sub>2</sub> is indicated as 50%, instead of being calculated as the difference between 100% and the methane content. **CAR 04b was raised**. In response the updated spreadsheet was provided, where the calculation of the Nitrogen content in the residual gas was corrected. In steps 1 and 2 of “Flare efficiency 5<sup>th</sup> verification v3” (ref. 11c) it was calculated as N<sub>2</sub> = 100 – (CH<sub>4</sub>+O<sub>2</sub>) for the complete monitoring period, thus in accordance with the “Tool to determine project emissions from flaring gases containing methane” (ref. 4). **CAR 04b was closed**.
- Oxygen concentration is estimated as 0.12% in step 1 and 2 of the flare efficiency calculations and as Nitrogen is calculated as the difference between the total (100%) and the methane fraction, the sum of the volumetric fractions in the residual gas is 100.12%. **CAR 04c was raised**. In response the updated spreadsheet “CAR 4 -Flair efficiency 5th Verification v3 2012 08 08 FES” (ref. 11d) was provided. In this spreadsheet the Oxygen content was corrected in steps 1 and 2 to 0% for the complete monitoring period, so the nitrogen content is finally calculated as N<sub>2</sub>= 100%- CH<sub>4</sub>%, which is consistent with the simplified approach in Step 1 of the “Tool to determine project emissions from flaring gases containing methane”. **CAR 04c was closed**.
- In the flare efficiency calculations, a density of 0.716 kg/m<sup>3</sup> is used, but methane density is indicated in the MR as 0.7168 kg/m<sup>3</sup>. **CAR 04d was raised**. In response the PP provided the updated spreadsheet, “Flare efficiency 5<sup>th</sup> verification” (ref. 11c), where the methane density was corrected to 0.7168 kg/m<sup>3</sup>; which is the value indicated by the applicable methodology, so **CAR 04d was closed**.

Monitoring Report, onsite checks	Requirement in the revised monitoring plan	Implementation of the project	Conclusion on the compliance of the implementation with the revised monitoring plan
RMP (ref.2b) & Approved Methodology			
Data/Parameter	3. FE	FE	In compliance
Description	Flare/combustion efficiency, determined by the operation hours (1) and the methane content in the exhaust gas (2)	Flare combustion efficiency	In compliance
Measured/Calculated /Default	Measured and calculated	Methane content measured in the inlet gas by on site equipment and in the exhaust gas measured in laboratory. Flare efficiency calculated as per "Tool to determine project emissions from flaring gases containing methane" (ref. 4), even this tool is not compulsory for methodology ACM0001 v2	In compliance
Source of data	(3) Continuous measurement of operation time of flare (e.g. with temperature)  (4) Periodic measurement of methane content of flare exhaust gas	Operation hours: The PLC registers flow, temperature and pressure readings minutely, indicating date and hour  Methane content in the exhaust gases is measured by the Chemical and Instrumental Analysis Center of Universidad Técnica Federico Santa María	In compliance
Monitoring equipment	(1) PLC (thermocouples). (2) Gas quality analyser (inlet methane), laboratory	PLC for the internal records of the operational conditions of the flare station  Gas Chromatographer. Analysis method: UOP Norm: 603-1  ASTM Norm: D1945-03 and D1946	In compliance
Measuring/Reading/ Recording frequency	Operating hours (1) measured continuously.  Methane content (2) measured quarterly, monthly if it is unstable	Operation hours: the LFG flow, temperature and pressure and exhaust gas temperature are measured continuously and the PLC records the readings minutely, indicating date and hour  Methane content in the exhaust gases is measured by a third party laboratory quarterly or monthly if values are unstable	In compliance
Calculation method (if applicable)	Please see D.2.2.2 of the second RMP (ref. 2b)	As per requirements of the Tool to calculate project emissions of flaring gases containing methane (ref. 4), but not considering Temperature restrictions.	In compliance, equations in section D.2.2.2 of the RMP 2

<b>QA/QC procedures</b>	Regular maintenance will ensure optimal operation of flares. Flare efficiency should be checked quarterly, with monthly checks if the efficiency shows significant deviations from previous values.	Regular maintenance for optimal operation of flares. Flare maintenance registry was provided (ref. 79)	In compliance
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### 3.5.1.3 Methane fraction in the landfill gas ( $w_{CH_4,y}$ )

Through the review of the documents and the onsite inspection it can be confirmed that the implementation of the monitoring system and procedures for this parameter comply with the monitoring system and procedures described in the revised monitoring plan (ref. 2b) and applied methodology (ref. 3).

This analyzer is located in the main pipeline, before the line divides into two pipelines, one for each flare. The methane fraction of the landfill gas is measured continuously by a methane analyzer NOVA Model 4170MN4X and recorded minute by minute by the PLC. The daily data from the PLC is sent at midnight every day to the onsite computer. All the data taken minute by minute by the NOVA has been provided in the spreadsheets "Datos quema month.xls" (ref. 12c).

The accuracy of the equipment is  $\pm 2\%$  for  $O_2$  and  $CH_4$ . According the manual of the NOVA 4170 (ref. 54, p13), the equipment needs to be checked monthly against a gas standard. On-site calibrations of the methane analyzer against the gas standard are performed weekly (more frequently that is recommended by the manufacturer) in order to avoid data loss. All the periodical checks were provided by the PP (ref. 49), and the complete detail of the internal calibrations is provided below:

Date	Standard %CH <sub>4</sub>	Before calib. %CH <sub>4</sub>	After calib. %CH <sub>4</sub>
02-03-2010	60	61	60
11-03-2010	60	61	60
18-03-2010	60	61	60
26-03-2010	60	61	60
01-04-2010	60	61	60
09-04-2010	60	61	60
21-04-2010	60	60	60
30-04-2010	60	60	60
10-05-2010	60	59	60
14-05-2010	60	60	60
21-05-2010	60	59	60
28-05-2010	60	59	60
04-06-2010	60	61	60
10-06-2010	60	61	60
17-06-2010	60	59	60
24-06-2010	60	58	60
30-06-2010	60	60	60
07-07-2010	60	59	60
15-07-2010	60	60	60
23-07-2010	60	61	60
29-07-2010	60	58	60
06-08-2010	60	61	60
13-08-2010	60	59	60

Date	Standard %CH4	Before calib. %CH4	After calib. %CH4
18-08-2010	60	58	60
26-08-2010	60	61	60
03-09-2010	60	63	60
10-09-2010	60	58	60
17-09-2010	60	62	60
24-09-2010	60	58	60
30-09-2010	60	62	60
07-10-2010	60	57	60
14-10-2010	60	63	60
21-10-2010	60	61	60
28-10-2010	60	60	60
05-11-2010	60	64	60
11-11-2010	60	62	60
18-11-2010	60	61	60
25-11-2010	60	64	60
02-12-2010	60	64	60
09-12-2010	60	59	60
17-12-2010	60	57	60
24-12-2010	60	57	60
30-12-2010	60	62	60
05-01-2011	60	60	60
13-01-2011	60	61	60
21-01-2011	60	61	60
27-01-2011	60	61	60
03-02-2011	60	60	60
09-02-2011	60	61	60
18-02-2011	60	62	60
25-02-2011	60	60	60
03-03-2011	60	60	60
10-03-2011	60	62	60
17-03-2011	60	59	60
25-03-2011	60	59	60
31-03-2011	60	60	60
08-04-2011	60	60	60
14-04-2011	60	61	60
21-04-2011	60	61	60
28-04-2011	60	60	60
05-05-2011	60	60	60
12-05-2011	60	61	60
20-05-2011	60	60	60
27-05-2011	60	60	60
02-06-2011	60	61	60

Date	Standard %CH <sub>4</sub>	Before calib. %CH <sub>4</sub>	After calib. %CH <sub>4</sub>
09-06-2011	60	61	60
16-06-2011	60	60	60
24-06-2011	60	60	60
30-06-2011	60	62	60
07-07-2011	60	59	60
14-07-2011	60	58	60
22-07-2011	60	59	60
28-07-2011	60	58	60

The oxygen sensor is designed to last several years. If the oxygen sensor registers a value of 20.9% passing only air, the sensor needs to be replaced. The methane detector is an optical sensor, which accuracy does not change and if the sensor is contaminated, it will not work and needs to be replaced. Furthermore, the equipment manual (ref. 54) indicates that the equipment does not require periodic calibrations if the monthly checks are carried out or until a mistake in the CH<sub>4</sub> sensor occurs.

The Project Chief prepares weekly and monthly report to inform the Manager and saves the daily data in CDs.

Procedures for data capture and management are part of ISO 9001:2008 procedures, and are listed in the PP's Procedures for data capture, management and control (ref. 52d). There is no manual transfer from the PLC to the plant PC. The data files "*Datos quema month.xls*" is a complete copy of the daily information automatically recorded in the plant's computer by the PLC; the original data is protected against edition. The "*Datos quema month.xls*" (ref. 12c) is created to perform the calculations; methane content is recorded in percentage (%) but the values have to be divided by 100.

The raw data from the PC onsite was selected randomly (see 3.5.1.1. for complete detail) and crosschecked against the spreadsheets with minute by minute data provided by the PP ("*Datos quema month.xls*"). No discrepancies were found.

Monitoring Report, onsite checks	Requirement in the revised monitoring plan	Implementation of the project	Conclusion on the compliance of the implementation with the revised monitoring plan
RMP (ref.2b) & Approved Methodology			
Data/Parameter	4. W <sub>CH<sub>4</sub>,y</sub>	W <sub>CH<sub>4</sub>,y</sub>	In compliance
Description	Methane fraction in the landfill gas	Methane fraction in the landfill gas	In compliance
Measured/Calculated /Default	Measured	Measured	In compliance
Source of data	N/A	Gas quality analyzer	In compliance
Monitoring equipment	Continuous Gas quality analyzer	Gas quality analyser NOVA 4170MN4X	In compliance
Measuring/Reading/ Recording frequency	Continuous	Continuously measured, methane content in the LFG is recorded minutely by the PLC	In compliance
Calculation method (if applicable)	N/A	N/A	N/A
QA/QC procedures	The gas analyzer should be subject to regular	Weekly testing /on site	In compliance

	maintenance and testing regime to ensure accuracy	calibrations (ref. 49)	
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### 3.5.1.4 LFG temperature ( $LFG_{temp}$ )

Through the review of the documents and the onsite inspection it can be confirmed that the implementation of the monitoring system and procedures for this parameter comply with the monitoring system and procedures described in the revised monitoring plan (ref. 2b) and applied methodology (ref. 3).

This parameter is used to normalize the landfill gas flow to standard conditions, as per the requirements of the methodology ACM0001 version 2. Temperature of the landfill gas is measured continuously with a thermometer, and recorded by the PLC every minute, which automatically normalizes the landfill gas flow using this data. Values registered are stored in a PC in the biogas plant, and in a compact flash memory installed in the PLC.

Landfill gas temperature is measured in three monitoring points, as it is correctly indicated in the monitoring report. The temperature meter installed in the main pipeline is used for ER calculations, while the temperature meters installed before each flare are use as back-up instruments. As explained in section 3.5.1.1, temperature meters are replaced if one of the measuring instruments needs to be removed for calibration.

It was confirmed in the site visit that the entire temperature meters are in good condition and show no sign of corrosion or damage. The tables below summarize the meters that were installed in the plant during the fifth monitoring period,

#### Temperature meters – Main pipe

Main pipe	Model	Serial number	Calibration date	Certificate valid until
From 4 <sup>th</sup> verification to 15/04/2009	YTA110-EA2DB/FU1	C2F305205	23/08/2006	22/08/2009
From 15/04/2009 until 28/07/2010	YTA110-EA2DB/FU1	C2J401275-912	13/04/2009	12/04/2012
From 28/07/2010 until 30/07/2010	YTA110-EA2DB/FU1	C2F305205	30/04/2009	29/04/2012
From 30/07/2010 until 31/07/2011 (end of MP5)	YTA110-EA2DB/FU1	C2J401275-912	28/07/2010	27/07/2013

#### Temperature meters – Flare #1 pipe

Flare 1 pipe	Model	Serial number	Calibration date	Certificate valid until
From 4 <sup>th</sup> verification to 30/07/2010	YTA110-EA2DB/FU1	C2G217891-707	03/08/2007	02/08/2010
From 30/07/2010 to 05/08/2010	YTA110-EA2DB/FU1	C2K102028	22/03/2010	21/03/2013
From 05/08/2010 until - 31/07/2011 (end of MP5)	YTA110-EA2DB/FU1	C2G217892-707	04/08/2010	03/08/2013

#### Temperature meters – Flare #2 pipe

Flare 2 pipe	Model	Serial number	Calibration date	Certificate valid until
From 4 <sup>th</sup> verification to 03/08/2010	YTA110-EA2DB/FU1	C2G217892-707	03/08/2007	02/08/2010

From 03/08/2010 until 31/07/2011 (end of MP5)	YTA110-EA2DB/FU1	C2G217891-707	03/08/2010	02/08/2013
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Changes were also made to the temperature meters, please see **CAR 5a and CAR5b raised and closed** in section 3.1. From 24/02/2010 until 28/07/2010, the temperature C2J401275-912 was installed in the main pipeline, and this meter was calibrated to work between -10 and 60°C. From 28/07/2010 to 30/07/2010, the temperature meter S/N C2F305205 was used temporarily so that the previous meter (C2J401275-912) could be sent to be calibrated for a temperature range between -10 and 100°C. The meter C2F305205 was calibrated to work within 0°C and 100°C.

As for the rest of the parameters recorded automatically by the PLC, the raw data from the following days was checked on site; and as the data downloaded from the system is protected against edition, it can be confirmed that the data used for the ERs calculation is the data measured on site:

Month – Year Verified	Days Verified
February 2010	24, 25, 26, 27
March 2010 – December 2010	27, 28, 29, 30
January 2011 - July 2011	1, 2, 3, 4,

All the data checked was verified to be consistent with the information in Datos quema (ref. 12c).

Monitoring Report, onsite checks	Requirement in the revised monitoring plan	Implementation of the project	Conclusion on the compliance of the implementation with the revised monitoring plan
RMP (ref.2b) & Approved Methodology			
Data/Parameter	5. LFG <sub>temp</sub>	LFG <sub>temp</sub>	In compliance
Description	LFG temperature	Landfill gas temperature	
Measured/Calculated /Default	Measured	Measured	In compliance
Source of data	Thermometer	Temperature transmitter on the main pipeline.	In compliance
Monitoring equipment	Thermometer	Temperature transmitter Yokogawa YTA 110, 1 on the main pipeline, 1 on each flare. Data of the temperature meter in the main flare is used for the normalization of the LFG used for ERs calculations	In compliance
Measuring/Reading/ Recording frequency	Continuous	Measured continuously. Temperature recorded minutely by the PLC	In compliance
Calculation method (if applicable)	N/A	N/A	N/A
QA/QC procedures	Equipment will be held on maintenance periodically	Temperature transmitter calibrated every 3 years (ref. 21)	In compliance

### 3.5.1.5 LFG pressure ( $LFG_{press}$ )

Through the review of the documents and the onsite inspection it can be confirmed that the implementation of the monitoring system and procedures for this parameter comply with the monitoring system and procedures described in the revised monitoring plan (ref. 2b) and applied methodology (ref. 3).

This parameter is used to normalize the landfill gas flow to standard conditions, as per the requirements of the applicable methodology. Landfill gas pressure is measured in three monitoring points, as indicated in the monitoring report. The pressure meter installed in the main pipeline is used for ER calculations, while the pressure meters installed before each flare are used as back-up instruments. As explained in section 3.5.1.1 pressure meters are replaced (by a back-up equipment with the same characteristics) if one of the measuring instrument needs to be removed for calibration.

It was confirmed in the site visit that the entire meters are in good condition and show no sign of corrosion or damage. In this monitoring period, the following equipment has been installed in the plant:

#### Pressure meters - Main pipe

Period of use	Model	Serial number	Calibration date	Certificate valid until
From 4 <sup>th</sup> verification to 11/04/2011	EJA510A	91F511977	28/04/2006	27/04/2011
From 11/04/2011 until 31/07/2011 (end of MP5)	EJA510A-EAS7N-07EF/D3/FU1	91HB26369	22/03/2010	21/03/2015

#### Pressure meters - Flare #1 pipe

Period of use	Model	Serial number	Calibration date	Certificate valid until
From 4 <sup>th</sup> verification - 31/07/2011 (end of MP5)	EJX510A	91G409098	13/09/2007	12/09/2012

#### Pressure meters - Flare #2 pipe

Period of use	Model	Serial number	Calibration date	Certificate valid until
From 4 <sup>th</sup> verification until 31/07/2011 (end of MP5)	EJX510A	91G830694-734	13/09/2007	12/09/2012

Monitoring Report, onsite checks RMP (ref.2b) & Approved Methodology	Requirement in the revised monitoring plan	Implementation of the project	Conclusion on the compliance of the implementation with the revised monitoring plan
<b>Data/Parameter</b>	6. p	$LFG_{press}$	OK
<b>Description</b>	Pressure of the landfill gas	Landfill gas pressure	
<b>Measured/Calculated /Default</b>	Measured	Measured	OK
<b>Source of data</b>	Pressure transmitter on the main pipeline	Pressure transmitter on the main pipeline	In compliance

<b>Monitoring equipment</b>	Pressure transmitter Yokogawa EJA 510 and EJX 510, 1 on the main pipeline and 1 on each flare	Pressure transmitter Yokogawa EJA 510 and EJX 510, 1 on the main pipeline and 1 on each flare. The data of the meter in the main pipeline is used for the ERs calculations and the other are back-ups equipment	In compliance
<b>Measuring/Reading/ Recording frequency</b>	Measured continuously, PLC records minutely.	Measured continuously, PLC records minutely.	In compliance
<b>Calculation method (if applicable)</b>	N/A	N/A	N/A
<b>QA/QC procedures</b>	Equipment calibrated every 5 years (ref. 19)	Equipment calibrated every 5 years (ref. 19)	In compliance

### ***3.5.1.6 Total amount of electricity and/or other energy carriers used in the project for gas pumping and heat transport (not derived from the gas)***

Through the review of the documents and the onsite inspection it can be confirmed that the implementation of the monitoring system and procedures for this parameter comply with the monitoring system and procedures described in the revised monitoring plan (ref. 2b) and applied methodology (ref. 3).

As per the requirements of the RMP (ref. 2b), this parameter is required to determine CO<sub>2</sub> emissions from use of electricity and LPG. Electricity consumption is measured continuously with an electricity meter, and values measured are recorded daily. The LPG is measured directly with an LPG meter, while LPG invoices are kept as back up. For this purpose, an LPG meter Daesung was installed during the fourth monitoring period.

This parameter (electricity and LPG consumption) is reported by the plant operators once a day at 9am in an excel spreadsheet, "Toma de estado.xls" (ref. 13), and it is calculated by subtracting the reading of the meters registered on the 1<sup>st</sup> day of one month from the first day of the consecutive month. This procedure is in compliance with the internal procedure "Procedure for data capture, gathering, processing and control" (ref. 52d), and the value obtained is then reported in the ERs calculation spreadsheet (ref. 7h).

#### **Electricity consumption:**

Significant changes to this parameter were addressed in the RMP approved on 02/07/2012. A diesel electricity generator was installed on site between 27/03/2010 and 31/03/2010 (ref. 55); so, according to the revised monitoring plan, the electricity consumption by the plant, provided by the grid or generated by the emergency diesel generator, are recorded by the same electricity meter during this monitoring period. Project emissions from this new emissions source are calculated considering a conservative emission factor of 1.3 tCO<sub>2</sub>e/MWh; this is the same value used to calculate PE due to electricity consumption from the grid (ref. 2b).

A temporary deviation from the monitoring plan is being requested together with the request for issuance corresponding to this monitoring period, because it was identified that, due to internal misconnections (ref. 32), the electricity meter installed (Merlin Gerin ME4zrt s/n 17072) had been underestimating the electricity consumption. This problem was solved on 23/07/2011 (ref. 32); the Project Participant reported this issue transparently, and proposed the following approach to calculate PE<sub>EC,y</sub> in this monitoring period:

- 1.- Estimate emissions due to electricity consumption in the most conservative way, as the maximum theoretical consumption of the plant, until the electricity meter was repaired.
- 2.- From 23/07/2012 on, calculate emissions due to electricity consumption as per the RMP.

To estimate the maximum theoretical electricity consumption, the PP included Table 5 and Table 6 in the MR version 5 (ref. 6h), indicating the electricity consumption of the plant and the electricity consumption of the PA during the fifth monitoring period, respectively.

Emissions due to electricity consumptions between 23/07/2011 and 31/07/2011 were verified to be calculated in the ER spreadsheet as follows:

$$E_{elec}[tCO_2e] = EC[MWh] \cdot EF_{elec,diesel} \left[ \frac{tCO_2e}{MWh} \right]$$

Where

- EC[MWh]: electricity consumption from the grid and from the diesel generator
- $EF_{elec,diesel}$ : CO<sub>2</sub> emission intensity of electricity and diesel consumption, 1.3 tCO<sub>2</sub>e/MWh

In section B.1 p7 of ref. 6c, it is indicated that the installation of the new electricity meter was made on July 22<sup>nd</sup>, and the calculations of the correction were made according to this information. Nonetheless, in p6 that is indicated to have occurred on June 22<sup>nd</sup>. In addition, in the Table 6 of monitoring report provided after the approval of the RMP (ref. 6c) the number of days for which the deviation applied was calculated on 310 days for 2010 and 202 days for 2011, but from 24/02/2010 to 31/12/2010 there are 311 days, and from 01/01/2011 to 22/07/2011 there are 203 days **CAR 2 was raised**. The number of days for which the correction applied, as well as the electricity consumption throughout this period, were corrected in MR version 2 VVS (ref. 6d), and the correct number of days was verified to be used in ref. 7d. **CAR 2 was closed**.

#### **Liquefied Petroleum Gas consumption:**

A set of data with daily readings of the electricity meter and the LPG meter was provided by the PP (ref. 13), but the spreadsheets corresponding to November and December 2010 were not provided. As this information is necessary to calculate the project emissions due consumption of LPG, **CL 11 was raised**. The requested information was provided by the PP (ref. 13b), and there it was verified that the values used for ER calculations were in accordance with the spreadsheets provided. **CL 11 was closed**.

In the previous verification the PP clarified some issues about the calibration and installation of the LPG meter (ref. 9d). The original calibration was performed by DAESUNG the provider of the equipment between 4<sup>th</sup> and 13<sup>th</sup> February (ref. 56). According to said document, a calibration frequency of 5 years was established in the fourth monitoring period, as recommended by the manufacturer. This is in line with Chilean normative, as no further requirements are established in Chile in this regard.

Emissions from LPG were calculated monthly as follows

$$PE_{LPG} \left[ \frac{tCO_2e}{month} \right] = LPG \left[ \frac{kg}{month} \right] * EF_{LPG} \left[ \frac{tCO_2e}{kg} \right]$$

And

$$LPG \left[ \frac{kg}{month} \right] = LPG \left[ \frac{m^3}{month} \right] * K \left[ \frac{kg}{m^3} \right]$$

Where

- LPG [m<sup>3</sup>]: LPG consumption as per the readings of the LPG meter
- ρLPG: LPG density, 0.515 kg/l
- EF LPG: LPG emission factor, 0.0034 tCO<sub>2</sub>/kg
- K: K conversion factor for Chile, 2.1 [kg/m<sup>3</sup>LPG] (ref. 59)

**Please see section 4 (CAR 10 raised and closed)** due to an inconsistency in the calculation of the project emissions due to LPG consumption.

Monitoring Report, onsite checks RMP (ref.2b) & Approved Methodology	Requirement in the revised monitoring plan	Implementation of the project	Conclusion on the compliance of the implementation with the revised monitoring plan
<b>Data/Parameter</b>	7.	(1) EC (2) LPG	In compliance, $EC = EC_{grid} + EC_{diesel}$
<b>Description</b>	Total amount of electricity and/or other energy used in the project for gas pumping and heat transport (not derived from the gas)	(1) Total amount of electricity consumption (2) Amount of Liquefied petroleum gas used to start up the flare	In compliance
<b>Measured/Calculated /Default</b>	Measured	Electricity: Measured and calculated due to a temporary deviation in this monitoring period LPG: Measured	In compliance.
<b>Source of data</b>	N/A	Electricity Meter LPG Meter	In compliance
<b>Monitoring equipment</b>	(1)Energy-meter (2) LPG meter	Electricity: Merlin Gerin ME4zrt LPG: Daesung G-1,6	In compliance.
<b>Measuring/Reading/ Recording frequency</b>	Electricity measured continuously and recorded daily LPG measured as demand occur and recorded monthly	Both electricity and LPG meters measure continuously, registered daily at 9:00	In compliance
<b>Calculation method (if applicable)</b>	N/A	Monthly consumption calculated as the difference between the reading of the first day of the month and the first day of the following month	In compliance
<b>QA/QC procedures</b>	Energy-meters should be subject to regular maintenance and testing regime to ensure accuracy. The meters will be calibrated each 5 years and the accuracy class is 1 %, according to manufacturer specification. LPG invoices will be kept as a back up to the LPG meter records.	Energy meter calibrated every 5 years according to manufacturer's specification (ref. 28). (Factory calibration certificate is still valid) LPG invoices kept in the plant, as it was verified on site visit.	In compliance

### 3.5.2 Verification of implementation of sampling plan

No sampling plan has been implemented by the PP. The LFG flow, pressure, temperature, methane fraction and exhaust gas temperature are measured continuously and reported every minute. Flare efficiency is measured monthly and reported quarterly (it is stable), as per the requirements in ACM0001 v2.

### 3.6 Accuracy of Equipment

All monitoring equipment specifications are evidenced by documentation presented by the PP and the onsite inspection. Such documents were properly verified to confirm that the type, accuracy and calibration frequency of the equipment used during this monitoring period was in line with the revised Monitoring Plan (ref. 2b).

The equipment involved in the project activity and their calibration requirements are detailed in the tables below.

Monitoring equipment	Flow meter	Flow meter	Flow meter flare 1
Monitoring parameter	$LFG_{total,y} = LFG_{flare,y}$	$LFG_{total,y} = LFG_{flare,y}$	$LFG_{total,y} = LFG_{flare,y}$
S/N	6183B004-2006	S5K106065	S5J401066-912
Type	DY 150-EBMBA1 2D/FS1	DY150-EBLBA1-2D/FS1	DY100-EBLBA1-2D/FS1/L3
Level/Accuracy	+/- 1% (ref. 20a)	+/- 1%	+/- 1% (ref. 22)
Calibration frequency requirement	2 years (ref. 20a)	2 years (ref. 20a)	2 years (ref. 22)
Calibration date	08/09/2008 (ref 17a) 16/09/2010 (ref. 38),	12/01/2010 (ref. 48)	05/05/2009 (ref. 22)
Validity	07/09/2010 15/09/2012	11/01/2012	04/05/2011
Are there delays in calibration?	No (*)	No (*)	No (*)
Calibration Entity	Calibraciones Industriales S.A. (ref. 17a, 38)	N/A Yokogawa Original certificate	N/A Yokogawa Original certificate
Accreditation Certificate for the calibration entity Issuing authority Relevant	Accredited by INN – Chile (ref. 17a, 38) Calibraciones Industriales is recognised as part of the National Metrology Network <a href="http://www.inn.cl/metrologia/rn/m/portada/index.php">http://www.inn.cl/metrologia/rn/m/portada/index.php</a>	N/A Yokogawa Original certificate	N/A Yokogawa Original certificate

(\*) For the exact detail of the dates the equipments were in use during this monitoring period, please refer to section 3.5.1.

Monitoring equipment	Flow meter flare 1 (also used in flare 2)	Flow meter flare 2 (also used in flare 1)	Pressure transmitter, main pipeline
Monitoring parameter	$LFG_{total,y} = LFG_{flare,y}$	$LFG_{total,y} = LFG_{flare,y}$	P, $LFG_{flare,y}$
S/N	7213B033	7213B035	91F511977
Type	Yokogawa DY100 EB MBA1-2D/FS1	Yokogawa DY100 EB MBA1-2D/FS1	Yokogawa EJA 510 (main pipeline)
Level/Accuracy	+/- 1% (ref. 45)	+/- 1% (ref. 45)	0.2 % of span (ref. 19)
Calibration frequency requirement	2 years (ref. 45)	2 years (ref. 45)	5 years (ref 19)
Calibration date	19/05/2009 (ref. 37), 04/05/2011 (ref. 40)	25/05/2007 (ref. 45) 19/04/2011(ref.39)	28/04/2006 (ref. 18a) 19/04/2011 (ref. 36)
Validity	18/05/2011 03/05/2013	24/05/2009 18/04/2013	27/04/2011 18/04/2016
Are there delays in calibration?	No (*)	No (*)	No (*)
Calibration Entity	Calibraciones Industriales S.A. (ref. 40)	Calibraciones Industriales S.A. (ref.39)	ASMAR

<b>Accreditation Certificate for the calibration entity Issuing authority Relevant</b>	Accredited by INN – Chile (ref. 40)	Accredited by INN – Chile (ref. 39)	Accredited by INN – Chile (ref. 75)
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(\*) For the exact detail of the dates the equipments were in use during this monitoring period, please refer to section 3.5.1.

<b>Monitoring equipment</b>	Pressure transmitter, main pipeline	Pressure transmitter, flare 1	Pressure transmitter, flare 2
<b>Monitoring parameter</b>	P, LFG <sub>flare,y</sub>	P, LFG <sub>flare,y</sub>	P, LFG <sub>flare,y</sub>
<b>S/N</b>	91HB26369	91G409098	91G830694-734
<b>Type</b>	Yokogawa EJA 510 (main pipeline)	Yokogawa EJX510 (Flare 1)	Yokogawa EJX510 (Flare 2)
<b>Level/Accuracy</b>	0.2 % of span (ref. 19)	0.2 % of span (ref. 44)	0.2 % of span (ref. 44)
<b>Calibration frequency requirement</b>	5 years (ref. 47)	5 years (ref. 44)	5 years (ref. 44)
<b>Calibration date</b>	22/03/2010 (ref. 47)	13/09/2007 (ref. 24a, ref. 44)	13/09/2007 (ref. 24b, ref. 44)
<b>Validity</b>	21/03/2015	12/09/2012	12/09/2012
<b>Are there delays in calibration?</b>	No (*)	No (*)	No (*)
<b>Calibration Entity</b>	Y.E.W. Chile S.A.	Y.E.W. Chile S.A.	Y.E.W. Chile S.A.
<b>Accreditation Certificate for the calibration entity Issuing authority Relevant</b>	Representative of Yokogawa	Representative of Yokogawa	Representative of Yokogawa

(\*) For the exact detail of the dates the equipments were in use during this monitoring period, please refer to section 3.5.1.

<b>Monitoring equipment</b>	Temperature meter, main pipeline	Temperature Meter, main pipeline	Temperature meter, flare 2 (also used in flare 1)
<b>Monitoring parameter</b>	T, LFG <sub>flare,y</sub>	T, LFG <sub>flare,y</sub>	T, LFG <sub>flare,y</sub>
<b>S/N</b>	C2J401275-912	C2F305205	C2G217891-707
<b>Type</b>	Yokogawa YTA 110 (main pipeline)	Yokogawa YTA-110	Yokogawa YTA 110
<b>Level/Accuracy</b>	+/- 0.14 °C (ref. 46)	+/- 0.14 °C (ref. 46)	+/- 0.14 °C (ref. 46)
<b>Calibration frequency requirement</b>	3 years (ref. 46)	3 years (ref. 26)	3 years (ref. 46)
<b>Calibration date</b>	13/04/2009 (ref. 46) 28/07/2010 (ref. 33)	23/08/2006 (ref. 68b T1.1) 30/04/2009 (ref. 42)	03/08/2007 (ref. 68c T3) 03/08/2010 (ref. 34)
<b>Validity</b>	12/04/2012 27/07/2013	22/08/2009 29/04/2012	02/08/2010 02/08/2013
<b>Are there delays in calibration?</b>	No (*)	No (*)	No (*)
<b>Calibration Entity</b>	ASMAR YEW Chile S.A.	DTS	Y.E.W. Chile S.A. ASMAR
<b>Accreditation Certificate for the calibration entity Issuing authority Relevant</b>	ASMAR accredited by INN (ref. 74)	Accredited by INN (ref. 76)	ASMAR accredited by INN (ref. 74)

(\*) For the exact detail of the dates the equipments were in use during this monitoring period, please refer to section 3.5.1.

<b>Monitoring equipment</b>	Temperature meter, flare 1 (also used in flare 2)	Temperature Meter, flare 1	Gas quality analyzer
<b>Monitoring parameter</b>	T, LFG <sub>flare,y</sub>	T, LFG <sub>flare,y</sub>	WCH <sub>4,y</sub>
<b>S/N</b>	C2G217892-707	C2K102028	7292
<b>Type</b>	Yokogawa YTA 110	Yokogawa YTA-110	NOVA 4170MN4X
<b>Level/Accuracy</b>	+/- 0.14 °C (ref. 46)	+/- 0.14 °C (ref. 46)	+/-2% (ref. 54)
<b>Calibration frequency requirement</b>	3 years (ref. 46)	3 years (ref. 68c T6)	Not required, weekly check/on-site calibrations recommended by the manufacturer and performed by the PP
<b>Calibration date</b>	03/08/2007 (ref. 68c T3) 04/08/2010 (ref. 35)	22/03/2010 (ref. 68c /temperature/T6)	Please refer to section 3.5 parameter 3.5.1.3 for the complete detail of the on-site calibrations
<b>Validity</b>	02/08/2010 03/08/2013	21/03/2013	N/A
<b>Are there delays in calibration?</b>	No (*)	No (*)	N/A
<b>Calibration Entity</b>	Y.E.W. Chile S.A. ASMAR	Y.E.W. Chile S.A.	GIRSA (Internal Check)
<b>Accreditation Certificate for the calibration entity Issuing authority Relevant</b>	ASMAR accredited by INN (ref. 74)	Representative of Yokogawa	N/A

(\*) For the exact detail of the dates the equipments were in use during this monitoring period, please refer to section 3.5.1.

<b>Monitoring equipment</b>	Electricity meter	LPG Meter
<b>Monitoring parameter</b>	ID9 of ACM0001 v2	ID9 of ACM0001 v2.
<b>S/N</b>	17072	0831914562
<b>Type</b>	Merlin Gerin ME4zrt	Daesung
<b>Level/Accuracy</b>	Class 1 (ref. 77)	3% of min. flow, 2% of max flow, in accordance with Chilean norm NCh 2230/23 (ref. 58)
<b>Calibration frequency requirement</b>	5 years (ref. 28)	5 years (ref. 56)
<b>Calibration date</b>	Calibrated by the manufacturer 15/11/2006 (ref. 28)	04/02/2008 to 13/02/2008 (ref. 56)
<b>Validity</b>	14/11/2011	04/02/2013
<b>Are there delays in calibration?</b>	No	No
<b>Calibration Entity</b>	Schneider Electric, fabric calibration (ref. 28). Merlin Gerin and Schneider Electric are now the same company	Daesung (Factory certificate)
<b>Accreditation Certificate for the calibration entity Issuing authority Relevant</b>	N/A	N/A

Monitoring equipment	Exhaust gas temperature meter (flare 1)	Exhaust gas temperature meter (flare 2)
Monitoring parameter	FE	FE
S/N	C2J401271 912	C2F305201 610
Type	Yokogawa YTA-110	Yokogawa YTA-110
Level/Accuracy	+/- 0.14 °C (ref. 46)	+/- 0.14 °C (ref. 46)
Calibration frequency requirement	3 years (ref. 46)	3 years (ref. 26)
Calibration date	13/04/2009 (ref. 46)	30/04/2009 (ref. 27b)
Validity	12/04/2012	29/04/2012
Are there delays in calibration?	No	No
Calibration Entity	Y.E.W. Chile S.A.	DTS
Accreditation Certificate for the calibration entity Issuing authority Relevant	Representative of Yokogawa	Accredited by INN (ref. 76)

### 3.7 Summary of compliance with the calibration frequency requirements for measuring instruments.

The calibration of the following measuring equipment has an impact on the claimed emission reductions:

**A Flow meters:** The calibration frequency of the flow meters is 2 years. There are three flow meters installed in the plant, as indicated in section 3.6. All the flow meters had a valid calibration certificate throughout the complete monitoring period. The validity of the calibration certificates expires on the following dates:

- Flow meter s/n 6183B004-2006: 15/09/2012 (ref. 38)
- Flow meter s/n S5K106065: 11/01/2012 (ref. 48)
- Flow meter s/n S5J401066-912: 04/09/2011 (ref. 22)
- Flow meter s/n 7213B035: Valid from 25/05/2007 until 24/05/2009 (ref. 45), and from 19/04/2011 until 18/04/2013 (ref. 39)
- Flow meter s/n 7213B033: 03/05/2013 (ref. 40)

**B Pressure transmitter:** The calibration frequency of the pressure transmitters is 5 years. The calibration certificates were provided by the PP and no delayed calibration was found. The validity of the calibration certificates expires on the following dates:

- Pressure transmitter s/n 91F511977: 18/04/2016 (ref. 18a, ref. 36)
- Pressure transmitter s/n 91HB26369 : 21/03/2015 (ref. 47)
- Pressure transmitter s/n 91G409098 12/09/2012 (ref. 24a, ref. 44)
- Pressure transmitter s/n 91G830694-734 12/09/2012 (ref. 24a, ref. 44)

**C Temperature transmitter:** The calibration frequency of the temperature transmitters is 3 years. Calibration certificates were provided by the PP and no delayed calibration was found. An issue was found with regard to the temperature transmitter in the main pipeline YOKOGAWA YTA 110 s/n C2J401275-912, as it was verified that it was calibrated to operate between -10 and 60°C. The temperature meter in the main pipeline was recalibrated on 28/07/2011 to measure temperatures

within -10 and 100°C, and it was reinstalled on 30/07/2012. From the beginning of the monitoring period and until 28/07/2010, all the measurements where the landfill gas was equal or above 60°C were omitted for purpose of ER calculations, please refer to CAR 05a and CAR 05b previously raised in section 3.1. The validity of the calibration certificates expires on the following dates:

- Temperature transmitter s/n C2J401275-912: 27/07/2013 (ref. 33)
- Temperature transmitter s/n C2F305205: 29/04/2012 (ref. 42)
- Temperature transmitter s/n C2G217891-707: 02/08/2013 (ref. 34)
- Temperature transmitter s/n C2G217892-707: 03/08/2013 (ref. 35)
- Temperature transmitter s/n C2K102028: 21/03/2013 (ref. 68c T6)
- Temperature transmitter s/n C2F305201 610: 29/04/2012 (ref. 27b)
- Temperature transmitter s/n C2J401271 912: 12/04/2012 (ref. 46)

**D Electricity meter:** The calibration frequency of the electricity meter Merlin Gerin ME4zrt is every 5 years (ref. 28). No recalibration has been required yet, the same conformity statement factory issued by the manufacturer for MP4 applies for this monitoring period. It is valid until 14/11/2011.

**E LPG meter** The calibration frequency of the LPG meter Daesung is every 5 years. No calibration has been performed yet The LPG meter is factory-calibrated, and the validity of the calibration expires on 04/02/2013.

No outdated calibrations of the monitoring equipment were found in this fifth monitoring period.

### 3.8 Accuracy of Emission Reduction Calculations

The calculation of emission reductions is found to be correct. One CAR (#10) was raised with regards to the accuracy of the emission reduction calculations. Some issues related to the data used for calculation were found, but the response to CAR and CLs was satisfactory and these were closed. The details of the reported and the verified values for all parameters are listed in section 4, 'Calculation of Emission Reductions'.

With regard to the calculation of the flare efficiency, **CAR 4 was raised and closed in section 3.5.1.2.** of this report, for discrepancies found in the calculation of the nitrogen content of the raw gas, the methane density and the methane content.

Discrepancies were also found in the calculation of  $PE_{LPG}$ , but these were corrected satisfactorily as **CAR 10 was raised and closed out in Section 4** of this report.

In the ERs calculation spreadsheet (ref. 7c), a summary of the daily values is provided, separated by month. With this data, monthly averages are calculated and used for ER calculation. **CAR 8 was raised** after the following issues were found related to the source of the data:

Date	Description
29/07/2010	The value for methane content is linked from the same external cell than the landfill gas temperature.
10/05/2011	The value for landfill gas temperature is linked from the same cell than the methane content
05/07/2011	The value for methane content is linked form the same external cell than the Temperature of the landfill gas
24/07/2011	Temperature of Flare 1 is linked from the same external cell than the Temperature of Flare 2

The PP provided a modified version of the ER calculation spreadsheet (ref. 7e), where all the aforementioned links were corrected. **CAR 8 was closed out.**

- (a) A complete set of data was available for the whole monitoring period. Parameters were monitored according to the registered PDD and applicable revision of the monitoring plan; this was verified through the review of the Flaring data (ref. 12c minute by minute data recorded), flare efficiency reports (ref. 10) and the ER calculation spreadsheet (ref. 7h).
- (b) Data was downloaded during the site visit and it was cross checked against the data used for ER calculations. Four days per month were verified, as shown in the table below, and no discrepancies were found. As the data downloaded from the system is protected against edition, it can be confirmed that the data used for the ERs calculation is the data measured on site and recorded every minute:

Month – Year verified	Days cross-checked
February 2010	24, 25, 26, 27
March 2010 – December 2010	27,28, 29, 30
January 2011 - July 2011	1, 2, 3, 4,

- (c) Calculations were found to be accurate and in accordance with the applicable Methodology ACM0001 v2. CAR 10 was previously raised and closed out, since inconsistencies were found with regard to the calculation of project emissions due to LPG consumption. Flare efficiency was calculated as per the “Tool to determine project emissions from flaring gases containing methane” version 1, even it is not required for this project activity.
- (d) All default values applied are in compliance with the methodology ACM0001 v2, IPCC guidelines, and national regulations. Please refer to section 3.11 for further details.

### **3.9 Quality of Evidence to Determine Emission Reductions**

Critical parameters used for the determination of the Emission Reductions are discussed in section 3.4 above. All the data recorded is in compliance with the Monitoring Report.

### **3.10 Management and operational System and Quality Assurance**

The company involved in the project have ISO 9001:2008 (ref. 64c) quality assurance system implemented and certified, therefore we can affirm that the management system of the CDM project is in place, with the responsibilities properly identified and in place.

In order to verify data quality, the Company involved in the project works in accordance with a quality assurance procedure (Procedure for data collection, processing and control, ref.52d) and the Operation Manual (ref. 78), which establishes the operational and management structure implemented.

### **3.11 Data from External Sources**

#### **3.11.1 Regulatory requirements relating to landfill gas projects (Adjustment Factor - AF)**

The value of AF is 8%. This value was established as a fixed value for the whole crediting period in registered PDD section B.2, if no change in the local regulations applies to the project activity.

The value was defined ex-ante, following the methodology ACM0001 version 2. The value was established considering a conservative estimation during the validation assessment (ref. 1, page 8).

There is no change in the national regulations of closed landfill since the project was registered, so no change in the AF occurs.

### **3.11.2 CO<sub>2</sub> emission intensity of the electricity and/or other energy carriers**

#### **CO<sub>2</sub> emission factor of the grid**

The CO<sub>2</sub> emission factor of the grid is 1.3 tCO<sub>2</sub>e/MWh. An RMP was approved by the UNFCCC on 29/07/2010 where 1.3 tCO<sub>2</sub>/MWh has been accepted as grid emission factor. This conservative approach applied was based on the provisions of EB 39 Annex 7, Scenario A, Option A.2 (ref. 69). This value remained unchanged with the approval of a second RMP by the CDM EB, on 02/07/2012.

It was verified that the CO<sub>2</sub> emission factor of the grid was correctly applied in ERs calculation sheet (ref. 7h).

#### **CO<sub>2</sub> emission factor of the diesel generator**

A CO<sub>2</sub> emission factor of 1.3 tCO<sub>2</sub>e applies for electricity consumption from the diesel generator, as per the RMP approved by the CDM EB on 02/07/2012. This EF is based on Scenario B, Option B2 of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" version 1 (ref. 69). According to the above mentioned Tool, an emission factor of 1.3 tCO<sub>2</sub>e can be used as a default value to estimate project and leakage emissions from electricity consumption from an off-grid power plant. The diesel generator can be considered as an off-grid plant, so the approach is applicable to the project activity.

This is the first verification that this parameter is monitored; it was included after a diesel generator was installed in the plant. The emission factor of the diesel generator was not originally included in the monitoring report, so **CL 6 was raised** requesting the PP to report it separately from the grid emission factor, and asking the PP to explain why an emission factor of 1.3 tCO<sub>2</sub>/MWh was selected. The PP explained that the grid emission factor was still conservative as diesel generation only represented about 12.5% of the total electricity consumption during the year, and that the calculation of the grid emission factor of the diesel resulted in a value similar but lower to the 1.3 tCO<sub>2</sub>e established for EF<sub>grid</sub>. Despite this, an RMP had to be carried out in order to include the EF of the diesel generator in the monitoring plan. The RMP was approved by the CDM EB on 02/07/2012, and the emission factor of 1.3 tCO<sub>2</sub>e per MWh to be used for the electricity consumption from the diesel generator was validated. **CL 6 was closed.**

It was verified that this emission factor was correctly applied to calculate project emissions from electricity consumption.

#### **CO<sub>2</sub> emission factor of the Liquefied Petroleum gas (LPG)**

An emission factor of 0.0034 tCO<sub>2</sub>e/kg-LPG was applied by the PP in this monitoring period. As indicated in the applicable RMP, this value was calculated based on the IPCC Guidelines 2006 (ref. 65). From this document the values for LPG Net Calorific value and LPG effective CO<sub>2</sub> emission factor were obtained. This represents a change compared to previous verification, an emission intensity of 0.0028 tCO<sub>2</sub>e/L was applied in MP4.

According to the source indicated by the PP, LPG Emission factor can be calculated as follows

$$EF_{LPG} \left[ \frac{\text{kgCO}_2\text{e}}{\text{Gg}} \right] = NCV_{LPG,up} \left[ \frac{\text{TJ}}{\text{Gg}} \right] \times EF_{LPG,up} \left[ \frac{\text{kgCO}_2}{\text{TJ}} \right]$$

Where

EF<sub>LPG</sub>: CO<sub>2</sub> emission intensity of Liquefied Petroleum Gas

NCV<sub>LPG,up</sub>: LPG Net Calorific Value, upper 95% confidence interval (52.2 TJ/Gg)

EF<sub>LPG,up</sub>: LPG Effective CO<sub>2</sub> emission factor, upper 95% confidence interval (65,600 kgCO<sub>2</sub>e/TJ)

$$EF_{LPG} \left[ \frac{\text{kgCO}_2\text{e}}{\text{Gg}} \right] = 52.2 \left[ \frac{\text{TJ}}{\text{Gg}} \right] \times 65,600 \left[ \frac{\text{kgCO}_2\text{e}}{\text{TJ}} \right]$$

$$EF_{LPG} = 3424 \left[ \frac{\text{kgCO}_2\text{e}}{\text{Gg}} \right] \sim 0.0034 \left[ \frac{\text{tCO}_2\text{e}}{\text{kg}} \right]$$

The resulting emission factor was rounded to two significant digits. This was considered valid since only a small amount of LPG is consumed in the PA, because the two flares operate continuously and the LPG is used for flare ignition only. Furthermore, the final value with the entire decimals will result in an amount of 0.23 tCO<sub>2</sub>e from LPG consumption for the entire monitoring period, so it has no impact on the ERs claimed.

### 3.11.3 Methane Global Warming Potential Value

The value 21 tCO<sub>2</sub>e/tCH<sub>4</sub> is defined by the methodology ACM0001 version 2 page 11 (ref. 3) based on the IPCC Guidelines for National Greenhouse Gas Inventories.

### 3.11.4 Methane Density

The value 0.0007168 tCH<sub>4</sub>/m<sup>3</sup>CH<sub>4</sub> is defined by the methodology ACM0001 version 2, page 11 (ref. 3), at standard conditions of 0° Celsius and 1.013 bar. No change since registration of the PA.

In the spreadsheets "Datos quema *month.xls*" (ref. 12c) instead of multiply by the density the amount in Nm<sup>3</sup> of CH<sub>4</sub> is divided by the inverse of the methane density (1.395). The calculation and results are the same.

#### 4. Calculation of Emission Reductions

Parameter	Reported Value in MR version 1 (ref. 6a) and ERs calculation spreadsheets version 1 (ref. 7a)	Verified Value in MR version 5 (VVS) (ref. 6h) and ERs calculation spreadsheets version 5 (ref. 7h)
$LFG_{total,y} = LFG_{flare,y}$ (Nm <sup>3</sup> )	18,899,450.78 Nm <sup>3</sup>	18,863,765.10 Nm <sup>3</sup>
Flare combustion efficiency (%)	99.037%	99.038%
$w_{CH_4}$ (m <sup>3</sup> CH <sub>4</sub> /m <sup>3</sup> LFG) (%) (Average value, not used for calculation of ERs)	52.16%, calculated as the average of all monthly values	52.17% calculated as the average of all monthly values
$LFG_{temp}$ Temperature of the landfill gas (°C)	Not applicable, no separate monitoring of temperature is necessary as per AM_CLA_0023 of ACM0001 v2, the PLC uses T to automatically normalize the Landfill gas flow	Not applicable, Not applicable, no separate monitoring of temperature is necessary as per AM_CLA_0023 of ACM0001 v2, the PLC uses T to automatically normalize the Landfill gas flow
$LFG_{press}$ Pressure of the landfill gas (Pa)	Not applicable, no separate monitoring of temperature is necessary as per AM_CLA_0023 of ACM0001 v2, the PLC uses P to automatically normalize the Landfill gas flow	Not applicable, no separate monitoring of temperature is necessary as per AM_CLA_0023 of ACM0001 v2, the PLC uses P to automatically normalize the Landfill gas flow
Total amount of electricity used in the project for gas pumping and heat transport (MWh)	895 MWh	2,316 MWh (not including discount from MP1-MP4)
Total amount of LPG used in the project for gas pumping and heat transport (not derived from the gas) (L LPG)	32,526 L	32,526 L (68.30 kg)
CO <sub>2</sub> emission intensity of the electricity (tCO <sub>2</sub> e/MWh)	1.3 tCO <sub>2</sub> /MWh	1.3 tCO <sub>2</sub> /MWh
CO <sub>2</sub> emission intensity of the LPG (tCO <sub>2</sub> e/L – tCO <sub>2</sub> e/kg)	0.0028 tCO <sub>2</sub> e/L	0.0034 tCO <sub>2</sub> e/kg
Regulatory requirements relating to landfill gas projects	8% (Adjustment Factor)	8% (Adjustment Factor)
Methane Global Warming Potential Value	21 tCO <sub>2</sub> e/tCH <sub>4</sub>	21 tCO <sub>2</sub> e/tCH <sub>4</sub>
Methane Density	0.0007168 tCH <sub>4</sub> /m <sup>3</sup> CH <sub>4</sub>	0.0007168 tCH <sub>4</sub> /m <sup>3</sup> CH <sub>4</sub>

The calculations are performed in accordance with the methodology (ref. 3) and the PDD (ref. 1). The steps taken are correctly described in Section E of the Monitoring Report v5 VVS (ref. 6h).

For each year in the monitoring period, Emissions reduction are calculated as the difference between the baseline emissions and the project emissions (no leakage effects are taken into consideration in this project);

$$ER_y = \left( \sum_m^{12} (MD_{project,m} - MD_{reg,m}) \right) * GWP_{CH_4} - (LPG * EF_{LPG}) - (EC * EF_{elec})$$

The steps taken are the following:

- 1) Each minute the biogas flow (m<sup>3</sup>/h) is automatically recorded and then normalized by the flare station PLC according to the measured pressure and temperature (parameter 3.1).

- 2) Each minute the normalized flow of biogas Nm<sup>3</sup>/h is divided by 60 to transform the units to Nm<sup>3</sup>/min, and then it is multiplied by the methane concentration (%), measured each minute as well, to obtain the flow of methane (Nm<sup>3</sup>CH<sub>4</sub>/min).
- 3) The daily accumulated methane flow (Nm<sup>3</sup> CH<sub>4</sub>/day) is divided by the inverse of the methane density 1.395 Nm<sup>3</sup>CH<sub>4</sub>/KgCH<sub>4</sub> to obtain KgCH<sub>4</sub> (Kg of methane under normal conditions) in the ER calculation spreadsheet (ref. 7g, monthly sheets)
- 4) The daily Kg of methane are accumulated monthly and transformed to tCH<sub>4</sub>/month in the ER calculation spreadsheet (ref. 7g, sheet "ERs calculation").
- 5) The result obtained in the point (4) is multiplied by the flare efficiency to obtain the monthly amount of methane destroyed MD<sub>project,m</sub> (which is equal to MD<sub>flared</sub>). This is correct according the methodology and RMP 2.
- 6) The result obtained in point (5) is multiplied by the adjustment factor to obtain the monthly value for MD<sub>reg,m</sub>.
- 7) For each month the difference between MD<sub>project,m</sub> and MD<sub>reg,m</sub> is calculated and multiplied by the methane global warming potential, and the result is aggregated yearly.
- 8) Project emissions from electricity and LPG are subtracted from the result in (7). Project emissions are determined in a different way depending whether the temporary deviation applies or not:

- **PE<sub>Electricity</sub>**

From the beginning of the crediting period until 22/07/2011:

$$E_{\text{consumed,deviation}} = E_{\text{plant}}[\text{MWh}] * d * 24 * 1.1$$

Where

$E_{\text{plant}}$ : Theoretical electricity consumption of the plant, **(169.59 kW)**

$d$ : total days from the beginning of the monitoring period until the deviation was solved (24/02/2010 until 22/07/2011)

$E_{\text{consumed,deviation}}$  = Total electricity consumption from 24/02/2010 until 22/07/2011, **2,301.28 MWh (1,392.41 in MWh 2010, 908.87 MWh in 2011)**

Total electricity consumption was calculated as

$$E_{\text{consumed}} = E_{\text{consumed,deviation}} + E_{\text{consumed,measured}}$$

Where

$E_{\text{consumed,measured}}$  is the electricity consumed by the PA from the grid and diesel generator, from 23/07/2011 until 31/07/2011, was measured with the electricity meter **(14.91 MWh)**

Finally, emissions due to electricity consumption were calculated as

$$PE_{\text{electricity}} = E_{\text{consumed}} * 1.3 \left[ \frac{\text{tCO}_2\text{e}}{\text{MWh}} \right]$$

- **PE<sub>LPG</sub>**:

CO<sub>2</sub> Emissions due to LPG consumption were calculated as follows in ref. 7c:

$$PE_{\text{LPG}}[\text{tCO}_2\text{e}] = \text{LPG}[\text{m}^3] * K \left[ \frac{\text{kg}}{\text{m}^3} \right] * \frac{1}{\text{LPG}_{\text{density}} \left[ \frac{\text{kg}}{\text{m}^3} \right]} * EF_{\text{LPG}} \left[ \frac{\text{tCO}_2\text{e}}{\text{kg}} \right]$$

**CAR 10 was raised** due to the equation used to determine the emissions from LPG consumption presents inconsistencies with the units. In response, the PP provided an updated version of the ER calculation spreadsheets (ref. 7d), where emissions from LPG were calculated monthly as follows:

$$LPG \left[ \frac{kg}{month} \right] = LPG \left[ \frac{m^3}{month} \right] * K \left[ \frac{kg}{m^3} \right]$$

And

$$PE_{LPG} \left[ \frac{tCO_2e}{month} \right] = LPG \left[ \frac{kg}{month} \right] * EF_{LPG} \left[ \frac{tCO_2e}{kg} \right]$$

It was verified that the data and equations used to calculate project emissions due to LPG consumption in the CERs calculations spreadsheets (ref. 7d to ref. 7h) were correct. Values calculated for  $PE_{LPG}$  (tCO<sub>2</sub>e/month) are aggregated yearly. **CAR 10 was closed.**

## **5. Recommendations for Changes in the Monitoring Plan**

The monitoring plan is implemented and fulfils the requirements of the revised monitoring plan (ref. 2b) and approved methodology ACM0001 version 2 (ref. 3).

No recommendation has been required to change the revised monitoring plan during this periodic verification.

## 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 final Monitoring Report is attached with this verification report.*

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

*The following data from external sources has been used*

- 1) Regulatory requirements relating to landfill gas project – AF Adjustment Factor (%): Considered as 8% in the registered PDD section B.2 (ref. 1). It has a high significance and low risk.
- 2) CO<sub>2</sub> emission intensity of the electricity and/or other energy carriers:
  - i. CO<sub>2</sub> emission intensity of the grid: A conservative default value of 1.3 tCO<sub>2</sub>e/MWh established in the RMP (ref. 2) was approved by CDM EB on 29/07/2010. It was not changed in the RMP (ref. 2b) approved by the CDM EB on 02/07/2012. It has medium significance and low risk.
  - ii. CO<sub>2</sub> emission intensity of the diesel: The RMP approved by the CDM EB on 02/07/2012 established an emission factor of 1.3 tCO<sub>2</sub>e/MWh. This is in line with the default value for off-grid power plants established on EB 39 Annex 7, option B2. It has medium significance and low risk.
  - iii. CO<sub>2</sub> emission intensity of the LPG: The latest default values obtained from the IPCC are applied, as per the revised monitoring plan approved on 02/07/2012. Default values for LPG Net Calorific Value of 52.2 TJ/Gg, and LPG Effective CO<sub>2</sub> emission factor of 65,600 kgCO<sub>2</sub>e/TJ were used, as per 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, tables 1.2 and 1.4 respectively. According to this,  $EF_{LPG} [kgCO_2e/Gg] = 52.2[TJ/Gg] \times 65,600[kgCO_2e/TJ] = 3,424 [kgCO_2e/Gg]$ . The value applied was rounded to two decimal figures, 0.0034 [tCO<sub>2</sub>e/kg]. It has low significance and low risk.
- 3) Methane Density: 0.7168 kg/m<sup>3</sup>, as per applied methodology ACM0001 version 1. It has medium significance and low risk.
- 4) Methane Global Warming Potential: 21 tCO<sub>2</sub>/tCH<sub>4</sub>, in accordance with the latest IPCC values and as specified in the applied methodology ACM0001 version 2. It has high significance and low risk.

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 recommendation was made for the upcoming monitoring periods.*

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 consistent with those contained in the registered PDD and revised monitoring plan. The emission reduction was 201,047 tCO<sub>2</sub> for the period 24/02/2010 to 31/07/2011 as per the estimation made in the registered PDD. The actual emission reduction has been verified as 125,179 tCO<sub>2</sub> for the same period.*

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.

*A temporary deviation from the registered monitoring plan is being requested along with the request for issuance, due to inaccurate monitoring of the electricity consumption. As per the provisions in the Project standard, this does not require prior approval from the EB since it was estimated that the plant operated at full capacity for the complete monitoring period under verification, including an addition of 10% due to transmission and distribution losses. The same approach was used to discount CERs due to the inaccurate measuring of the electricity in the previous monitoring periods. No other 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. 0170 on the UNFCCC website*

<http://cdm.unfccc.int/Projects/DB/DNV-CUK1134475476.36/view>

## 7. Verification and Certification Statement

SGS United Kingdom Ltd has been contracted by Gestión Integral de Residuos S.A. (GIRSA) to perform the verification of the emission reductions reported for the CDM project El Molle – Landfill gas (LFG) capture project, UNFCCC Ref. 0170 in the fifth monitoring period (24/02/2010 – 31/07/2011).

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 5 VVS, dated 07/11/2012.

The management of Gestión Integral de Residuos S.A. is responsible for the preparation, calculation and determination of GHG emission reductions from the project. 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 fifth monitoring period (24/02/2010 – 31/07/2011) based on the reported emission reductions in the Monitoring Report version 5 VVS dated 07/11/2012 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:	El Molle – Landfill gas (LFG) capture project
UNFCCC Reference Number:	0170
Registered PDD and Approved Revised Monitoring Plan Used for Verification:	PDD version 10, dated 12/03/2005 RMP approved by CDM EB on 02/07/2012
Methodology Used for Verification:	ACM0001, Consolidated baseline methodology for landfill gas project activities, version 2, dated 30/09/2005
Applicable Period:	Fifth monitoring period: 24/02/2010 – 31/07/2011
Total GHG Emission Reductions Verified:	<b>125,179 tCO<sub>2</sub>e</b>

### Signed on behalf of the Verification Body by Authorized Signatory

Signature:



Name: Siddharth Yadav

Date: 14/12/2012

## 8. Document References

01. El Molle PDD v10 - *Registered PDD version 10 dated 12/03/2005*
02. RMP - *Revision of the Monitoring Plan, approved by the CDM EB on 29/07/2010*
- 02b. RMP 2 approved - *Revision of the Monitoring plan, approved by the CDM EB on 02/07/2012*
03. ACM0001 version 2 - *Consolidated baseline methodology for landfill gas project activities version 2, dated 30/09/2005*
04. Tool to determine PE from flaring gases containing methane – *EB 28 Annex 13, dated 15/12/2006*
05. VVM v1.2 - *CDM Validation and Verification Manual version 1.2 dated 30/07/2010*
- 05b. VVS - *CDM Validation and Verification Standard version 2.0 dated 25/11/2011*
- 06a. 5th Monitoring Report uploaded - *Monitoring Report version 1 dated 16/08/2011, monitoring period 24/02/2010 – 31/07/2011*
- 06b. 5th Monitoring Report cc - *Monitoring Report, monitoring period 24/02/2010 – 31/07/2011, version 2 dated 25/10/2011*
- 06c. El Molle new Monitoring Report v1 2012 06 11 GDP ctc - *Monitoring Report , monitoring period 24/02/2010 – 31/07/2011, version 1 VVS dated 25/05/2012*
- 06d. El Molle new Monitoring Report v2 2012 07 23 GDP ctc - *Monitoring Report version 2 VVS dated 23/07/2012, monitoring period 24/02/2010 – 31/07/2011*
- 06e. El Molle MR v3 2012 08 09 GDP ctc clean - *Monitoring Report version 3 VVS dated 09/08/2012, monitoring period 24/02/2010 – 31/07/2011*
- 06f. El Molle MR v3 2012 08 21 GDP ctc - *Monitoring Report version 3 VVS dated 21/08/2012, monitoring period 24/02/2010 – 31/07/2011*
- 06g. El Molle MR v4 2012 08 31 GDP ctc\_clean - *Monitoring Report version 4 VVS dated 31/08/2012, monitoring period 24/02/2010 – 31/07/2011*
- 6h. El Molle MR v5 2012 11 07 clean.pdf - *Monitoring Report version 5 VVS dated 07/11/2012, monitoring period 24/02/2010 – 31/07/2011*
- 07a. ERs calculation 5th Verification - *ERs calculation spreadsheet version 1, monitoring period 24/02/2012 – 31/07/2011*
- 07b. ERs calculation 5th Verification 04 - *ERs calculation spreadsheet version 2, monitoring period 24/02/2012 – 31/07/2011*
- 07c. ERs calculation 5th 2012 05 31 - *ERs calculation spreadsheet version 1 VVS, monitoring period 24/02/2012 – 31/07/2011*

- 07d. ERs calculation 5th 2012 07 18 - *ERs calculation spreadsheet version 2 VVS, monitoring period 24/02/2012 – 31/07/2011*
- 07e. CERs calculation - version 3 2012 08 08 FES - *ERs calculation spreadsheet version 3 VVS, monitoring period 24/02/2012 – 31/07/2011*
- 07f. CERs calculation - version 3 2012 08 21 GDP - *ERs calculation spreadsheet version 3 VVS, monitoring period 24/02/2012 – 31/07/2011*
- 07g. CERs calculation - version 4 2012 08 31 GDP - *ERs calculation spreadsheet version 4 VVS, monitoring period 24/02/2012 – 31/07/2011*
- 07h. CERs calculation v5 2012 11 07 - *ERs calculation spreadsheet version 5 VVS, monitoring period 24/02/2012 – 31/07/2011*
- 08a. Validation Report DNV , El Molle - *Landfill gas (LFG) capture project validation report, dated 13/12/2007*
- 08b. Validation Report RMP – *El Molle Landfill gas (LFG) capture project validation opinion for revision of the monitoring plan dated 19/04/2010*
- 08c. Validation Opinion RMP2 approved - *El Molle Landfill gas (LFG) capture project validation opinion for revision of the monitoring plan dated 19/04/2010*
- 08d. Request for deviation El Molle.pdf – UNFCCC approval of a request for deviation for this project activity.
- 09a. AR6 MP1 - *First Monitoring period Verification and Certification report, issued on 12/06/2008*
- 09b. AR6 MP2 - *Second Monitoring period Verification and Certification report, issued on 29/12/2008*
- 09c. AR6 MP3 - *Third Monitoring period Verification and Certification report, issued on 04/10/2010*
- 09d. AR6 MP4 - *Fourth Monitoring period Verification and Certification report, issued on 25/05/2011*
- 10. Flare efficiency reports\ - Monthly efficiency reports provided by Universidad Técnica Federico Santa María
- 11a. Flair efficiency 5th Verification.xlsx – *Flare efficiency calculation spreadsheet*
- 11b. Flair efficiency 5th Verification v2.xlsx
- 11c. Flair efficiency 5th Verification v3.xlsx
- 11d. CAR 4 -Flair efficiency 5th Verification v3 2012 08 08 FES.xlsx
- 12. Datos quema\ - *Folder containing minutely data collected from gas analyzer and flow, temperature and pressure meters*
- 12b. Datos quema b\ - *Folder containing minutely data collected from gas analyzer and flow, temperature and pressure meters, version 2*
- 12c. Datos quema v3\ - *Folder containing minutely data collected from gas analyzer and flow, temperature and pressure meters, version 3*

13. Toma estado\ - *Folder containing monthly spreadsheets with daily readings of electricity and LPG meters, and other operational data*
- 13b. Toma de estado v2\ - *Folder containing monthly spreadsheets with daily readings of electricity and LPG meters, and other operational data; version 2*
14. Flare efficiency conditions\ - *Monthly efficiency reports elaborated by the PP*
- 15a. LPG ERs calculation.xlsx – *Spreadsheet describing the calculation of project emissions due to LPG consumption*
16. Photos Site Visit\
- 17a. Flow meter 6183B004 calibration certificate 08092008
- 18a. Pressure transmitter 91F511977 test certificate 28042006
19. Pressure transmitter Supplier guarantee letter freq
- 20a. Total Flow meter calibration frequency supplier letter igual a 16a
21. Total Temperature meter C2J401271-912 and C2J401275-912 certificates\_freq
22. Flare Flow meter calibration frequencies
23. Flare Flow meter 7213B033 calibration certificate\_previous
- 24a. Flare 1 Pressure transmitter 91G4009098 calibration cert
- 24b. Flare 2 Pressure transmitter 91G830694-734 calibration cert
- 25a. Temperature meter flare1 C2G217891-707 calibration certif.\_previous
- 25b. Temperature meter flare2 C2G217892-707 calibration certif.\_previous
26. Temperature meter flares Supplier guarantee lette freq
- 27a. Temperature meter 1 C2J401271-912 and C2J401275-912\_previous
- 27b. Temperature meter 2\_C2F305201-610 calibration certificate 30042009\_previous
28. Electricity meter calibration frequency
29. 1015-CAR01-GIRSA - Rescaling of Temp Transmitters
30. Diesel emission factor – *Calculation of diesel generator emission factor, not used*
31. Site visit attendance record – *Site visit attendance record for opening and closing meeting, dated 26/09/2011*
32. Electricity meter correction – *Letter confirming the correction of the electricity meter, dated 23/07/2011.*
33. CAL.ASMAR.E001908 Temperature meter C2J401275-912 - *Temperature meter C2J401275-912 calibration certificate, dated 28/07/2010*
34. CAL.ASMAR.E001925 Temperature meter C2G217891707 - *Temperature meter C2G217891707 calibration certificate, dated 02/08/2010*
35. CAL.ASMAR.E001941 Temperature meter C2G217892707 (Temperature meter C2G217892707 calibration certificate, dated
36. CAL.ASMAR.M009471 Pressure meter 91F511977 - *Pressure meter 91F511977 Calibration Certificate*

37. CAL.CISA.090519 Flow meter 7213B033 - *Flow meter 7213B033 calibration certificate*
38. CAL.CISA.101019 Flow meter 6183B004 - *Flow meter 6183B004 calibration certificate*
39. CAL.CISA.110419 Flow meter 7213B035 - *Flow meter 7213B035 calibration certificate)*
40. CAL.CISA.110504 Flow meter 7213B033 - *Flow meter 7213B033 calibration certificate, dated 04/05/2011*
41. CAL.BIOGAS Modificacion rango temperatura
42. CAL.DTS.092214 Temperature meter C2F305205-610 - *Temperature meter C2F305205-610 calibration certificate, dated 30/04/2009*
43. CAL.GASES – *Composition Certificate of gas standards, dated 13/03/2009, 04/06/2010, 04/08/2010 and 29/07/2011*
44. CAL.YEW.070913 Pressure meter 91G4009098 - *Pressure meter 91G4009098 calibration certificate, dated 13/09/2007*
45. CAL.YEW.080801 Flow meter 7213B035 - *Flow meter Yokogawa 7213B035 factory calibration certificate, dated 25/05/2007*
46. CAL.YEW.090413 Temperature meter C2J401271-C2J401275 - *Temperature meter Yokogawa C2J401271-C2J401275 calibration certificates, dated 13/04/2009*
47. CAL.YEW.100322 91K128783-91HB26369 - *Pressure meters Yokogawa s/n 91K128783 and 91HB26369 calibration certificates, dated 22/03/2010*
48. Test Certificate flow meter – *Flow meter s/n S5K106065 factory test certificate, dated 12/01/2010*
49. Contrast.zip – *Zipped folder containing gas analyzer's contrasting reports, from 02/03/2010 until 07/07/2011*
50. Generator Data and bill – *Diesel generator data sheet*
51. DSC00545 – *ID plate of the alternator of the diesel generator*
52. Procedures\
  - 52a. D-GA-002 PLAN DE CALIBRACION – *Calibration planification dated 01/03/2009, obsolete*
  - 52b. P-MB-006\_03Procedimiento de Calibracion – *Calibration procedures dated 01/11/2009, obsolete*
  - 52c. P-MB-006\_04 Procedure for Calibrations – *Calibration procedures dated 05/07/2010, obsolete*
  - 52d. 01 procedimiento de captura de datos (3) – *Procedure for Data collection and processing, dated 08/11/2011, in use.*
  - 52e. 02 procedimiento de falla (2) – *Procedure in case of failure, dated 09/11/2011, in use.*

52f. 03 procedimiento de calibracion (2) – *Calibration procedures, dated 09/11/2011, in use.*

53. Laboratory staff
54. NOVA Manual – *Gas analyzer's instruction manual*
55. certificados de medidor – *Letters from VFF Electricidad containing the Electricity meter installation certificate and description of the gen-set installed on site, dated 28/03/2010 and 31/03/2010*
56. LPG Daesung certificate -
57. Decree\_66 LPG regulations -
58. LPG installation and calibration certificate – *dated 11/08/2009 and 27/05/2008 respectively*
- 58b. LPG ABASTIBLE information – *Letter from local gas provide regarding LPG cylinders, dated 20/07/2010*
59. factor K GLP – *Chilean decree that establishes the K factor for LPG, dated 28/08/1986*
60. Guidelines for completing the monitoring report version 2 – *EB66 Annex 20, dated 02/03/2012*
61. Clean Development Mechanism Project Standard version 1 – *EB 65 Annex 5, dated 25/11/2011*
62. Supplier guarantee letter TT– *Letter from YEW Chile regarding calibration frequency and accuracy of Yokogawa temperature meters, dated 13/09/2007*
63. Training registry –
64. Certification\
- 64a. GIRSA CETAM UTFSM – *Report: "Calculation of confidence interval (CI) for the concentration values obtained from methane (CH<sub>4</sub>), oxygen (O<sub>2</sub>) and nitrogen (N<sub>2</sub>) in the exhaust gas from "El Molle" landfill under the administration of "Gestión Integral de Residuos S.A." (GIRSA)", dated November 2010*
- 64b. Certificate Aenor – *ISO 9001:2000 certificate, issued on 12/09/2007*
- 64c. Certificate ISO – *ISO 9001:2008 certificate, issued on 19/10/2010*
- 64d. Certificate TUV – *ISO 9001:2000 certificate, issued on 27/12/2005*
65. IPCC guidelines 2006 – *2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy*
- 66a. CAR 1 - Respaldo consumo electrico
- 66b. CAR 1 - Toma de estado AGOSTO 2011
- 66c. Consumo Electrico Planta de gas 220V 2012 08 08
67. CAR 7 - EQUIPOS INSTALADOS – *List of measuring equipment installed in the plant, version 1*
- 67b. CAR 7 - EQUIPOS INSTALADOS v2 – *List of measuring equipment installed in the plant, version 2*

- 67c. CAR 7 - EQUIPOS INSTALADOS 2012 08 31 – *List of measuring equipment installed in the plant, version 3*
- 67c2. CAR 7 - EQUIPOS INSTALADOS 2012 08 31 – *List of measuring equipment installed in the plant, version 4*
- 68. Calibration certificates v1\ - *Folder containing pictures of calibration certificates*
- 68b. Calibration certificates v2\ - *Folder containing pictures of calibration certificates*
- 68c. Calibration certificates v3\ - *Folder containing pictures of calibration certificates, dated*
- 69. Tool to calculate baseline project and or leakage emissions from electricity consumption version 1.0 - *EB39 Annex 07, dated 16/05/2008*
- 70a. CPU plate – *picture evidencing the PC's Electricity consumption*
- 70b. Flatron Monitor – *picture evidencing the screen's electricity consumption*
- 71. Logbook - temperature meter\ - *Folder containing evidence of replacements of the temperature meters installed*
- 72. Logbook - pressure meter\ - *Folder containing evidence of replacements of the pressure meters installed*
- 73. Logbook - flow meter\ - *Folder containing evidence of replacements of the flow meters installed*
- 74. Accreditation ASMAR temperature – *ASMAR Accreditation renewal certificate for temperature calibration, dated 16/08/2012*
- 75. Accreditation ASMAR pressure - *ASMAR Accreditation renewal certificate for pressure calibration, dated 16/08/2012*
- 76. Accreditation DTS Temperature - *DTS Accreditation renewal certificate for temperature calibration, dated 14/04/2010*
- 77. Electricity meter datasheet – *Merlin Gerin (Schneider Electric) ME4zrt technical data sheet*
- 78. Flare station OM - code 0538 – *Flare station's operation manual*
- 79. Flare Maintenance registry – *Summary of preventive maintenance work on flares and blowers*

MR Version	Date of Revision	Main changes and reason for Revision (non-exhaustive), Section in MR where changes were made
Version 1	16/08/2011	First version of the monitoring report initially uploaded for webhosting
Version 2	25/10/2011 (not updated in the MR)	Correction in PDD estimation of ERs and in the implementation status of the project (Section B.1)
VVS – Version 1	25/05/2012	Updated to VVS template, including recalculation of ERs and PDD estimation of ERs, changes due to the approval of a revision of the monitoring plan on 02/07/2012 and a temporary deviation from the monitoring plan
VVS – Version 2	23/07/2012 (not updated in the MR)	Correction in PDD estimation of ERs. Temporary deviation moved to section B.2.1 of the report, correction in the calculation of theoretical Electricity consumption (section B.1, . Details of equipment used included in section D.2, recalculation of CERs.
VVS – Version 3	08/08/2012 (and file date 09/08/2012, the second V3 has the same date in the document but file is date 21/08/2012)	Corrections to theoretical electricity consumption. Correction in calibration dates and measuring equipment used, recalculation of CERs
VVS – Version 4	31/08/2012	Further corrections to theoretical electricity consumption. Correction in calibration dates and measuring equipment used, recalculation of CERs
VVS – Version 5	07/11/2012	Version provided by the PP in order to account the CERs voluntary discounted from the erroneous electricity consumption registered between MP1 and MP4 (section 3.2.1), not part of the Findings Overview. Correction to serial number of pressure meter and clarification of accuracy for LPG meter, and also some minor editorial changes as per an improvement opportunity.

## 9. Findings Overview

### Findings Overview Summary

	CARs	CLs	FARs
Total Number raised	7	4	0

Date:	27/09/2011	Raised by:	Assessment team		
Type:	CAR	Number:	01	Reference:	AU4 Section 3
Lead Assessor Comment:			Date: 27/09/2011		
As reported in the MR page 7-8 (Ref.6a), the electricity meter that was used to measure the amount of electricity consumed by the project activity was not working correctly since MP 1. It was verified through a letter provided by VDF Electricidad Ltda. dated 23/07/2011 that the equipment had been installed incorrectly and that the current bobbins had to be changed. This company specializes in industrial electric installations. Therefore, the readings from the meter for this and all previous monitoring periods are unreliable up until 22/07/2011 (date when the meter was normalized). Hence, there are only 9 days that have accurate data from the meter.					
The MR states in page 8 (Ref.6a) that data from the days when the meter was working correctly was used to obtain a daily consumption average and that extrapolation was done to calculate the monthly consumption within the monitoring period. This represents a deviation from the monitoring plan, which states that this parameter should be measured.					
CAR 01 was raised.					
Project Participant Response:			Date: 18/06/2012		
Response is in documents attached					
Documentation Provided as Evidence by Project Participant:					
El Molle new Monitoring Report v1 2012 06 11 GDP stc.docx					
ERs calculation 5th 2012 05 31.xlsx					
Information Verified by Lead Assessor:					
PP sent the updated MR to resume the verification					
6c. El Molle new Monitoring Report v1 2012 06 11 GDP ctc.docx (MR version 1 VVS, dated 25/05/2012)					
7c. ERs calculation 5th 2012 05 31.xlsx					
Reasoning for not Acceptance or Acceptance and Close Out:			Date: 12/07/2012		
The PP provided the updated MR and CERs spreadsheet. In this document the PP proposed to undertake the following to consider the electricity consumption for this monitoring period:					
<div>1. Estimate the electricity consumption in the most conservative way, as the maximum theoretical consumption of the plant with an addition of 10%, as per CDM Project Standard v01.0, Appendix 1, paragraph 3, until the electricity meter was repaired.</div> <div>2. From 23.07.2012 and on, account the electricity consumption measured by the electricity meter, as per the RMP's indication.</div>					
In order to confirm and corroborate the approach and data used by the PP in this monitoring period the following has been raised:					
<div>a) A table showing the maximum theoretical electricity consumption has been provided in section B.1 of the Monitoring report. Please provide backup documentation regarding the electricity consumption of each equipment, and indicate the name of the equipment to which is attributable the indicated electricity consumption.</div> <div>b) The calculation of electricity consumption after the deviation was performed as the difference between the reading of the electricity meter on 23/07/2011 and 01/08/2011. The reading on 01/08/2011 is not available. Please provide the missing information.</div>					
CAR 01 remains open.					
Project Participant Response:			Date: 24/07/2012		

- a) PP is presenting the photos of the equipment plates. In these plates is presented information about nominal energy consumption. Refer to the document named as "CAR 1 – Respaldo consumo electrico.docx"
- b) PP is presenting the information of the measured data of August 2011, refer to the document "CAR 1 – Toma de estado AGOSTO 2011.xls".

**Documentation Provided as Evidence by Project Participant:**

- CAR 1 – Respaldo consumo electrico.docx
- CAR 1 – Toma de estado AGOSTO 2011.xls

**Information Verified by Lead Assessor:**

Ref. 7d. ERs calculation 5th 2012 07 18

Ref. 66a. CAR 1 - Respaldo consumo eléctrico

Ref. 66b. CAR 1 - Toma de estado AGOSTO 2011

**Reasoning for not Acceptance or Acceptance and Close Out: Date: 27/07/2012**

CAR 1a)

The PP provided in *Ref. 66a. CAR 1 - Respaldo consumo eléctrico* a set of photos showing the ID plate of the equipment installed in the plant. The equipments used were not identified in the monitoring report, but they are identifiable in *ref. 66a*, and the following information was verified in such document

Voltage	Device	Brand	Serial Number	Power input [kWh]
380V	Motor 1 Lobular Blower	WEQ	16MAI06 BW37784	30
	Motor 2 Lobular Blower	ABB motors	50007038005001	30
	Motor 3 (in standby)	WEQ	16MAI06 BW37783	30
	Motor 1 antorcha 1	WEQ	15MAI06 BW35606	11
	Motor 2 antorcha 2	WEQ	BM10094	15
	Motor 3 (in standby)	WEQ	15MAI06 BW35607	11
	Compressor 1	Ingersoll Rand	19451 GDBA AG H	11
	Compressor 2	Ingersoll Rand	19446 GDBA AG H	11
	Centrifugal pump	Leroy Somer	253883	2.2
	Centrifugal pump	n/a	130646255	3
220V	Air conditioning (4 x 2200W)	n/a	n/a	8.8
	Light bulb (3 x 500W)	n/a	n/a	1.5
	Light bulb (3 x 400W)	n/a	n/a	1.2
<b>Total (not considering stand-by devices)</b>				<b>124.7 kWh</b>

The total power consumption verified is not consistent with the information stated in the Monitoring report and in the ER calculation spreadsheet. In both documents it is indicated that the total electricity consumption of the plant is 121.32 kWh, and according to the information provided by the PP the electricity consumption is 124.7 kWh. In addition, no photos or documentation were provided regarding the 220V units and the electricity consumption of the monitoring equipment and computers was not included in the estimation. **CAR 1a remains open**

CAR 1b)

PP provided the spreadsheet *Ref. 66b. CAR 1 - Toma de estado AGOSTO 2011* containing the daily Reading of the electricity and LPG meters. According to said document, it was verified that the electricity meter on August 1<sup>st</sup> 2011 was 806.95 MWh, and the LPG meter was on 38.756 m<sup>3</sup>. Since such information was verified to be consistent with the values used for ER calculations in *ref. 7d*, **CAR 1b was closed**

**CAR 1 remains open.**

**Project Participant Response:**

**Date: 08/08/2012 – 21/08/2012**

*The correct value for installed capacity of the internal equipments including the monitoring and computer equipments is 167.75 kW, corresponding to internal electricity consumption in 2010 of 1,377.3 MWh and in 2011 of 913.92 MWh.*

In addition, documentation and photos were provided to DOE regarding monitoring and computer equipments. Moreover, the CERs calculation was amended and sent to DOE.

<b>Documentation Provided as Evidence by Project Participant:</b>				
<ul style="list-style-type: none"><li>CERs calculation - version 3 2012 08 08 FES.xlsx</li><li>Consumo Electrico Planta de gas 220V 2012 08 08.docx</li></ul>				
<b>Information Verified by Lead Assessor:</b>				
Ref. 7e. CERs calculation - version 3 2012 08 08 FES				
Ref. 66c. Consumo Electrico Planta de gas 220V 2012 08 08				
Ref. 70a. Foto CPU				
Ref. 70b. Foto Monitor Flatron				
<b>Reasoning for not Acceptance or Acceptance and Close Out:</b>			Date: 23/08/2012	
The PP Provided Ref. 66c. "Consumo Electrico Planta de gas 220V 2012 08 08", indicating the electricity consumption of the equipment not specified in ref. 66a. Office items were included in the electricity consumption, i.e. 4 desk computers, 4 CRT monitors and one laser printer. The electricity consumption of the monitoring equipment was included, and it was verified to be consistent with the pictures collected during the site visit (ref. 16 - DSC00466). Additionally the 2 stand-by motors 3 (30kWh and 11 kWh), where included in the electricity consumption, as this is a conservative measure to estimate the electricity consumption, it has been considered correct.				
The following list of the electric devices and its electricity consumption was provided by the PP:				
Voltage	Device	Brand	Serial Number	Power input [kWh]
380V	Motor 1 Lobular Blower	WEQ	16MAI06 BW37784	30
	Motor 2 Lobular Blower	ABB motors	50007038005001	30
	Motor 3 (in standby)	WEQ	16MAI06 BW37783	30
	Motor 1 antorcha 1	WEQ	15MAI06 BW35606	11
	Motor 2 antorcha 2	WEQ	BM10094	15
	Motor 3 (in standby)	WEQ	15MAI06 BW35607	11
	Compressor 1	Ingersoll Rand	19451 GDBA AG H	11
	Compressor 2	Ingersoll Rand	19446 GDBA AG H	11
	Centrifugal pump	Leroy Somer	253883	2.2
	Centrifugal pump	n/a	130646255	3
220V	Air conditioning (4 x 2200W)	n/a	n/a	8.8
	Light bulb (3 x 500W)	n/a	n/a	1.5
	Light bulb (3 x 400W)	n/a	n/a	1.2
	Computer (4 x 160 W)	n/a	n/a	0.64
	Monitor (4 x 330)	n/a	n/a	1.32
	Laser Printer	n/a	n/a	0.55
	Main line flow meter	n/a	n/a	0.001
	Flare 1 and 2 line flow meters	n/a	n/a	0.0018
	Temperature transducers for main line, 2 flares and 2 exhaust gases	n/a	n/a	0.0045
	Pressure meter for main line and 2 flares	n/a	n/a	0.0036

	Gases Analyzer	n/a	n/a	0.55
Total				168,771
<p>The electricity consumption of the monitor was verified on 330 W by the picture provided by the PP. However, the electricity consumption of the computer is not accurate; it is informed to be 160 W, but this value corresponds to the max power output of the +5.08V and +3.33V, and does not consider the +12V rails. The power of the PSU is indicated in the same photo as 365 W. Please correct the Electricity consumption.</p> <p><b>CAR 1a remains open</b></p>				
Project Participant Response:			Date: 30/08/2012	
PP Considered the 365 W value indicated in the equipment plate as the maximum capacity. CERs spreadsheet and MR were updated accordingly.				
Documentation Provided as Evidence by Project Participant:				
6g. El Molle MR v4 2012 08 31 GDP ctc				
7g. CERs calculation - version 4 2012 08 31 GDP				
Information Verified by Lead Assessor:				
6g. El Molle MR v4 2012 08 31 GDP ctc (MR version 4 VVS, dated 31/08/2012)				
7g. CERs calculation - version 4 2012 08 31 GDP				
Reasoning for not Acceptance or Acceptance and Close Out:				
<p>The PP provided “CERs calculation - version 4 2012 08 31 GDP” (ref. 7g), where the estimated electricity was recalculated. It was verified that the electricity consumption of each computer was updated to 365 W, thus increasing the total consumption of the plant from 168.77 kW to 169.59 kW. The ERs calculation was updated accordingly, and <math>PE_{EC,y}</math> increased from 2,996.81 tCO<sub>2e</sub> to 3,011.05 tCO<sub>2e</sub>, and the total ER decreased from 131,435 to 131,420 tCO<sub>2e</sub>.</p> <p>The estimated electricity consumption of the plant was verified to be accurate, and the Monitoring report v4 VVS was modified consequently. <b>CAR 1a is closed.</b></p> <p><b>CAR 1b was previously closed.</b></p> <p><b>CAR 1 is closed.</b></p>				
Acceptance and Close out by Lead Assessor:			Date: 05/09/2012	

Date:	27/09/2011	Raised by:	Assessment team		
Type:	CAR	Number:	02	Reference:	AU4 Section 3
Lead Assessor Comment:			Date: 27/09/2011		
The monitoring report states that the electricity meter was reinstalled correctly on the 22/06/2011. However, it was verified in the letter provided by VDF Electricidad Ltda. dated 23/07/2011 that the equipment was reinstalled correctly on the 22/07/2011. Please correct the MR as well as the approach presented on the extrapolation of data (mentioned in CAR 01).					
CAR 02 was raised.					
Project Participant Response:			Date: 21/10/2011 – 18/06/2012		
Date was corrected in the MR and in the approach of the extrapolation data.					
Documentation Provided as Evidence by Project Participant:					
MR is attached					
Information Verified by Lead Assessor:					
6b. 5th Monitoring Report cc (MR version 2, document received on 25/10/2011, but the date and version in the cover page of the document was not updated and remains to be v1 dated 16/08/2011)					
6c. El Molle new Monitoring Report v1 2012 06 11 GDP stc.docx (MR v1 VVS dated 25/05/2012)					
13. Toma estado					
Reasoning for not Acceptance or Acceptance and Close Out:			Date: 12/07/2012		
It was verified that the revised monitoring report (ref. 6c) now states the correct date of the reinstalled electricity meter as per the letter from VDF Electricidad Ltda on section B.1 page 7; but in the same section, on page 6, the date is incorrect. Please correct the monitoring report.					
Additionally, it was verified that the calculation of electricity consumption stated in the updated MR (ref. 6c) considers 310 days in 2010 and 202 days in 2011. However, the effective number of days from 24/02/2010 to 31/12/2010 is 311 days, and from 01/01/2011 to 22/07/2011 there are 203 days.					
Please correct the number of days used for the calculation of the project emissions.					
CAR 02 remains open.					
Project Participant Response:			Date: 18/07/2012		
<ul style="list-style-type: none"><li>The data in page 6 was corrected to 22/07/2011;</li><li>Regarding the number of days used for project emissions for energy consumption, the values were updated to 311 and 203 (2010 and 2011, respectively). These modifications caused small changes in CERs calculations, for this reason all the matched values were updated in spreadsheet and MR.</li></ul>					
Documentation Provided as Evidence by Project Participant:					
<ul style="list-style-type: none"><li>ERs calculation 5th 2012 07 18.xlsx</li></ul>					
Information Verified by Lead Assessor:					
Ref. 6d El Molle new Monitoring Report v1 2012 07 19 GDP stc (MR version 2 VVS, document received on 23/07/2012, but the date in the cover page of the document was not updated and remains to be 25/05/2012)					
Ref. 7d. ERs calculation 5th 2012 07 18					
Reasoning for not Acceptance or Acceptance and Close Out:					
The PP provided the updated Monitoring Report v2 (ref. 6d), and it was verified that the requested corrections to the MR were included in said report. The number of days and hours for which the deviation was applied were correctly updated on pages 8 and 9 of the Monitoring report v2.					
It was also verified that the electricity consumption in the ER calculation spreadsheet was modified in accordance with the number of days and hours for which the correction applied.					
CAR 2 is closed.					
Acceptance and Close out by Lead Assessor:			Date: 27/07/2012		

Date:	27/09/2011	Raised by:	Assessment team		
Type:	CAR	Number:	03	Reference:	Monitoring Report
<b>Lead Assessor Comment:</b>		<b>Date:</b> 27/09/2011			
According to the MR, page 21 (Ref.6a), the estimation of emission reductions in the PDD for the monitoring period are 223,305 tCO <sub>2</sub> e. However, considering the dates of this monitoring period, the verified value is 200,748 tCO <sub>2</sub> e. This has been verified as follows:					
MP5: 24/2/2010 - 31/7/2011					
15 months and 7 days					
PDD estimation					
Year 2010 137,110 tCO <sub>2</sub>					
Year 2011 145,004 tCO <sub>2</sub>					
2010, per month 11,425.833 tCO <sub>2</sub>					
2010, per day 380.861 tCO <sub>2</sub>					
2010 ER estimated 116,162.639 tCO <sub>2</sub>					
2011, per month 12,083.667 tCO <sub>2</sub>					
2011 ER estimated 84,585.667 tCO <sub>2</sub>					
Estimated Ers in PDD (116,162 + 84,585) 200,748 tCO <sub>2</sub>					
Please make the necessary corrections. Furthermore, in section E.6, provide a clear explanation on why the estimated emission reductions were not achieved.					
<b>CAR 03 was raised.</b>					
<b>Project Participant Response:</b>		<b>Date:</b> 18/06/2012			
<i>Emissions reductions were corrected in the MR and it was included and explanation regarding the performance of the project in section E.6.</i>					
<b>Documentation Provided as Evidence by Project Participant:</b>					
<i>MR is attached</i>					
<b>Information Verified by Lead Assessor:</b>					
6b. 5th Monitoring Report cc (MR version 2, document received on 25/10/2011, but the date and version in the cover page of the document was not updated and remains to be v1 dated 16/08/2011)					
6c. El Molle new Monitoring Report v1 2012 06 11 GDP stc.docx (MR version 1 VVS, dated 25/05/2012)					
<b>Reasoning for not Acceptance or Acceptance and Close Out:</b>		<b>Date:</b> 12/07/2012			
The PP provided the updated MR (ref. 6c) and on page 1 and on section E.5 different CERs estimations from the PDD were considered. Please clarify which is correct and how it was calculated.					
<b>CAR 03 was remains open.</b>					
<b>Project Participant Response:</b>		<b>Date:</b> 20/07/2012			
<i>The correct value for PDD estimation of emission reductions for the monitoring period are 201,047 tCO<sub>2</sub> as stated in section E.6. The calculation procedure was included in the sheet "ER ex-ante in PDD" of the Excel worksheet named as "ERs calculation 5th 2012 05 31.xls". The incorrect values in page 1 and section E.5 of the MR were corrected. The PDD estimative was calculated in a daily basis for the entire period and not in monthly basis in the example in above, in order to be more precise.</i>					
<b>Documentation Provided as Evidence by Project Participant:</b>					
<ul style="list-style-type: none"> <li><i>ERs calculation 5th 2012 07 18.xlsx</i></li> </ul>					
<b>Information Verified by Lead Assessor:</b>					
Ref. 6d. El Molle new Monitoring Report v2 2012 07 23 GDP ctc (MR version 2 VVS, document received on 23/07/2012, but the date in the cover page of the document was not updated and remains to be 25/05/2012)					
Ref. 7d. ERs calculation 5th 2012 07 18					
<b>Reasoning for not Acceptance or Acceptance and Close Out:</b>		<b>Date:</b> 27/07/2012			

<p>The PP included an additional sheet in the ER calculation spreadsheet v3, where PDD ER <b>estimations</b> are calculated according to the length of this monitoring period and the ER estimations from the PDD for 2010 and 2011 (137,110 tCO<sub>2</sub>e for 2010, and 145,004 tCO<sub>2</sub>e for 2011). The ER estimation was checked and it was verified to be calculated correctly based on a daily average emissions reduction, resulting in 201,047 tCO<sub>2</sub>e for the period comprised between 24/02/2010 and 31/07/2011.</p> <p>However, the table in Section E.5 displays incorrectly the amount of Emissions reductions actually achieved in this monitoring period (132,271 tCO<sub>2</sub>e vs 132,274 tCO<sub>2</sub>e verified). Please correct the table in Section E.5 of the monitoring report.</p> <p><b>CAR 3 remains open.</b></p>	
<b>Project Participant Response:</b>	<b>Date:</b> 08/08/2012
<i>There was a typo mistake. The correct value for emission reduction for this monitoring period is 131,453 tCO<sub>2</sub>.</i>	
<b>Documentation Provided as Evidence by Project Participant:</b>	
<i>CERs calculation - version 3 2012 08 08 FES.xlsx</i>	
<b>Information Verified by Lead Assessor:</b>	
Ref. 7e. CERs calculation - version 3 2012 08 08 FES	
<b>Reasoning for not Acceptance or Acceptance and Close Out:</b>	
<p>Due to the corrections in the electricity consumption in CAR 1, the total Emissions Reduction in the fifth monitoring period decreased from 132,274 to 131,453 tCO<sub>2</sub>. This value was verified to be calculated properly in the ER spreadsheet, and it is correctly stated in the first page of the monitoring report and in sections A.1, E.4 and E.5. The ERs estimated in the PDD were calculated accurately in the Monitoring Report v2 VVS in 201,047 tCO<sub>2</sub>e, and remained the same in the latest version of the MR provided by the PP (v3 VVS, ref. 6e). Provided that ER estimations and ER calculations were verified to be correctly calculated and stated in Monitoring Report,</p> <p><b>CAR 3 is closed.</b></p>	
<b>Acceptance and Close out by Lead Assessor:</b>	<b>Date:</b> 13/08/2012

Date:	27/09/2011	Raised by:	Assessment team		
Type:	CAR	Number:	04	Reference:	AU4 Section 3 (Flare Efficiency)
<b>Lead Assessor Comment:</b>			<b>Date:</b> 27/09/2011		
<p>During the verification of the flare efficiency calculation sheets (Ref. 11), it was verified that the values in the sheet titled "Step 1" (specifically cells N24, Q22, and W24) were different than those included in the onsite records of the data collected during sampling. Please clarify and correct.</p> <p><b>CAR 04 was raised.</b></p>					
<b>Project Participant Response:</b>			<b>Date:</b> 25/10/2011		
Flare efficiency spreadsheet was corrected					
<b>Documentation Provided as Evidence by Project Participant:</b>					
Flare efficiency spreadsheet is attached					
<b>Information Verified by Lead Assessor:</b>					
11b. Flare efficiency 5th Verification v2					
14. Flare efficiency conditions					
<b>Reasoning for not Acceptance or Acceptance and Close Out:</b>			<b>Date:</b> 12/07/2012		
<p>It was confirmed that the new flare efficiency spreadsheet was corrected (ref.11b) and the corrections were performed according to the onsite registrations for the parameters used to calculate the flare efficiencies (ref.14) for cells N24 and Q22. However;</p> <ul style="list-style-type: none"> <li>a) On Step 1, cell W24 (volumetric fraction of CH<sub>4</sub> in the residual gas) of the flare spreadsheet has a value of 52% (ref.11b), but the onsite record for this parameter is 41% (ref.14). Please correct.</li> <li>b) In the Flare efficiency calculation spreadsheet, on step 1 and 2, the N<sub>2</sub> content in the raw gas is calculated as per the simplified approach in EB28 Annex13. Despite this, it was found that from October 2010 and on, the N<sub>2</sub> is indicated as 50%, instead of being calculated as the difference between 100% and the methane content. Please correct the calculation in order to be consistent with the approach used to calculate the flare efficiency.</li> <li>c) Oxygen concentration is estimated as 0.12% in step 1 and 2 of the flare efficiency calculations and as Nitrogen is considered the difference between the total (100%) and the methane fraction, the sum of the volumetric fraction in the residual gas is 100.12%. Please clarify or correct.</li> <li>d) Methane density is indicated in the MR as 0.7168 kg/m<sup>3</sup>, but in the flare efficiency calculations, a density of 0.716 kg/m<sup>3</sup> is used.</li> </ul>					
<b>CAR 04 remains open.</b>					
<b>Project Participant Response:</b>			<b>Date:</b> 20/07/2012		
<ul style="list-style-type: none"> <li>a) The information regarding the volumetric fraction of CH<sub>4</sub> in the residual gas that is presented in cell W24 was updated to 41%. Please refer to the new flare efficiency spreadsheet named as "CAR 4 - Flare efficiency 5<sup>th</sup> Verification v3.xlsx".</li> <li>b) For the items b and c, PP fixed the volumetric fraction of O<sub>2</sub> in the residual gas to 0.12% and calculate the volumetric fraction of N<sub>2</sub> in the residual gas by means of the following equation: <math>N_2 = 100 - (CH_4 + O_2)</math>. The mentioned calculations were updated in the new version of the spreadsheet name as "CAR 4 - Flare efficiency 5<sup>th</sup> Verification v3.xlsx".</li> <li>c) Same as above.</li> <li>d) The methane density were updated to 0.7168 in the new version of the spreadsheet named as "CAR 4 - Flare efficiency 5th Verification v3.xlsx".</li> </ul>					
<b>Documentation Provided as Evidence by Project Participant:</b>					
CAR 4 -Flare efficiency 5th Verification v3.xlsx					
<b>Information Verified by Lead Assessor:</b>					
Ref. 11c. Flare efficiency 5th Verification v3					
<b>Reasoning for not Acceptance or Acceptance and Close Out:</b>					

<p>a) The methane content in W24 was changed to 41%, in accordance to the information in the flare efficiency reports (ref. 14). This resulted in a decrease of the efficiency calculated for Flare #1 on 11/11/2010, from 99.282% to 99.255%. Such change has no impact on the Emissions reductions, as the lower flare efficiency registered in the monitoring period is used for ER calculations, and this was registered on 25/02/2010 (99.037%). <b>CAR 4a is closed.</b></p> <p>b) It was verified that all references to a nitrogen volumetric fraction of 50% in flare #2 were corrected in steps 1 and 2 of the Flare efficiency calculation, and Nitrogen content in the residual gas is now calculated as <math>N_2 = 100 - (CH_4 + O_2)</math> for the complete monitoring period. This approach is in accordance with EB28 Annex13. <b>CAR 4b is closed.</b></p> <p>c) Despite the calculations of Nitrogen content were corrected, and are now the same in steps 1 and 2 of the flare efficiency calculation, no further explanation was provided to clarify why a volumetric fraction of 0.12% of <math>O_2</math> in the residual gas has been considered. <b>CAR 4c remains open.</b></p> <p>d) The methane density was verified to be corrected to 0.7168 kg/m<sup>3</sup> in ref. 11c, which is in line with the applicable methodology. <b>CAR 4d is closed.</b></p> <p><b>CAR 4 remains open</b></p>	
<b>Project Participant Response:</b>	<b>Date:</b> 08/08/2012
<p><i>There was a mistake considered 0.12% as a O2 content and according to "Tool to determine project emissions from flaring gases containing methane" - version 1, page 5:</i></p> <p><i>"As a simplified approach, project participants may only measure the volumetric fraction of methane and consider the difference to 100% as being nitrogen (N2)."</i></p> <p><i>Thus, in the flare efficiency spreadsheet (version 3), sheet "Step 1" and "Step 2" (lines 25 and 26, respectively) were considered:</i></p> <ul style="list-style-type: none"> <li><i>O2 content = 0;</i></li> <li><i>100% - CH% = N2%</i></li> </ul>	
<b>Documentation Provided as Evidence by Project Participant:</b>	
CAR 4 -Flair efficiency 5th Verification v3 2012 08 06 FES.xlsx	
<b>Information Verified by Lead Assessor:</b>	
Ref. 11d. CAR 4 -Flair efficiency 5th Verification v3 2012 08 08 FES	
<b>Reasoning for not Acceptance or Acceptance and Close Out:</b>	
<p>A modified version of the calculation of the flare efficiency was provided by the PP (ref. 11d). It was verified that the Oxygen content was corrected to 0% for the complete monitoring period in steps 1 and 2, so the nitrogen content is now calculated as <math>N_2 = 100\% - CH_4\%</math>. This is consistent with the simplified approach in Step 1 of the "Tool to determine project emissions from flaring gases containing methane"</p> <p>The Nitrogen content in the landfill gas, and the complete calculation of the Flare efficiency was verified to be accurate, so <b>CAR 4c is closed</b></p> <p><b>CAR 4 is closed</b></p>	
<b>Acceptance and Close out by Lead Assessor:</b>	<b>Date:</b> 13/08/2012

Date:	27/09/2011		Raised by:	Assessment team													
Type:	CAR	Number:	05	Reference:	AU4 section 3 (thermocouple operation range)												
<b>Lead Assessor Comment:</b>				<b>Date:</b> 27/09/2011													
<p>The PLC was set by the manufacturer (JEAN FRANCOIS BRADFER AS&amp;D CONSULTORES EIRL) to register LFG temperatures between -10 and 60°C. Since the last monitoring period, some LFG temperatures were above 60°C and the PLC could not register correctly the information and just reported 60°C (because of the set conditions). To avoid this problem, the PP requested the manufacturer to modify the registration range of the PLC and the manufacturer carried out the service on June 17<sup>th</sup> 2010. Since June 17<sup>th</sup> 2010 the PLC was able to register temperatures between -10°C and 100°C.</p> <p>The letter issued by AS&amp;D Consultores (dated 13.01.2011) indicates that the change was done because of PP request; but it needs to be clarified by the manufacturer if the flare station can operate normally in the range of -10°C to 100°C for the parameter LFG temperature. <b>CAR 05a was raised.</b></p> <p>Furthermore, from 24/02/2010 until 28/07/2010, the temperature meter that was in use was C2J401275-912. This meter was calibrated to be used in measurement ranges from 0 to 60°C. It was verified that the minutes with records of 60°C were unreliable because that is the value the meter recorded whenever the temperature was 60°C or over. Therefore, in order to avoid values when temperature was outside equipment measurement range, it was requested that all minutes with a recorded temperature of 60°C were removed. From 29/07/2010 to 30/07/2010 meter with S/N C2F305205 was used temporarily so that the previous meter (C2J401275-912) could be sent to be calibrated. As indicated in the calibration certificate of the temporary meter, the measurement range of that meter is from -0 to 100°C. When the meter that was sent to be calibrated returned, it was set to also have the measurement range of 0-100°C.</p> <p>Therefore, data relating to temperature is considered valid under the following conditions:</p> <table border="1"> <thead> <tr> <th>Temperature meter</th><th>Measurement range</th><th>Dates used</th></tr> </thead> <tbody> <tr> <td>C2J401275-912</td><td>0 to 60°C</td><td>24/02/2010 – 28/07/2010</td></tr> <tr> <td>C2F305205</td><td>0 to 100°C</td><td>29/07/2010 – 30/07/2010</td></tr> <tr> <td>C2J401275-912</td><td>0 to 100°C</td><td>30/07/2010 - 31/07/2011</td></tr> </tbody> </table> <p>Please correct the ER calculation sheet by excluding the required minutes in June and July 2010. Also, please provide an official letter from the corresponding party indicating that the recalibration of the temperature meter C2J401275-912 that indicates measurement ranges from 0 to 100°C is feasible and allows the plant to be operated without problems. <b>CAR 05b was raised.</b></p> <p><b>CAR 05 was raised.</b></p>						Temperature meter	Measurement range	Dates used	C2J401275-912	0 to 60°C	24/02/2010 – 28/07/2010	C2F305205	0 to 100°C	29/07/2010 – 30/07/2010	C2J401275-912	0 to 100°C	30/07/2010 - 31/07/2011
Temperature meter	Measurement range	Dates used															
C2J401275-912	0 to 60°C	24/02/2010 – 28/07/2010															
C2F305205	0 to 100°C	29/07/2010 – 30/07/2010															
C2J401275-912	0 to 100°C	30/07/2010 - 31/07/2011															
<b>Project Participant Response:</b>				<b>Date:</b> 25/10/2011													
<p><b>CAR 05a:</b> letter issued by AS&amp;D Consultores establishes that the range of measurement up to 100° C does not affect the burning conditions inside the flare station</p> <p><b>CAR 05b:</b> minutes in June and July until the 29th were excluded from emission reduction calculation.</p>																	
<b>Documentation Provided as Evidence by Project Participant:</b>																	
<p><b>CAR 05a:</b> letter issued by AS&amp;D Consultores is attached</p> <p><b>CAR 05b:</b> emission reduction calculation spreadsheet is attached as well as “datos quema” spreadsheets from June and July 2010. Calibration laboratory cannot emit a certificate indicating any judgment regarding the operation condition of the plant, since their only concern is the instrument. However the instrument catalog is attached to establish that it can operate under that range of temperature with the same accuracy.</p>																	
<b>Information Verified by Lead Assessor:</b>																	
29. 1015-CAR01-GIRSA - Rescaling of Temp Transmitters																	
7b. ERs calculation 5th Verification 04																	
<b>Reasoning for not Acceptance or Acceptance and Close Out:</b>				<b>Date:</b> 12/07/2012													

<p>a) Letter from AS&amp;D Consultores, dated 24.10.2011 was verified and it states that the rescaling of the temperature instrument and the upper temperature condition of biogas does not affect the burning conditions inside the flare (ref. 29). <b>CAR 05a was closed out.</b></p> <p>b) The ERs have been recalculated (ref. 7b) and according to the letter from AS&amp;D Consultores, dated 24.10.2011 (ref.29), there are no negative effects in the burning conditions of the flare due to the temperature meter measurement ranges from -10 to 100°C; but checking the updated “Datos quema” it was verified that for example on 30.06.2010, from 12:03 to 13:09 and 13:16 to 16:21 hours, values equal or higher than 60°C for the LFG were registered and used for the calculations. Please correct. <b>CAR 05b remains open.</b></p>	
<b>CAR 05 remains open.</b>	
<b>Project Participant Response:</b>	<b>Date: 20/07/2012</b>
<p>a) Closed out.</p> <p>b) The appointed information was checked and PP considers that the information is indeed correct. PP asks for a new assessment of the attached spreadsheet, because maybe DOE has an old version of it. The mentioned information is not included in the new version of the spreadsheet named as “JUNE 2010.xlsx”.</p>	
<b>Documentation Provided as Evidence by Project Participant:</b>	
<ul style="list-style-type: none"> <li>JUNE 2010.xlsx</li> </ul>	
<b>Information Verified by Lead Assessor:</b>	
Ref. 12c Datos quema v3\June 2010.xlsx	
Ref. 12c Datos quema v3\July 2010.xlsx	
<b>Reasoning for not Acceptance or Acceptance and Close Out:</b>	<b>Date: 26/07/2012</b>
<p>The PP provided a corrected version of the plant’s operational parameters registered on June and July 2010 (Ref. 12c), that were in effect different to the latest version available by the verification team (ref. 12b). All the measurements in which the temperature registered was 60°C or higher were deleted for June (entire month) and July 2010 (1-28), and the data in said spreadsheets was verified to be the same as in sheets “Jun 10” and “Jul 10” of the ER calculation spreadsheet (ref. 7d). The only difference relies in the ER spreadsheet, as the data for the methane content in the landfill gas registered on 29/07/2010 is not correctly linked (please see CAR 8 below).</p> <p><b>CAR 5 Pending</b> (pending response CAR 7, change of the temperature meter of the main line)</p>	
<b>Reasoning for not Acceptance or Acceptance and Close Out:</b>	<b>Date: 25/09/2012</b>
<p>After CL 7 was closed satisfactorily, it was verified that the temperature meter C2J401275-912 was effectively replaced on 28/07/2012; hence, no correction was required after that date, so all the measurements that were out of the measuring range were deleted.</p> <p><b>CAR 5 is closed.</b></p>	
<b>Acceptance and Close out by Lead Assessor:</b>	<b>Date: 25/09/2012</b>

Date:	27/09/2011	Raised by:	Assessment team		
Type:	CL	Number:	06	Reference:	AU4 Section 4 (Diesel Genset)
<b>Lead Assessor Comment:</b>			<b>Date:</b> 27/09/2011		
<p>Clarify why the project emission from the newly installed diesel generator are not reported separately in the monitoring report and ER calculation sheet. Please also demonstrate the appropriateness of the selected emission factor (1.3 tCO<sub>2</sub>/MWh), which is specifically a grid emission factor default value from EB 39.</p> <p><b>CL 06 was raised.</b></p>					
<b>Project Participant Response:</b>			<b>Date:</b> 25/10/2011		
<p><i>The electric generator was installed to back up the plan operation during unprogrammed power outages and the extra charged hours the Chilean grid has established during the higher consumption season of the year (from April to September).</i></p> <p><i>Its energy dispatch is registered by the same electric meter that measures the energy dispatched by the public grid, because as demonstrated in the attached spreadsheet, the emission factor used by the project (1.3 t CO<sub>2</sub>/MWh) is conservative enough for both types of sources.</i></p> <p><i>Noteworthy that the official emission factor of Chilean grid fluctuates between 0.8 to 1.0 tCO<sub>2</sub> /MWh. El Molle Landfill Gas (LFG) project emission factor is, at least, 30% higher than that. The electric generator emission factor is very close to the used value (1.29 v/s 1.3 tCO<sub>2</sub>/MWh), but these type of energy is only used 12.5 % of the total time (25% of the day during 50% of the year).</i></p> <p><i>Therefore not only the power unit emission factor is underneath the used value but most of the time is still very conservative.</i></p>					
<b>Documentation Provided as Evidence by Project Participant:</b>					
<i>A spreadsheet calculating the emission factor for de power unit is attached</i>					
<b>Information Verified by Lead Assessor:</b>					
30. Diesel emission factor 2. RMP.pdf 2b. RMP 2 approved.pdf					
<b>Reasoning for not Acceptance or Acceptance and Close Out:</b>					
<p>Due to the installation of the diesel generator a Revision of the Monitoring Plan was carried and approved by the EB on 02.07.2012.</p> <p>In this RMP it was validated that to consider a conservative approach to account the project emissions of the electricity consumed by the PA during the period a single electricity meter was installed, the PP decided to estimate this value using option B2 of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" v1. As this value (1.3 tCO<sub>2</sub>/MWh) is applicable for "electricity consumption from an off-grid fossil fuel fired captive power plant", which is the case of this project activity because the diesel generator is a captive power plant not connected to the grid that supplies electricity to the LFG plant, it was considered correct.</p> <p><b>CL 06 was closed.</b></p>					
<b>Acceptance and Close out by Lead Assessor:</b>			<b>Date:</b> 11/07/2012		

Date:	12/07/2012	Raised by:	Paulina Kellenberger / Pablo Osorio		
Type:	CL	Number:	07	Reference:	Monitoring Report
<b>Lead Assessor Comment:</b>				<b>Date:</b> 12/07/2012	
<p>a) In the previous verification period three flow meters were included in the monitoring report (main line and back up equipments), but only one flow meter is indicated in the MR of this monitoring period. Besides, the model of the flow meter in the MR (DY 150-<b>EBMBA1</b>-2DFS1) does not match the information verified in the site visit (DY 150-<b>EBLBA1</b>-2D /FS1).</p> <p>b) Calibration certificates for the flow meter Yokogawa DY100 EBMBA1-2D /FS1 s/n 7213B035 (ref. 16 - DSC00486) were provided, but are valid for the period from 25/05/2007 until 24/5/2009, and from 19/04/2011 until 18/04/2013. Furthermore the calibration certificate of the flow meter previously installed in the main line DY105 s/n 6183B004 as a calibration certificate valid until 08/09/2010 (ref. 17a) and a new certificate from 16/09/2010 (ref. 38). To confirm all the equipment used in the plant were working for the entire monitoring period with a valid calibration certificate, please provide the exact date, type and serial number of the equipment that were replaced/installed in the LFG plant.</p>					
<b>CL 07 was raised.</b>					
<b>Project Participant Response:</b>				<b>Date:</b> 23/07/2012	
<p>a) The other flow meter was included in the relevant box and all the information was corrected to be in accordance with the certificates.</p> <p>b) The information is provided in the MR, spreadsheet named as "CAR 7 - EQUIPOS INSTALADOS.xlsx" and the supporting calibration certificates.</p>					
<b>Documentation Provided as Evidence by Project Participant:</b>					
<ul style="list-style-type: none"> <li>"CAR 7 - EQUIPOS INSTALADOS.xlsx"</li> <li>"F1, F3, F4, F6, F7, F8, P3, P4, T2, T3.jpeg"</li> </ul>					
<b>Information Verified by Lead Assessor:</b>					
<p>Ref. 67. CAR 7 - EQUIPOS INSTALADOS</p> <p>Ref. 68 Photos\F1.jpeg</p> <p>Ref. 68 Photos\F3.jpeg</p> <p>Ref. 68 Photos\F4.jpeg</p> <p>Ref. 68 Photos\F6.jpeg</p> <p>Ref. 68 Photos\F7.jpeg</p> <p>Ref. 68 Photos\F8.jpeg</p> <p>Ref. 68 Photos\P3.jpeg</p> <p>Ref. 68 Photos\F4.jpeg</p> <p>Ref. 68 Photos\T2.jpeg</p> <p>Ref. 68 Photos\T3.jpeg</p> <p>Ref. 6d. El Molle new Monitoring Report v2 2012 07 23 GDP ctc (MR version 2 VVS, document received on 23/07/2012, but the date in the cover page of the document was not updated and remains to be 25/05/2012)</p> <p>Ref. 9d AR6 MP4</p>					
<b>Reasoning for not Acceptance or Acceptance and Close Out:</b>				<b>Date:</b> 27/07/2012	
<p>A list of the installed monitoring equipment was provided, including model, serial number, validity of their calibration certificates and photographic evidence of the aforementioned information. The photographic evidence in ref. 68 was verified to be in accordance with ref. 67.</p> <p>In the spreadsheet provided by the PP it is stated that the temperature meter C2G217892-707 was installed in the main pipeline from the fourth monitoring period until 03/08/2010, and C2J401275-912-707 was installed from 15/04/2009 on. This information is not consistent, since the working periods of both temperature meters are overlapped. According to the verification report of the fourth monitoring period (ref. 9d) the temperature meter C2G217892-707 was installed in flare #2, and the temperature meter Yokogawa YTA 110 s/n C2J401275-912-707 was installed in the main pipeline (from 15.04.2009 and then on). In addition, information regarding the exhaust gas temperature transmitters, and the pressure and temperature transmitter installed at the entrance of each flare were not provided.</p> <p>Please provide the correct information related to the changes in the temperature meters, and also please provide information regarding the monitoring equipment used to measure the temperature of the exhaust gas.</p>					

<b>CL 7 remains open.</b>	
<b>Project Participant Response:</b>	<b>Date:</b> 08/08/2012 – 21/08/2012
<p><i>There was a typo mistake. The PP sent a spreadsheet named as "CAR 7 - EQUIPOS INSTALADOS.xlsx" providing all the information about the changes in the temperature meters and the monitoring equipment used to measure the temperature of the exhaust gas.</i></p> <p>In addition, the PP sent the calibration certificates to DOE.</p>	
<b>Documentation Provided as Evidence by Project Participant:</b>	
<ul style="list-style-type: none"> <li>CAR 7 - EQUIPOS INSTALADOS.xlsx</li> <li>"Calibration certificates of sensors", paste containing all the calibration certificates mentioned in the spreadsheet above.</li> </ul>	
<b>Information Verified by Lead Assessor:</b>	
<p>Ref. 67b. CAR 7 - EQUIPOS INSTALADOS v2</p> <p>Ref. 68b. calibration certificates of sensors\</p> <p>Ref. 16. Photos Site Visit</p> <p>Ref. 9d. AR6 MP4</p> <p>Ref. 6e. El Molle MR v3 2012 08 09 GDP ctc (MR version 3 VVS, dated 08/08/2012)</p> <p>Ref. 6f. El Molle MR v3 2012 08 21 GDP ctc (MR version 3 VVS, dated 21/08/2012, but in the cover page of the document, the date remains to be 08/08/2012)</p>	
<b>Reasoning for not Acceptance or Acceptance and Close Out:</b>	<b>Date:</b> 22/08/2012
<p>The information provided by the PP was checked, and all the instruments indicated as operative by the end of the fifth monitoring period were checked against the information verified during the site visit (pictures were taken by the verification team during the site visit). The instruments indicated as installed at the beginning of the monitoring period were checked against the equipment indicated in the Verification Report of the fourth monitoring period, and no discrepancies were found.</p> <p>It is worthy of mention that not all the meters have a calibration certificate valid for the complete verification period. Flow meter Yokogawa DY100 EBMA1-2D/FS1 s/n 7213B035 does not have a valid calibration certificate from 25/5/2009 until 18/04/2011, but according to the information provided by the PP, it was not installed in the plant during this period.</p> <p>The flow meter s/n 7213B033 (F6) was calibrated on 19/05/2009 and on 04/05/2011 (F4), but ref. 67b is not consistent with this information. Despite this, it was verified that these calibration dates were correctly stated in the Monitoring Report v3 VVS (ref. 6f).</p> <p>In the Monitoring Report v3 VVS it is indicated that the flow meter Yokogawa sn S5K106065 was factory calibrated and that the calibration was valid until 12/01/2012. It was checked in ref.68b/F8.jpeg that the test certificate for said flow meter was dated 12/01/2010, so the validity of the calibration certificate was verified. The information in CAR 7 - EQUIPOS INSTALADOS v2 (ref. 67b) was found mostly consistent with the calibration certificates provided (ref. 68b), the pictures taken during the site visit (ref. 16), the verification report of the fourth monitoring period (ref. 9d) and the Monitoring Report v3 VVS(ref. 6f), but some exceptions to this were found</p> <ul style="list-style-type: none"> <li>Please provide evidence to verify that the meters were effectively replaced in the dates stated in ref. 67b "CAR 7 – Equipos instalados v2"</li> <li>According to the calibration certificates provided (ref. 68b – T1), the temperature meter s/n C2F305205 was calibrated on 30/04/2009, but on ref. 67b and in the MR v03 VVS the calibration date indicated is 04/09/2009. Please correct.</li> <li>The calibration certificate of the Temperature meter s/n C2J401275-912 (T2) indicates that this equipment was calibrated on 28/07/2010, but in the ref. 67b and in the Monitoring Report the calibration date is 30/07/2010. Please correct.</li> <li>No information was provided with regard to the LFG temperature meter installed in flare 1 from the beginning of the monitoring period until 30/07/2010. Please complete.</li> </ul>	
<b>CL 7 remains open.</b>	
<b>Project Participant Response:</b>	<b>Date:</b> 31/08/2012

- PP is providing the logbooks in order to evidence the effective dates of replacement.
- The data was updated in the MRv04 to 30/04/2009.
- The data was updated in the MRv04 to 28/07/2010.

The information has been provided in the MRv04. The calibration certificate is the "T3" which has two meters in the same calibration certificate.

**Documentation Provided as Evidence by Project Participant:**

6g. El Molle MR v4 2012 08 31 GDP ctc  
67c. CAR 7 - EQUIPOS INSTALADOS 2012 08 31  
68c. Certificados de calibracao sensores\  
71. Logbook – temperatura meter\  
72. Logbook – pressure meter\  
73. Logbook – flow meter\

**Information Verified by Lead Assessor:**

6g. El Molle MR v4 2012 08 31 GDP ctc (MR version 4, dated 31/08/2012)  
67c. CAR 7 - EQUIPOS INSTALADOS 2012 08 31  
68c. Certificados de calibracao sensores\  
71. Logbook – temperatura meter\  
72. Logbook – pressure meter\  
73. Logbook – flow meter\

**Reasoning for not Acceptance or Acceptance and Close Out:**

The PP provided copies of the plant's logbook to document the change in the flow, pressure and temperature meters carried out during the fift monitoring period PP also provided ref. 67c. "CAR 7 - EQUIPOS INSTALADOS 2012 08 31", summarizing the meters used, including model, serial numbers and calibration and replacement dates. It was verified to be consistent with information stated in the logbook with regard to the replacement of the equipment. The information was updated accordingly in the MR according to the information provided. All the changes in the measuring equipment were documented and reported in the MR.

**CL 7 is closed**

**Acceptance and Close out by Lead Assessor:**

**Date:** 25/09/2012

Date:	26/06/2012	Raised by:	Paulina Kellenberger / Pablo Osorio		
Type:	CAR	Number:	08	Reference:	ER calculation
<b>Lead Assessor Comment:</b>			<b>Date:</b> 26/06/2012		
In the ER calculation spreadsheet the following issues were found:					
<ul style="list-style-type: none"><li>July 29<sup>th</sup>, 2010: The value for Methane content is linked from the same external cell than Temperature. Please correct.</li><li>May 10<sup>th</sup>, 2011: The value for Temperature is linked from the same external cell than the Methane content. Please correct.</li><li>July 5<sup>th</sup>, 2011: The value for Methane content is linked from the same external cell than Temperature. Please correct.</li><li>July 24<sup>th</sup>, 2011 Temperature of Flare 1 is linked from the same external cell than Temperature of Flare 2. Please correct.</li></ul>					
<b>CAR 08 was raised.</b>					
<b>Project Participant Response:</b>			<b>Date:</b> 20/07/2012		
The mentioned spreadsheets were updated correcting the indicated above. The new spreadsheets are presented separately in archives named as: "JULY 2010.xlsx", "MAY 2011.xlsx" and "JULY 2011. xlsx".					
<b>Documentation Provided as Evidence by Project Participant:</b>					
<ul style="list-style-type: none"><li>JULY 2010.xlsx</li><li>MAY 2011.xlsx</li><li>JULY 2011. xlsx</li></ul>					
<b>Information Verified by Lead Assessor:</b>					
Ref. 12c Datos quema v3\July 2010 Ref. 12c Datos quema v3\May 2010 Ref. 12c Datos quema v3\July 2011 Ref. 7d. ERs calculation 5th 2012 07 18					
<b>Reasoning for not Acceptance or Acceptance and Close Out:</b>			<b>Date:</b> 27/07/2012		
The ER calculation sheet (ref. 7d) was checked, and it was verified that no modification was done in the cells corresponding to July 29 <sup>th</sup> , 2010 (Jul 10! F32), May10th 2011 (May 11! D13) and July 5 <sup>th</sup> and 24 <sup>th</sup> of 2011 (Jul 11! F8 and Jul 11! J27) so the same issues have to be corrected.					
Please correct the abovementioned values in the ER spreadsheet.					
<b>CAR 8 remains open.</b>					
<b>Project Participant Response:</b>			<b>Date:</b> 08/08/2012		
<i>The typo mistakes were corrected.</i>					
<b>Documentation Provided as Evidence by Project Participant:</b>					
<i>CERs calculation - version 3 2012 08 08 FES.xlsx</i>					
<b>Information Verified by Lead Assessor:</b>					
Ref. 7e. CERs calculation - version 3 2012 08 08 FES					
<b>Reasoning for not Acceptance or Acceptance and Close Out:</b>					
The ER calculation spreadsheet was checked, and it was verified by the DOE that the requested modifications were made, and no other inconsistencies were found.					
<b>CAR 8 is closed</b>					
<b>Acceptance and Close out by Lead Assessor:</b>			<b>Date:</b> 10/08/2012		

Date:	26/06/2012	Raised by:	Paulina Kellenberger / Pablo Osorio		
Type:	CL	Number:	09	Reference:	Monitoring Report
<b>Lead Assessor Comment:</b>				<b>Date:</b> 26/06/2012	
<p>Please modify the monitoring report according to the guidelines provided in EB 66 Annex 20 and the Project Standard (EB65 annex 5):</p> <ul style="list-style-type: none"> <li>Information regarding the post-registration changes are indicated in the MR under section B.1 of the MR. PP is asked to modify the MR in order to include such information in the relevant sub-section of section B.2</li> <li>Please provide a diagram of the monitoring system, where appropriate, in section C of the MR</li> <li>The tables on section D.2 have to include for "<i>Monitoring equipment</i>" the information on type, accuracy class, serial number, calibration frequency date of last calibration and validity. Please complete for the monitoring parameters the same information.</li> <li>In section D.2 of the monitoring report the information regarding the diesel generator has not been included. Please provide the information.</li> </ul>					
<b>CL 09 was raised.</b>					
<b>Project Participant Response:</b>				<b>Date:</b> 19/07/2012	
<ul style="list-style-type: none"> <li>EB 66 Annex 20 leads to the CDM Project Standard EB65, Annex 5, "Description of implemented registered project activity" and indicates that all the special events occurred during the monitoring period should be addressed in section B.1., considering this the information included in section B.1 is attending the requirements. However, EB 66 Annex 20 also indicates that PP should include in the relevant sub-section information on any request for prior approval by the EB, so the PP included this information in order to attend the requirement. The relevant sub-sections modified were B.2.1 and B.2.3.</li> <li>A relevant diagram of the monitoring system was included in section C</li> <li>The missing information was added.</li> <li>EC is for the present monitoring period, the sum of <math>EC_{grid}</math> plus <math>EC_{diesel}</math> due to the fact that the project only used one electricity meter during the current monitoring period, but will be monitored separately for next periods and detailed monitoring box. For this reason is not possible to separate. Both are using conservative approaches.</li> </ul>					
<b>Documentation Provided as Evidence by Project Participant:</b>					
<ul style="list-style-type: none"> <li><i>El Molle new Monitoring Report v1 2012 07 19 GDP stc.docx</i></li> </ul>					
<b>Information Verified by Lead Assessor:</b>					
<p>Ref. 6d El Molle new Monitoring Report v1 2012 07 19 GDP stc (MR version 2 VVS, document received on 23/07/2012, but the date in the cover page of the document was not updated and remains to be 25/05/2012)</p> <p>Ref. 9d. AR6 MP4</p>					
<b>Reasoning for not Acceptance or Acceptance and Close Out:</b>					
<p>Project participant provided ref. 6d El Molle new Monitoring Report v1 2012 07 19 GDP stc. The following modifications were verified to be carried out.</p> <ul style="list-style-type: none"> <li>The information related to the post registration changes was correctly included in Section B.2 of the monitoring plan</li> <li>A diagram of the monitoring system was included in Section C of the monitoring report.</li> <li>Information related to accuracy, class, serial number was added under the relevant parameters in listed in Section D.</li> <li>Information about the electricity meter installed to measure the electricity consumption from the diesel generator was included under the parameter EC, electricity consumption.</li> </ul>					
<b>CL 9 is closed</b>					
<b>Acceptance and Close out by Lead Assessor:</b>				<b>Date:</b> 26/07/2012	

Date:	05/07/2012	Raised by:	Paulina Kellenberger / Pablo Osorio		
Type:	CAR	Number:	10	Reference:	LPG consumption – AU4 section 3
<b>Lead Assessor Comment:</b>				<b>Date:</b> 05/07/2012	
Emissions due to consumption of LPG are calculated as					
$E_{LPG} \left[ \frac{tCO_2e}{kg_{LPG}} \right] = LPG[m^3] \cdot \frac{K_{LPG} \left[ \frac{kg}{m^3} \right]}{\rho_{LPG} \left[ \frac{kg}{m^3} \right]} EF_{LPG} \left[ \frac{tCO_2e}{kg} \right]$					
This calculation is inconsistent with units, the usage of density and K factor is redundant and the value for LPG density does not apply since this fuel is measured in gas state. Please correct the calculations of emissions due to LPG consumption.					
<b>CAR 10 was raised.</b>					
<b>Project Participant Response:</b>				<b>Date:</b> 19/07/2012	
Project participant ask for a new assessment at this point, because PP considered that the equation has been misunderstood with the units, due to the fact that the LPG density is only used in order to convert kg of LPG to litres, as presented in the spreadsheet and in the MR. The reason to do this, is because the PP considered a better way to control and account the LPG. In order to avoid misunderstood, PP will change the approximation of this calculation keeping the units in kilograms and calculating the project emissions directly without convert into litres.					
$E_{LPG} [tCO_2e] = LPG[m^3] \times K_{LPG} \left[ \frac{kg \text{ LPG}}{m^3} \right] \times EF_{LPG} \left[ \frac{tCO_2e}{kg \text{ LPG}} \right]$					
<b>Documentation Provided as Evidence by Project Participant:</b>					
<ul style="list-style-type: none"><li>El Molle new Monitoring Report v1 2012 07 19 GDP stc.docx</li><li>ERs calculation 5th 2012 07 18.xlsx</li></ul>					
<b>Information Verified by Lead Assessor:</b>					
Ref. 6d El Molle new Monitoring Report v1 2012 07 19 GDP stc (MR version 2 VVS, document received on 23/07/2012, but the date in the cover page of the document was not updated and remains to be 25/05/2012)					
Ref. 7d. ERs calculation 5th 2012 07 18					
<b>Reasoning for not Acceptance or Acceptance and Close Out:</b>					
Emissions reductions were recalculated in <i>ERs calculation 5th 2012 07 18</i> , (ref. 7d) according to the equation stated in the PP response, which is correct. The K factor of 2.1 was used, and the gas density is no longer included in the equation. LPG consumption is now indicated in terms of kg, and the same emission factor as in ref. 7c has been used. Hence, LPG consumption is now calculated as					
$LPG[kg] = LPG[m^3] \times K_{LPG} \left[ \frac{kg \text{ LPG}}{m^3} \right]$					
$LPG[kg] = LPG[m^3] \times 2,1 \left[ \frac{kg \text{ LPG}}{m^3} \right]$					
Project emissions from LPG consumption are now calculated as follows					
$E_{LPG} [tCO_2e] = LPG[kg] \times EF_{LPG} \left[ \frac{tCO_2e}{kg \text{ LPG}} \right]$					
$E_{LPG} [tCO_2e] = LPG[kg] \times 0.0034 \left[ \frac{tCO_2e}{kg \text{ LPG}} \right]$					
Project emissions from LPG consumption were previously calculated in ref. 7c in 0.4509 tCO <sub>2</sub> e After the correction, project emissions from LPG consumption were calculated in 0.2322 tCO <sub>2</sub> e.					
Since the latest ERs calculations spreadsheet provided the correct calculations of LPG consumption during the monitoring period,					
<b>CAR 10 was closed.</b>					
<b>Acceptance and Close out by Lead Assessor:</b>				<b>Date:</b> 25/07/2012	

Date:	05/07/2012		Raised by:	Paulina Kellenberger / Pablo Osorio	
Type:	CL	Number:	11	Reference:	LPG consumption – AU4 section 3
<b>Lead Assessor Comment:</b>				<b>Date:</b> 05/07/2012	
The backup spreadsheets “Toma de Estado” were not provided for November and December 2010. Please provide the requested information in order to have a complete set of data for LPG consumption.					
<b>CL 11 was raised.</b>					
<b>Project Participant Response:</b>				<b>Date:</b> 20/07/2012	
The information is provided by the PP in two archives named as: “CL 11 – Toma de estado NOVIEMBRE 2010.xls” and “CL 11 - Toma de estado DICIEMBRE 2010.xls”.					
<b>Documentation Provided as Evidence by Project Participant:</b>					
<ul style="list-style-type: none"> <li>• CL 11 – Toma de estado NOVIEMBRE 2010.xls</li> <li>• CL 11 - Toma de estado DICIEMBRE 2010.xls”.</li> </ul>					
<b>Information Verified by Lead Assessor:</b>					
Ref. 13b Toma estado v2\CL 11 – Toma de estado NOVIEMBRE 2010					
Ref. 13b Toma estado v2\CL 11 – Toma de estado DICIEMBRE 2010					
Ref. 7d. ERs calculation 5th 2012 07 18					
<b>Reasoning for not Acceptance or Acceptance and Close Out:</b>					
The PP provided the requested spreadsheets, and it was verified that the reading of the LPG meter registered on the first day of November (25.352 m <sup>3</sup> ) and December (25.555 m <sup>3</sup> ) corresponds to the values used in the ER calculation spreadsheet (ref. 7d) to calculate the LPG consumption.					
Due to the missing spreadsheets were provided and its relevant information was verified to be consistent with the data used for ER calculations,					
<b>CL 11 was closed.</b>					
<b>Acceptance and Close out by Lead Assessor:</b>				<b>Date:</b> 25/07/2012	

## 10. Statement of Competence

### Statement of Competence

Name: **Paulina Kellenberger**

#### Status

- Lead Assessor	<b>x</b>	- Expert	<b>x</b>
- Assessor	<b>x</b>	- Financial Expert	
- Local Assessor	<b>Chile</b>	- Technical Reviewer	

#### Scopes of Expertise

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

Approved Member of Staff by:

**Siddharth Yadav**

Date:

**05/07/2012**

## Statement of Competence

Name: Pablo Osorio

### Status

- Lead Assessor		- Expert	
- Assessor		- Financial Expert	
- Local Assessor	Chile	- Technical Reviewer	

### Scopes of Expertise

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

Approved Member of Staff by:

Siddharth Yadav

Date:

07/03/2012

## Statement of Competence

Name: Maria Varnero

### 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

<b>1. Energy Industries (renewable / non-renewable)</b>	<input type="checkbox"/>
Technical Area(s):	
<b>2. Energy Distribution</b>	<input type="checkbox"/>
Technical Area(s):	
<b>3. Energy Demand</b>	<input type="checkbox"/>
Technical Area(s):	
<b>4. Manufacturing</b>	<input type="checkbox"/>
Technical Area(s):	
<b>5. Chemical Industry</b>	<input type="checkbox"/>
Technical Area(s):	
<b>6. Construction</b>	<input type="checkbox"/>
Technical Area(s):	
<b>7. Transport</b>	<input type="checkbox"/>
Technical Area(s):	
<b>8. Mining/Mineral Production</b>	<input type="checkbox"/>
Technical Area(s):	
<b>9. Metal Production</b>	<input type="checkbox"/>
Technical Area(s):	
<b>10. Fugitive Emissions from Fuels (solid, oil and gas)</b>	<input type="checkbox"/>
Technical Area(s):	
<b>11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride</b>	<input type="checkbox"/>
Technical Area(s):	
<b>12. Solvent Use</b>	<input type="checkbox"/>
Technical Area(s):	
<b>13. Waste Handling and Disposal</b>	<input checked="" type="checkbox"/>
Technical Area(s): TA 13.1: Waste handling and disposal	
<b>14. Afforestation and Reforestation</b>	<input type="checkbox"/>
Technical Area(s):	
<b>15. Agriculture</b>	<input checked="" type="checkbox"/>
Technical Area(s): TA 15.1: Agriculture	

Approved Member of Staff by: Siddharth Yadav Date: 06/02/2012

## Statement of Competence

Name: **Joe Sun**

### Status

- Lead Assessor	<input type="checkbox"/>	- Expert	<input 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

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

Approved Member of Staff by: **Siddharth Yadav** Date: **11/09/2012**

## Statement of Competence

Name: Yi Liao

### Status

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

### Scopes of Expertise

<b>1. Energy Industries (renewable / non-renewable)</b>	<b>x</b>
Technical Area(s): TA 1.1 Thermal energy generation from fossil fuels and biomass including thermal electricity from solar	
TA 1.2 Energy generation from renewable energy sources	
<b>2. Energy Distribution</b>	
Technical Area(s):	
<b>3. Energy Demand</b>	
Technical Area(s):	
<b>4. Manufacturing</b>	
Technical Area(s):	
<b>5. Chemical Industry</b>	
Technical Area(s):	
<b>6. Construction</b>	
Technical Area(s):	
<b>7. Transport</b>	
Technical Area(s):	
<b>8. Mining/Mineral Production</b>	
Technical Area(s):	
<b>9. Metal Production</b>	
Technical Area(s):	
<b>10. Fugitive Emissions from Fuels (solid, oil and gas)</b>	
Technical Area(s):	
<b>11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride</b>	
Technical Area(s):	
<b>12. Solvent Use</b>	
Technical Area(s):	
<b>13. Waste Handling and Disposal</b>	<b>x</b>
Technical Area(s): TA 13.1: Waste handling and disposal	
<b>14. Afforestation and Reforestation</b>	
Technical Area(s):	
<b>15. Agriculture</b>	
Technical Area(s):	

Approved Member of Staff by:

Siddharth Yadav

Date:

15/02/2012

## 11. Photographic Evidence

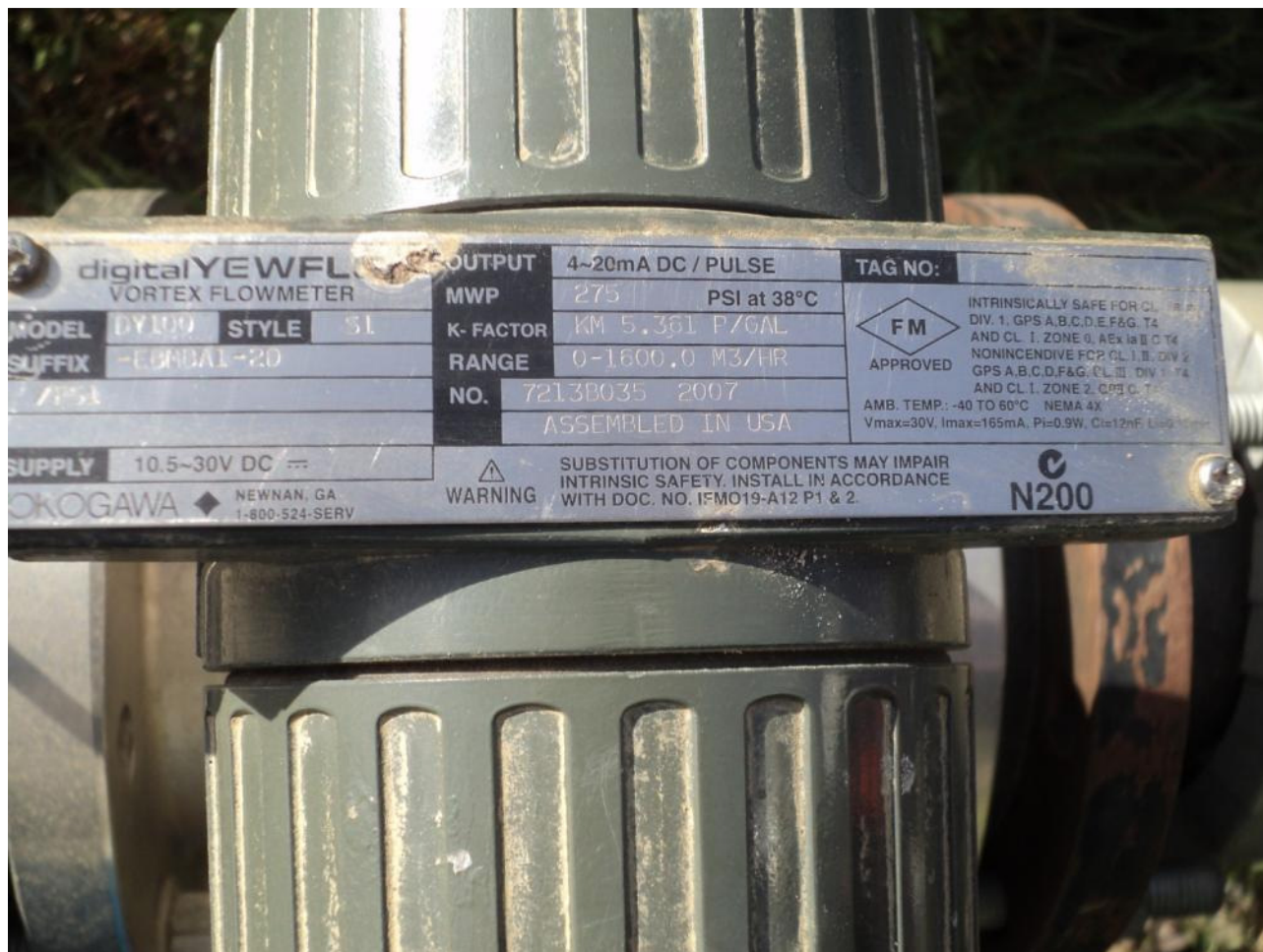


Unique reference number: 16a. 7213B033

Parameter: LFG<sub>flare,y</sub>

Name of equipment: Landfill gas flow meter  
Yokogawa

Date: 26/09/2011



Unique reference number: 16b. 7213B035  
Name of equipment: Flow meter Yokogawa

Parameter:  $LFG_{\text{flare},y}$   
Date: 26/09/2011



Unique reference number: 16c. S5K106065

Parameter: LFG<sub>flare,y</sub>

Name of equipment: Flow meter Yokogawa  
DY150

Date: 26/09/2011



Unique reference number: 16d. 91HB26369      Parameter: LFG<sub>flare,y</sub>, P  
Name of equipment: Pressure transmitter      Date: 26/09/2011  
Yokogawa



Unique reference number: 16e. 91G409098

Parameter:  $LFG_{\text{flare},y}$ , P

Name of equipment: Pressure transmitter Date: 26/09/2011  
Yokogawa

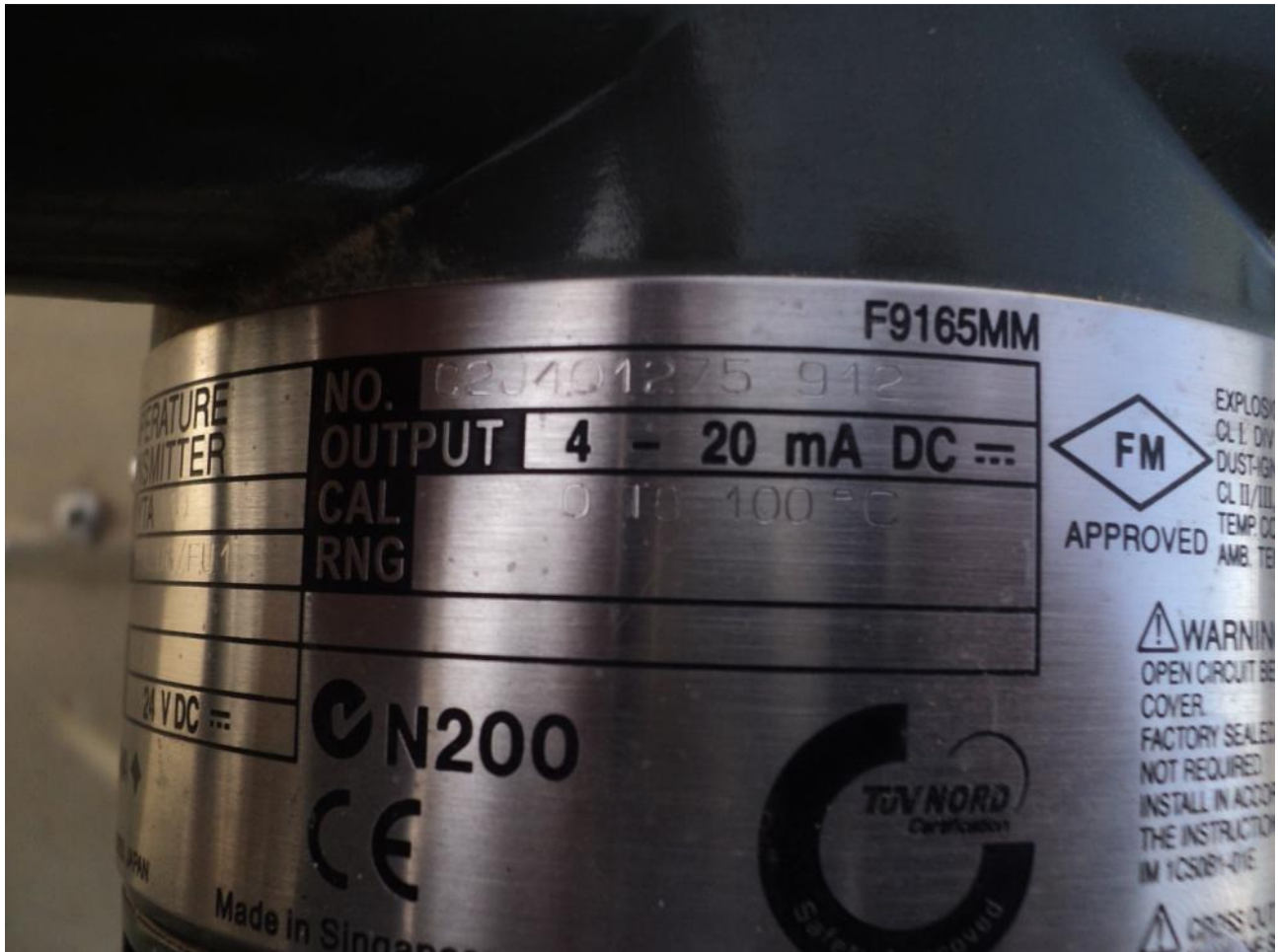


Unique reference number: 16f. 91G830694

Parameter:  $LFG_{\text{flare},y}$ , P

Name of equipment: Pressure transmitter  
Yokogawa

Date: 26/09/2011



Unique reference number: 16g. C2J401275

Parameter: LFG<sub>flare,y</sub>, T

Name of equipment: Temperature Transmitter  
Yokogawa

Date: 26/09/2011



Unique reference number: 16h. C2G217892- Parameter: LFG<sub>flare,y</sub> T 707

Name of equipment: Temperature transmitter Date: 26/09/2011  
Yokogawa



Unique reference number: 16i. C2G217891

Parameter:  $LFG_{\text{flare,y}}$ , T

Name of equipment: Temperature transmitter  
Yokogawa

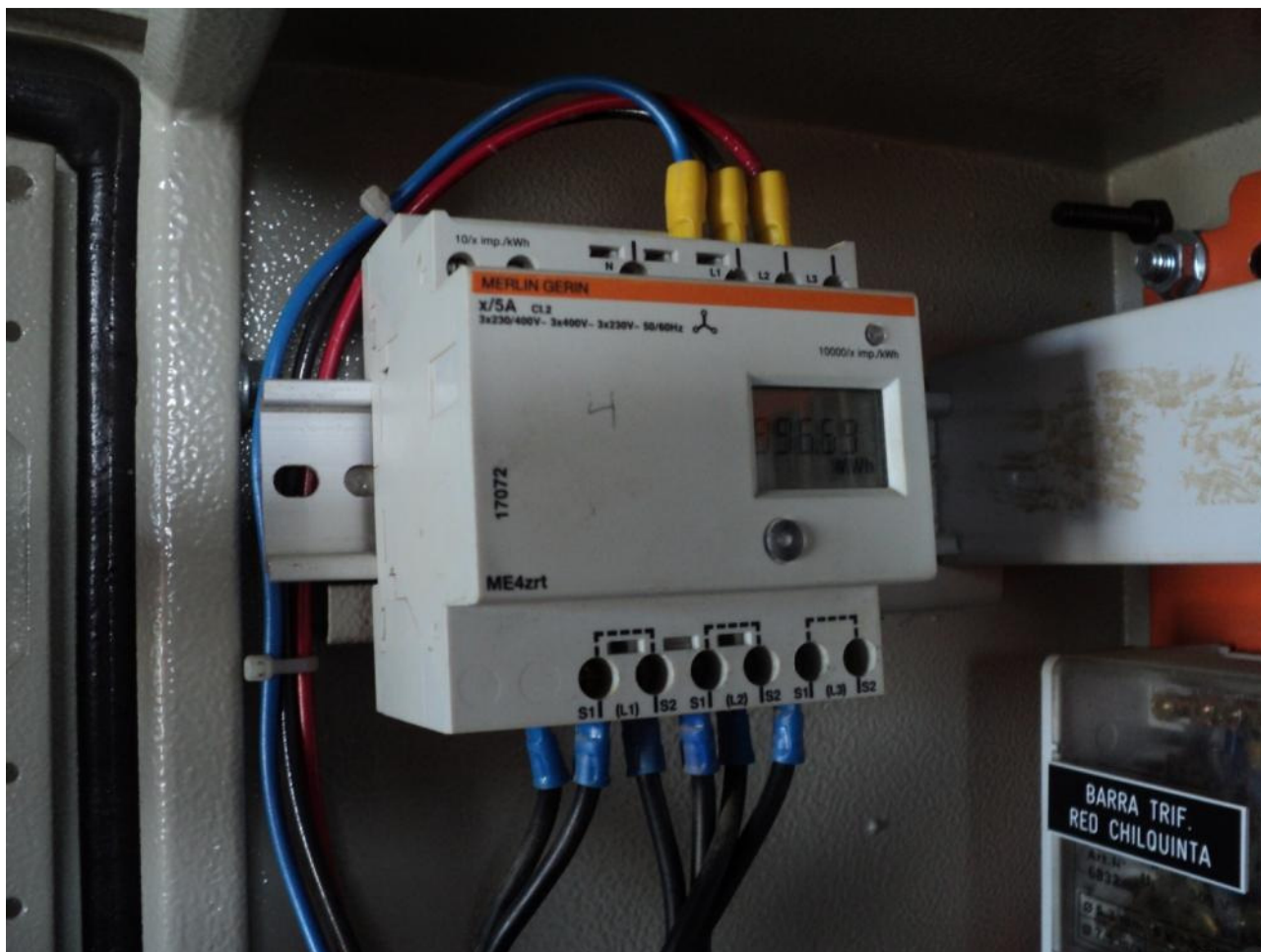
Date: 26/09/2011



Unique reference number: 16j. 7292

Parameter:  $w_{CH_4,y}$

Name of equipment: Gas quality analyzer Date: 26/09/2011  
NOVA



Unique reference number: 16k. 17072

Parameter: ID9 of ACM0001 v2 (electricity consumption)

Name of equipment: Electricity meter Merlin Gerin ME4zrt Date: 26/09/2011



Unique reference number: 16l. 0831914562

Parameter: ID9 of ACM0001 v2 (LPG consumption)

Name of equipment: LPG meter Daesung

Date: 26/09/2011



Unique reference number: 16m. C2F305201      Parameter: Temperature of the landfill gas (T)  
Name of equipment: Temperature meter      Date: 26/09/2011  
Yokogawa



Unique reference number: 16n. C2J401271

Parameter: Temperature of the landfill gas, T

Name of equipment: Temperature transmitter  
Yokogawa

Date: 26/09/2011

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## History

Version	EB Requirement	Nature of revision	Validity
Issue 6	VVs Version 02.0	Update to checklist to include VVS procedures	25 <sup>th</sup> May 2012
Issue 5.4	VVM Version 01.2	Update to checklist	24 <sup>th</sup> February 2011