中国质量认证中心
CHINA QUALITY CERTIFICATION CENTRE

VERIFICATION REPORT

(Final)

China Quality Certification Centre
(CQC)

"Mianyang Landfill Gas Utilisation Project"
(Monitoring period: 25/02/2011 ~ 24/08/2011)

Report No: Ve-2011-0005
Date: 2012-03-12

中国质量认证中心
CHINA QUALITY CERTIFICATION CENTRE

Report No.	Date of first issue	Revision No.	Date of this revision
Ve-2011-0005	2011-11-21	Version 3.0	2012-03-12

Subject: 6th Periodic Verification

China Quality Certification Center (CQC) Section 9, No.188, Nansihuan (the South Fourth Ring Road) Xilu (West Road), Beijing 100070, China	**Client:** Sindicatum Carbon Capital Ltd.

Project site(s):
Mianyang Landfill, Loufang village, Mianyang City, Sichuan Province, P. R. China.

The geographical co-ordinates are: latitude 104°43'06"E & longitude 31°24'50"N

Project Title: Mianyang Landfill Gas Utilisation Project

Registration Number: 1664

Monitoring period: 25th February 2011 to 24th August 2011

Applied Methodology/version:
ACM0001 (version 05): Consolidated baseline methodology for landfill gas project activities
AMS-I.D (version 12): Grid connected renewable electricity generation

First Monitoring Report (MR) version: Date of issuance: 2011-09-09 Version No: 1.0	**Final MR:** Date of issuance: 2011-11-04 Version No: 2.0

Verified Emission Reductions: 50,372 tCO_2e

Work carried by:	**Work reviewed by:**
Mr. Gu Liran Mr. Dong Chunsong	Ms. Zhang Lixin Mr. Wang Zhenyang

Summary of the verification opinion:

Sindicatum Carbon Capital Ltd. has commissioned China Quality Certification Centre (CQC) to verify the emission reductions of the project "Mianyang Landfill Gas Utilisaztion Project" (UNFCCC Reference Number 1664) in China during from 25th February 2011 to 24th August 2011 against the relevant requirements for CDM project activities.

The verification scope is defined as a periodic independent review and ex-post determination by the Designated Operational Entity of the monitored reductions in GHG emissions during the defined monitoring period. Based on VVM, CQC verification team applied the means of document review, follow-up interview, on-site visit, information cross-check to perform the verification.

During verification, **2** Clarification Requests (CLs) were raised by CQC team and attached in the Appendix A of this report and successfully closed.

In summary, CQC confirms that:

- The project is implemented in accordance with the registered project design document;
- The monitoring plan is in accordance with the approved methodology applied by the CDM project activity;
- The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD;
- The GHG emission reduction is calculated without material misstatements.

Our opinion relates to the project's 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, CQC confirms that the implementation of the project has resulted in 50,372tCO_2e during the period from 25th February 2011 to 24th August 2011.

Approved by:  **Mr. Chen Wei (Vice President of CQC)**

Abbreviations

AF	Adjusted factor
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CL	Clarification Request
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CQC	China Quality Certification Centre
DOE	Designated Operational Entity
DR	Document Review
EB	Executive Board
FAR	Forward Action Request
GHG	Greenhouse Gas
I	Interview
LFG	Landfill Gas
MoV	Means of Verification
MR	Monitoring Report
MQCM	CDM monitoring & Quality Control Manual
PDD	Project Design Document
PLC	Programme Logic Controller
PP	Project Participants
SCC	Sindicatum Carbon Capital Ltd.
UNFCCC	United Nations Framework Convention on Climate Change
VVM	Clean Development Mechanism Validation and Verification Manual

Table of Contents

1 INTRODUCTION

Sindicatum Carbon Capital Ltd. has commissioned China Quality Certification Centre (CQC) to verify the emission reductions of the project "Mianyang Landfill Gas Utilisation Project" in Mianyang City, Sichuan Province, P. R. China. This report summarizes the verification objective, scope, methodology and verification finding for the project, with regard to the applicable CDM requirements and VVM[/5/]. CQC verification team has reviewed the GHG data collected by the PP for the 6th monitoring period covering the period from 25th February 2011 to 24th August 2011.

1.1 Verification Objective

The objectives of this periodic verification include:

- to ensure that the project activity has been implemented and operated as per the registered PDD and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- to ensure that the monitoring report and supporting documents are completed and verifiable and in accordance with applicable CDM requirements;
- to ensure that actual monitoring systems and procedures comply with the monitoring systems and procedures in the monitoring plan and the approved methodology;
- to evaluate the data recorded and stored as per the monitoring methodology.

1.2 Verification Scope

The verification scope is given as an independent and objective review of the project's design document, monitoring plan, monitoring report and other relevant documents.

This verification is not intended to provide any consulting services to the project participants. However, stated requests for clarifications and/or corrective actions may provided input for improvement of the project monitoring towards reductions in the GHG emissions.

1.3 Verification Criteria

CQC has performed this verification according to AMS-I.D (Version 12) Grid connected renewable electricity generation[/4/], ACM0001 (Version 05),

Consolidated baseline methodology for landfill gas project activities[/3/], Tool to determine project emission from flaring gases containing methane"[/7/], the registered PDD[/8/] and VVM[/5/]. In addition, CQC verification team conducted this verification based on CQC's CDM quality manual and procedures.

1.4 History of the verification process

The Monitoring Report covering the monitoring period 25th February 2011 to 24th August 2011 (Version 1)[/1/] was submitted to CQC on 9th September 2011. After completeness check, CQC publicized the Monitoring Report (version 1) on UNFCCC web site (https://cdm.unfccc.int/UserManagement/FileStorage/PKEIT6RBUVMJCQFO1258YWSA4HDN30) on 22/09/2011.

Based on the submitted documents and registered PDD, document review and a fact finding mission in form of an on-site visit was performed in October 2011.

After reviewing the revised and resubmitted Monitoring Report and relevant evidence, corrective actions of the 2 CLs raised and outstanding concerns, CQC issues final verification report and certification report.

After receiving the request of review, CQC revised the final verification report as required.

2 VERIFICATION METHODOLOGY

2.1 Verification Team Appointment

Based on the requirements of competency, experience and qualified sectoral scopes, CQC has composed a verification team in accordance with CQC's internal procedures.

Table 1 Verification Team

Qualification	Last name	First name	Country
Verification team leader	Gu	Liran	China
CDM verifier	Dong	Chunsong	China
Technical reviewer	Zhang	Lixin	China
Technical reviewer	Wang	Zhenyang	China

2.2 Desk Review

PP submitted Monitoring Report and supporting documents including inventory of measurement instruments, CDM Monitoring & Quality Control Manual, specification of measurement instruments, verification and calibration certificates of measurement instruments in October 2011. In order to assess the quality of provided information, CQC verification team applied as a minimum the activities listed in Section C of VVM version 01.2.

Furthermore, the verification team has used technical information from sources other than Monitoring Report such as registered PDD, approved methodology ACM0001 (Version 05), AMS-I.D (Version 12), host party legislations, previous verification reports issued by SGS & CQC[/6/]. The list of reviewed documents is included in the Appendix D of this verification report.

In order to ensure the transparency of the decision making process, the reference codes listed in Appendix D of this verification report are used in the CDM Verification Protocol and - as far applicable - in the report itself. CQC verification team had this document reviewed in accordance with the requirements of Paragraphs 179~184 of VVM version 01.2.

2.3 On-site assessment

On 10th & 11th October 2010, CQC verification team (Mr. GU, Liran and Mr. DONG, Chunsong) conducted an on-site visit for the project to confirm selected information and to resolve issues identified by the verification team in the document review. During the on-site visit, representatives of the PPs were interviewed. The on-site activities comprised as a minimum the activities listed in Paragraph 184 of Section C of the VVM version 01.2.

The key interviewee and main topics of the interviews are summarized in Table 2.

Table 2: Interviewee and Interview Topics

Date	Interviewee	Organization	Interview Topics
10th October 2011	**Mr. Jay Mariyappan** Managing Director **Mr. Guowei (Marcus) Xia** CDM Manager **Mr. Yang Bo**, **Mr. Leo Wang** & **Mr. Yang Ruining** Site Engineer	Sindicatum Carbon Capital Ltd.	- Project implementation; - Technical equipments operation; - Equipments maintenance and repair; - Meter equipments calibration and verification; - Monitoring plan and management procedure; - Monitor data; - Training and QA/QC; - GHG calculation; - Compliance with national and local laws and regulations.

11th October 2011	**Mr. Zhang Faming** General Manager	Mianyang Taidu Environmental Energy Technical Development Co., Ltd. (project owner)	- Environmental impacts; - Compliance with national and local laws and regulations.

2.4 Use of the Verification Protocol

In order to ensure transparency a verification protocol was customized for the project based on VVM. The verification protocol serves the following purposes:

- It organizes, details and clarifies the requirements related to CDM verification;
- It ensures a transparent verification process where the verifier will document how a particular requirement has been validated and the result of the verification.

The verification protocol consists of two tables. The different columns in these tables are described in the figure below. The verification protocol to be completed by PP for the project is enclosed in Appendix A to this report.

Corrective action requests (CARs) are issued, where:

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

Requests for clarification (CLs) are issued if the information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

Verification Protocol Table 1: ***verification checklist for Clean Development Mechanism (CDM) Project Activities***				
Verification checklists	***Reference***	***Means of verification (MoV)***	***Verification findings***	***Draft and/or Final Conclusion***
The various	*Gives*	*Explains how*	*The section is*	*This is either*

requirements in Table 2 are linked to checklist questions the project should meet. The checklist is organized in different sections, following VVM (Version 01.2)	*reference to documents where the answer to the checklist question or item is found.*	*conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.*	*used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.*	*acceptable based on evidence provided (OK), or a corrective action request (CAR) due to non-compliance with the checklist question (See below). A request for clarification (CL) is used when the verification team has identified a need for further clarification.*

Verification Protocol Table 2: Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests	***Ref. to checklist question in table 1***	***Summary of project owner response***	***Verification conclusion***
If the conclusions from the draft Verification are either a CAR or a CL, these should be listed in this section.	*Reference to the checklist question number in Table 1 where the CAR or CL is explained.*	*The responses given by the project participants during the communications with the verification team should be summarised in this section.*	*This section should summarise the verification team's responses and final conclusions. The conclusions should also be included in Table 1, under "Final Conclusion".*

2.5 Final Verification Report

The draft verification report containing a set of 2 CLs was submitted to the PP on 13th October 2011 to be confirmed and to take some corrective actions. After reviewing the revised and resubmitted Monitoring Report and evidence on resolving the 2 CLs raised and outstanding concerns, CQC issues this final verification report and a certification report.

2.6 Internal Quality Control

This final verification report including the initial verification findings were subject to an internal technical review before being submitted to PP and requesting issuance of CERs according to CQC internal procedure CDMP09. The technical review was performed by two technical reviewers qualified in accordance with CQC's internal procedure CDMP01.

3 VERIFICATION FINDINGS

As mentioned above all findings are summarized in Table 1 of the attached verification protocol.

3.1 remaining CARs, CLs and FARs during the previous verification periods

All the CARs & CLs raised during previous verification periods were successfully closed, and there were no FARs raised during the previous verification periods.

3.2 Project implementation in accordance with the registered PDD

The project was registered on 26th May 2008, with a fix crediting period from 1st June 2008 to 31st May 2018. The project reference number is 1664. This is the sixth monitoring period, which is from 25th February 2011 to 24th August 2011.

An enclosed flare (capacity 1,000Nm^3/h, manufacturer: Nanjing Shunfeng-Pioneer), a landfill gas pre-treatment system with measurement equipments has been installed on-site before the first period verification. During this monitoring period, 4 same generators (internal combustion engines, engine type: G12V190ZLDZ-2, generator type: 17C6456-6LA42) and rated power 500kW (manufacturer: Jinan Diesel Engine Co., Ltd.). The engines #1 & #2 started to operate on 12th and 13th March 2010, respectively, and engines #3 & #4 started to generate electricity on 15th September 2010; the total installed capacity is 2MW. This has been confirmed during the on-site visit by CQC verification team with the nameplates, the internal combustion engines purchase contract/39/ and the generators' purchasing contract/42/.

The measurement equipments installed on-site are shown in Figure B.4-1 of the MR (Figure B.4-1 – Location of the measurement devices). All these equipments are calibrated and verified by accredited third-party entity in accordance with Chinese national standards within this monitoring period. The detailed description of the monitoring equipments' verification and calibration are described in Appendix B of this verification report. This has been confirmed by CQC verification team during the on-site visit.

While a CL (**CL1**) was raised as: Figure 1 of MR version 1.0 has 2 maps, while there are 3 maps in the registered PDD, which indicates the location of the project site, this is an inconsistence; and the PP clarified that this was the edited mistake and the map in the MR Version 2.0 had been revised and is consistent with the registered PDD; hence this CL can be closed (see Appendix A – Verification Protocol, Table 2).

In summary, CQC verification team confirms that:

- The implementation and equipments installation of the project activity are consistent with the registered PDD (in the registered PDD, the

engine/generator type was G12V190ZLDZ-Z/17C6456-6LA42, respectively, which was a typo mistake; the verification team confirmed this typo mistake with the name plate, internal combustion engines purchase contract[/39/], the actual installed engine/generator model number is: G12V190ZLDZ-2/1FC6456-6LA42); this also refers to the CL raised in the previous verification report[/6/];

- The actual operation of the proposed CDM project activity is as per the registered PDD by the PP;
- Information (data and variables) provided in the monitoring report is in accordance with that stated in the registered PDD.
- No deviations from the monitoring plan, revisions to the monitoring plan, or notification of changes occurred during this monitoring period.

3.3 Compliance of the monitoring plan with the monitoring methodology

The approved consolidated monitoring methodology ACM0001, version 05 *"Consolidated monitoring methodology for landfill gas project activities"* is applied to the project and AMS-I.D., version 12 "*Grid connected electricity generation from renewable sources*" is used for the energy displacement component.

As per the Registered PDD, the monitoring plan contains:

- The management structure of the project and management responsibilities for relevant person in the project;
- The installation of metering equipment &systems;
- Calibration requirements[/14/, /15/, /21/~/27/] of metering equipment, frequency and accuracy;
- Monitoring data (mentioned above);
- Quality control including internal inspection for data and other process;
- Date retention place and period;
- Reporting modality and requirements.

PP has developed CDM monitoring & Quality control manual (version 6) according to the above monitoring plan. PP has implemented the monitoring plan as per the manual during this monitoring period.

CQC verification team confirms that the monitoring plan described in the registered PDD is in accordance with the approved monitoring methodology applied by the project.

3.4 Compliance of monitoring with the monitoring plan

3.4.1 Monitoring equipments application and calibration

3.4.1.1. $LFG_{total, y}$ Total quantity of landfill gas captured in year y (Nm^3)

As per the registered PDD, this parameter is measured by a flow meter continuously. And data are aggregated monthly and yearly. The verification findings during on-site visit are as follows:

The V-Cone flow meter (F-FT1, SN: FT101-8031601, detailed in Appendix B) with ±0.5%/13/ is well installed and was checked by CQC team. The flow meter is in good condition. Service report of onsite installation and commissioning by the manufacturer was verified.

This parameter is measured continuously by the flow meter and normalized to 0℃, 1atm automatically with continuously measured temperature and pressure. Normalized reading is recorded by PLC. CQC team checked the computer algorithm which is used for converting the data under actual working condition into that under normal condition and found it correct.

Reading converted under standard temperature and pressure condition of the flow meter is recorded by PLC at one minute interval, transferred from the site PLC via the internet on a daily basis to SCC Beijing office by site engineer. Then CDM manager checks the data from the site PLC and archives them in a detailed CDM spreadsheet (soft copy and hard copy/10/).

The hourly flow is calculated as the sum of 60-minute flow data and then aggregated daily, weekly, monthly and yearly in the detailed CDM monitoring spreadsheet.

Site engineer checks the condition of the flow meter every day. During verification we confirmed no breakdown during this monitoring period.

Verification and calibration of the flow meter was conducted by the accredited third-party organization. Verification certificate was provided and verified as valid during this monitoring period and in accordance with the manufacturer's recommendation. The detailed information is listed in Appendix B "*Measurement Equipments List*" of this report.

As per Registered PDD, the sum of the LFG quantities fed to the flare and the power plant shall be compared hourly with the $\boldsymbol{LFG_{total}}$, the lowest value would be used for calculation of $\boldsymbol{MD_{project, y}}$. During this monitoring period, the value of $\boldsymbol{LFG_{total}}$ and the sum of $\boldsymbol{LFG_{flare}}$ and $\boldsymbol{LFG_{electricity, y}}$ are compared automatically every minute by PLC and the lower value at one minute interval is used for hourly flow data calculation. CQC team checked the computer algorithm and the data of sampled hours and found it correct.

3.4.1.2. $LFG_{electricity, y}$ Amount of landfill gas combusted in power in year y (Nm^3)

As per the Registered PDD, this parameter shall be measured by flow meter on the inlet to each generator continuously and data are aggregated monthly and yearly. The verification findings during on-site visit are as follows:

The LFG fed to the 4 power generators are measured by 4 flow meters (E-FT1, E-FT2, E-FT3 and E-FT4, accuracy ±0.5%, SN: FT110A-KVA100407001, FT110B-KVA100407002, FT108-8092301/ FT109-8092302 and FT110C-KVA100407003/ FT110-8092303, respectively; detailed in Appendix B) installed on the 4 power generators, respectively. CQC verification team confirmed the operation of 4 generators during the on-site visit.

This parameter is measured continuously by 4 flow meters and normalized to 0℃, 1atm automatically with continuously measured temperature and pressure. Normalized reading is recorded by PLC. CQC team checked the computer algorithm which is used for converting the data under actual working condition into that under normal condition and found it correct.

Reading converted under standard temperature and pressure condition of the flow meter is recorded by PLC at one minute interval, transferred from the site PLC via the internet on a daily basis to SCC Beijing office by site engineer. Then CDM manager checks the data from the site PLC and archives them in a detailed CDM spreadsheet (soft copy and hard copy).

The hourly flow is calculated as the sum of 60-minute flow data and then aggregated daily, weekly, monthly and yearly in the detailed CDM monitoring spreadsheet.

Site engineer checks the condition of the 4 flow meters every day. During verification it was confirmed that no breakdown occurred during this monitoring period.

Verification and calibration of the flow meter was conducted by the accredited third-party organization. Verification certificate was provided and verified as valid during this monitoring period and in accordance with the manufacturer's recommendation. The detailed information on verification and calibration is listed in Appendix B "*Measurement Equipments List*" of this report.

As per Registered PDD, the sum of the LFG quantities fed to the flare and the power plant shall be compared hourly with the LFG_{total}, the lowest value would be used for calculation of $MD_{project, y}$. So the LFG_{total} and **the sum of** LFG_{flare} and $LFG_{electricity, y}$ are compared automatically every minute by PLC and the lower value at one minute interval is used for hourly flow data calculation after the operation of first generator put to use. CQC team checked the computer algorithm and the data of sampled hours and found it correct.

3.4.1.3. $LFG_{flare,\,y}$ Amount of landfill gas fed into flare(s) in year y (Nm^3)

As per the registered PDD, the flares shall be fitted with individual flow meters which measure volume flow by the use of orifice plates or turbine meters or similar. This parameter is measured by a flow meter continuously. And data are aggregated monthly and yearly. The verification findings during on-site visit are as follows:

The V-Cone flow meter (FT2 & Flow meter SN: FT102-8031602, detailed in Appendix B) with ±0.5%[13] is well installed and was checked by CQC team. The flow meter is in good condition. Service report of onsite installation and commissioning by the manufacturer was verified,

This parameter is measured continuously by the flow meter and normalized to 0℃, 1atm automatically with continuously measured temperature and pressure. Normalized reading is recorded by PLC. CQC team checked the computer algorithm which is used for converting the data under actual working condition into that under normal condition and found it correct.

Reading converted under standard temperature and pressure condition of the flow meter is recorded by PLC at one minute interval, transferred from the site PLC via the internet on a daily basis to SCC Beijing office by site engineer. Then CDM manager checks the data from the site PLC and archives them in a detailed CDM spreadsheet (soft copy and hard copy).

The hourly flow is calculated as the sum of 60-minute flow data and then aggregated daily, weekly, monthly and yearly in the detailed CDM monitoring spreadsheet.

Site engineer checks the condition of the flow meter every day. During verification it was confirmed that no breakdown occurred during this monitoring period.

Verification and calibration of the flow meter was conducted by the accredited third-party organization. Verification certificate was provided and verified as valid during this monitoring period and in accordance with the manufacturer's recommendation. The detailed information on verification and calibration is listed in Appendix B "*Measurement Equipments List*" of this report.

As per Registered PDD, total flow to the flares shall be checked by mass balance calculation with total LFG flow and generator consumption. During this monitoring period, the value of $\boldsymbol{LFG_{total}}$ and the $\boldsymbol{sum\ of\ LFG_{flare}}$ and $\boldsymbol{LFG_{electricity,\,y}}$ are compared automatically every minute by PLC and the lower value at one minute interval is used for hourly flow data calculation.

CQC team checked the computer algorithm and the data of sampled hours and

found it correct.

CQC team confirms that $LFG_{flare,y}$ has been verified to be monitored as per the monitoring plan in the registered PDD.

3.4.1.4. $\omega_{CH4,y}$ Methane Fraction in Landfill Gas (m^3CH_4/m^3LFG)

As per Registered PDD, this parameter is measured continuously by proprietary infra read instrumentation mounted in the gas pipe work between the gas treatment package and the generator sets/flares. The verification findings during on-site visit are as follows:

The on-line Infra-Red Gas Analyzer (GA1 & GA2, SN: 27053 and 26949, respectively; detailed in Appendix B)/17/ is installed on the main pipe between the gas treatment package and the first flow meter to monitor the concentration of CH_4. The equipment was checked by CQC team during the site visit and found in good condition.

This parameter is measured continuously by the Infra-red Gas analyzer. The reading is recorded by PLC at one minute intervals and transferred from the site PLC via the internet on a daily basis to SCC Beijing office by site engineer. CDM manager checks the data from the site PLC and archives them in the detailed CDM monitoring spreadsheet to calculate mass flow of Methane.

To cross check the reading, the methane concentration is also measured once a day using a proprietary hand held infra red portable GA 2000+ landfill gas analyzer. The measured results are recorded manually in the operation log.

Site engineer conducts preventive daily check every day, zero check every month and site gas span using certified calibration gas every month. During this monitoring period, no breakdown was observed. Verification and calibration of the analyzer was conducted by the accredited third-party accredited entity. Verification certificate was provided and verified as valid during this monitoring period and in accordance with the manufacturer's specifications. The detailed information on verification and calibration is listed in Appendix B "*Measurement Equipments List*" of this report.

CQC team also checked the variations of methane percentage during this monitoring period and found that the range of methane concentration was between 56.0% and 60.1%. According to the researches/34/ of landfill sites in China, methane concentration interrelates to waste ingredient, the efficiency of gas collecting system and environmental temperature, and the range of methane concentration is about 40~70%. Therefore, it was reasonable and acceptable that the methane concentration varied due to the operation of the engines and pipe extension, variation of environmental temperature, stable amount of

collected LFG while more collecting wells were constructed during this monitoring period[35].

Therefore, CQC team confirms that $\omega_{CH4,y}$ has been verified to be monitored as per the monitoring plan in the registered PDD.

3.4.1.5. $FV_{RG,h}$ volumetric flow rate of the residual gas in dry basis at normal conditions in the hour *h*

As per Registered PDD, this parameter is measured by a V-cone flow meter with ±0.5% accuracy and PP shall ensure that the same basis is considered for this measurement and the measurement of the volumetric fraction of all components in the residual gas when the residual gas temperature exceeds 60℃. The verification findings during on-site visit are as follows:

This parameter is monitored according Annex 13 of EB 28 *"Tool to determine project emission from flaring gases containing methane"*. It is the same parameter as $LFG_{flare,y}$ (Amount of landfill gas fed into flare(s) in year y) which is monitored continuously and recorded at one minute interval.

According to the tool, if the residual gas moisture is significant (temperature above 60℃), the measured flow rate of the residual gas that is usually referred to wet basis should be corrected to dry basis due to the fact that the measurement of methane is usually undertaken on a dry basis. Through checking the temperature of the landfill gas (parameter $T_{total,y}$), it has been confirmed that the temperature of the landfill gas was always below 60℃ during this monitoring period.

CQC team confirms that $FV_{RG,h}$ has been verified to be monitored as per the monitoring plan in the registered PDD.

3.4.1.6. $fv_{i,h}$ Volumetric fraction of component *i* in the residual gas in the hour *h* where *i* =CH_4, CO, CO_2,O_2, H_2, N_2

As per the Registered PDD, this parameter is measured by PP using a continuous gas analyzer, values are averaged hourly time interval and PP shall ensure that the same basis is considered for this measurement and the measurement of the volumetric flow rate of the residual gas ($FV_{RG,h}$) when the residual gas temperature exceeds 60℃. The verification findings during on-site visit are as follows:

According to Annex 13 of EB 28 *"Tool to determine project emission from flaring gases containing methane"*, a simplified approach was applied by PP in this project, the PP only measured the methane content of the residual gas and

considered the remaining part as N_2.

In this project, $fv_{i,h}$ is the same parameter as ω_{CH4} (Methane Fraction in Landfill Gas) which has been discussed in Section 3.4.1.4 above. It was monitored continuously and recorded at one minute interval.

3.4.1.7. $fv_{CH4,RG,h}$ volumetric fraction of methane in the residual gas on dry basis in hour *h*

As per the Registered PDD, this parameter is measured by PP using a continuous gas analyzer, values are averaged hourly time interval and PP shall ensure that the same basis is considered for this measurement and the measurement of the volumetric flow rate of the residual gas ($FV_{RG,h}$) when the residual gas temperature exceeds 60℃. The verification findings during on-site visit are as follows:

This parameter is monitored according to Annex 13 of EB 28 “Tool to determine project emission from flaring gases containing methane”. It is the same parameter as ω_{CH4} (Methane Fraction in Landfill Gas) which has been discussed in Section 3.4.1.4 above. It was monitored continuously and recorded at one minute interval. Please refer to Section 3.4.1.4 for the verification of this parameter.

According to the tool and the registered PDD, it should be ensured that the same basis is considered for the measurement of this parameter and the measurement of the volumetric flow rate of the residual gas when the residual gas temperature exceeds 60℃. Through checking the temperature of the landfill gas, it has been confirmed that the temperature of the landfill gas was always below 60℃ during this monitoring period.

CQC team confirms that $fv_{CH4,RG,h}$ has been verified to be monitored as per the monitoring plan in the registered PDD.

3.4.1.8. $EL_{EX,LFG}$ Total amount of electricity exported out of the project boundary (MWh)

As per the Registered PDD, this parameter is to be measured by the electricity meter on sub-station connecting generators to the grid. The electricity meter is to be maintained and calibrated according to manufacturer’s instructions or the relevant regulations/37/. The verification findings during on-site visit are as follows:

The 4 power generators and connection to the grid were implemented during the previous monitoring period; the first two generators started to operate on 12th

and 13th March 2010 respectively and the rest two started commissioning on 15th September 2010. The electricity generated includes 2 parts: works load part and export part to the grid. The electricity meter (SN: 207515174, bi-directional, detailed in Appendix B), which is used to measure the electricity delivered to the grid and import from the grid were installed at the grid interface. The installation of the meters and the grid connection layout drawing/36/ were consistent with the registered PDD.

3.4.1.9. EL_{IMP} Total amount of electricity imported to meet project requirement (MWh)

As per the registered PDD, this parameter is continuously measured by electricity meter on incoming connection to LFG utilization compound. The verification findings during on-site visit are as follows:

The electricity meter is properly installed. The electricity energy meter (SN: 207515174, bi-directional, detailed in Appendix B), which is used to measure the electricity delivered to the grid and import from the grid were installed at the grid interface. Site engineer takes cumulative readings monthly and record manually into the daily work log. Verification and calibration information on the electricity meters are listed in Appendix B "*Measurement Equipments List*" of this report.

CQC team confirms that EL_{IMP} has been verified to be monitored as per the monitoring plan in the registered PDD/8/.

3.4.1.10. Annual operation hours: annual operation hours of the generators (h/year)

As per the Registered PDD, this parameter is measured by PP annually. The verification findings during on-site visit are as follows:

The 4 power generators and connection to the grid were implemented during this monitoring period; the first two generators started to operate on 12th and 13th March 2010 respectively and the rest two started commissioning on 15th September 2010. The operational hours were measured by the integrated calculagraphs within the 4 generators. CQC team checked and confirmed the operation hours were measured by the integrated calculagraphs automatically.

3.4.1.11. *P* Pressure of the LFG captured (Pa)

As per the Registered PDD, pressure transmitter mounted in the gas pipe work between the gas treatment package and the generator sets and flares and this parameter will be measured by continuously. The verification findings during on-site visit are as follows:

One pressure transmitter was well mounted on the main gas pipe, 1 pressure transmitter was well mounted on the flare pipe and 4 pressure transmitters were well mounted on the sub-pipes to the generators respectively, as shown in the Figure B.4-1 of MR. The pressure has been measured continuously and recorded at one minute interval in PLC and transferred via internet on a daily basis to SCC Beijing office by site Engineer. CDM manager checks the data from the site PLC and archives them in the detailed CDM monitoring spreadsheet. The pressure measured by the transmitter on the main pipe is used for calculation of the density of methane combined with the corresponding temperature and the values measured by the transmitters on the sub-pipes are used as a reference. Due to the calibration valid period of the pressure transmitters, the pressure transmitter (SN: 4925643) on the main pipe was substituted by another pressure transmitter (SN: 4925641) and the detailed information are listed in Appendix B - Verification and calibration information on the pressure transmitter is listed in Appendix B "*Measurement Equipments List*" of this report.

3.4.1.12. $T_{total, y}$ Temperature of the Landfill Gas (℃)

As per the Registered PDD, this parameter is measured by a probe continuously. The verification findings during on-site visit are as follows:
The temperature transmitter (509-TT6, 509-TT12 & 509-TT13, which installed at the point of F-TT1 in the Figure B.4-1/12/, detailed in Appendix B) is well mounted in the main gas pipe between the gas treatment package and the first flow meter.

The temperature of LFG has been measured continuously and recorded at one minute interval in PLC and transferred via internet on a daily basis to SCC Beijing office by site Engineer. CDM manager checks the data from the site PLC and archives them in the detailed CDM monitoring spreadsheet. The temperature is used for calculation of the density of methane combined with the corresponding pressure.

Verification and calibration information on the temperature transmitter is listed in Appendix B "*Measurement Equipments List*" of this report.

3.4.1.13. $PE_{flare, y}$: Project emissions from flaring of the residual gas

As per the Registered PDD, this parameter is monitored according to *"Tool to determine project emissions from flaring gases containing Methane"*. The verification findings during on-site visit are as follows:

An enclosed flare/16/ is well installed on site. PP determines the flare efficiency $\eta_{flare, h}$ based on the approach of default value as per step 5 of "Tool to determine

project emissions from flaring gases containing Methane". The key to determine the flare efficiency is the temperature of the exhausted gas from the flare, which refers to 3.4.1.14.

The verification of other parameters required for calculation of $PE_{flare,y}$ including $FV_{RG,h}$, $fv_{i,h}$ and $fv_{CH4,RG,h}$ have been discussed in the above sections of this report.

3.4.1.14. T_{flare} Temperature of the exhaust gas of the flare(℃)

As per the Registered PDD, this parameter is monitored by the type N thermocouples. A temperature above 500℃ indicates that a significant amount of gases are still being burnt and that the flares are operating. As per the "Tool to determine project emission from flaring emission from flaring gases containing methane", this parameter is used for determination of the hourly flare efficiency. The verification findings during on-site visit are as follows:

As an enclosed flare is used, the PP selects option a) of the "Tool to determine the project emissions from flaring gases containing methane" to determine the flare efficiency:

- To use a 90% default value. Continuous monitoring of compliance with manufacturer's specification of flare (temperature, flow rate of residual gas at the inlet of the flare) must be performed.

and uses a principle in line with Step 6: Determination of the hourly flare efficiency of the tool, which in the case of enclosed flares and the use of the default value for flare efficiency, the flare efficiency in the hour *h* ($\eta_{flare,h}$) is:

- Default value = 0%, if the temperature in the exhausted gas of the flare is below 500℃ for more than 20 minutes during the hour h,
- Default value = 50%, if the temperature in the exhausted gas of the flare is above 500℃ for more than 40 minutes during the hour h, but the manufacturer's specifications on proper operation of the flare are not met at any point in time during the hour h;
- Default value = 90%, if the temperature in the exhausted gas of the flare is above 500℃ for more than 40 minutes during the hour h, and the manufacturer's specifications on proper operation of the flare are met continuously during the hour h;

During verification, CQC team has confirmed that the above principle is correctly applied during this proposed monitoring period based on the following verification findings:

With regards to the monitoring of *flow rate of residual gas at the inlet of the flare*,

CQC team found that the actual flow rate of residual gas did not exceed the range required in the manufacturer's specifications (100Nm^3/h~1000 Nm^3/h) during this proposed monitoring period. The monitoring procedure refers to section 3.4.1.3 of this report.

With regards to the monitoring of *temperature*, validation team found that:

The Type N thermocouples/11/ (TCT3, 4, 9, 12, 14, 15, 16, 18 & 20, detailed in Appendix B) are well installed inside the flare (separately at 20%, 40%, 60% and 80% of total flare height), the temperature parameter is monitored continuously and recorded at one minute interval and transferred from the site PLC via the internet on a daily basis to SCC Beijing office. Due to the calibration valid period of the thermocouples, the Type N thermocouples TCT12, 14, 15 & 3 were used from 25th February 2011 to 1st March 2011, the thermocouples TCT4, 9 & 18 were used from 1st March 2011 to 16th August 2011, and the thermocouples TCT15, 20, 12 & 22 were used for the rest of this monitoring period. Verification and calibration information for the thermocouples in listed in Appendix B – "*Measurement Equipments List"* of this report.

During verifying the monitoring results of the temperature, CQC team also noticed that during some time in this monitoring period the temperature is higher than 700℃. With regards to this issue, a clarification request was raised during the 3rd monitoring period for this project, PP provided the *Flare operational manual*/30/, *Flare system purchasing contract*/31/ and *Flare system specification sheet*/32/ to clarify the high temperature issue (above 700℃, see CL02 and its response from the verification report of the 3rd monitoring period).

According to *AM_CLA_0047_Temperature of the exhaust gases at the sampling point inside the flare*/33/, the high temperature (above 700℃) maybe due to the following different reasons and DOE should take different measures to verify. The verification findings are described in the follow table:

Possible Reasons	Verification findings
1) the flare capacity is not adequate to the gas flow;	CQC verification team compared the operational records of the flare system and found the flow rate during the monitoring period was within the capacity of the flare, temperature of the flare, and CH4 content of LFG was within the range specified by the manufacture. The detailed specification of the flare refers to the following table 3.
2) air mixing or/and quantity inside the flare is not adequate and combustion may be taking place in the cooling zone or even in the exhaust (staged	CQC team observed the flame at the top of the flare and found it invisible during on-site visit. Due to the monitoring period is prior to the on-site visit, CQC team interviewed the site engineers

combustion - using atmospheric air entrained from the top).	and confirmed that the there was no visible flame observed by the site engineers during this monitoring period. CQC team also checked the operation log book[/29/] and found that there is no record of visible flame during this monitoring period.
There is a possibility that the temperature in the cooling zone may be above 700℃ due a specific design (low height flares – usually forced draft configuration – or isolated flares). This will not represent a limitation provided that: 1. the operational capacity is in the range of the flare capacity; 2. In case of low height flares (less than 10 internal diameters), the methane composition throughout the sampling section is uniform. The methane composition profile should be measured once a year at maximum stable flare capacity observed during that year and used to calculate flare efficiency instead of a single point measurement. The traversing method should result in the same methane concentration as obtained with the single point measurement. Traversing procedure can be implemented in only one axis and at least 8 points defined as the centre of 4 equal area concentric circle crowns. The sampling probe shall remain at lease 5 minutes in each point.	As per the Step 6 – Determination of the hourly flare efficiency of the tool[/7/], calculation is only for the option of the enclosed flares and continuous monitoring of the flare efficiency, hence, it is not necessary for the PP to measure the methane composition profile for PP has selected the option a which is to use the default value for the flare efficiency.

Table 3 Specification of the flare system

Parameters	Manufacturer's requirements
Min. exhausted gas temp.	500℃
Max. exhausted gas temp.	1200℃
Min. flow rate	100Nm^3/h
Max. flow rate	1000 Nm^3/h

Min. CH_4 content of LFG	30%
Max. CH_4 content of LFG	100%
Thickness of ceramic fiber lagging	325mm
Dimension of the flare	Φ2,000(mm)×8,000(mm)
Temp. of the flare surface	≦70℃

Therefore, it is concluded that the operation during the proposed monitoring period was under this specification. Therefore, the flare efficiency can be defaulted as 90%.

3.4.1.15. Laws and regulations about waste management system in China

As per the Registered PDD, relevant laws and regulations about solid waste management system in China should be monitored yearly. While there is some changes, the baseline scenario or monitor plan will changed accordingly. As per ACM0001 version 5, this parameter is required for any changes to the adjustment factor (AF) or $MD_{reg,\,y}$ and is updated at renewal of the crediting period. The verification findings during on-site visit are as follows:

The Chinese national standard - *"Standard for pollution control on the landfill site of Municipal Solid Waste (GB16889-2008)"*[/20/] was published in 2008 and is effective from 01/07/2008 onwards. Wherein, solid waste landfill site requirements, infrastructure design and construction requirements of solid waste landfill site, admission requirements of solid waste landfill disposal have been added or amended.

3.4.2 Management system and Quality Assurance

PP has developed a detailed monitoring management system and quality assurance, which is documented in CDM Monitoring & Quality Control Manual[/9/]. CQC verification team confirms this through reviewing the records and interviewing the interviewees during on-site visit. As per CDM Monitoring & Quality Control Manual, PP has conducted annual internal audit to insurance the operational quality. The 2011 internal audit and the management review were in March 2011. PP provided the *Internal Audit Report* and the *Management Review Report*[/28/] to CQC verification team and the team confirmed the validity of these actions during the on-site visit.

Therefore, CQC verification team confirms that the monitoring is in accordance with the monitoring plan.

3.5 Assessment of data and calculation of GHG emission reductions

According to ACM0001 (version 05), the registered PDD and the Monitoring Report, the emission reduction for this project is determined as follows:

$$ER_y = (MD_{project,\ y} - MD_{reg,\ y}) \times GWP_{CH4} + EL_y \times CEF_{electricity,\ y} - ET_y \times CEF_{thermal,\ y} \quad 1)$$

$$MD_{project,\ y} = MD_{flared,\ y} + MD_{electricity,\ y} + MD_{thermal,\ y} \quad 2)$$

$$MD_{electricity,\ y} = LFG_{electricity,\ y} \times \omega_{CH4,\ y} \times D_{CH4} \quad 3)$$

$$MD_{flared,\ y} = (LFG_{flared,\ y} \times \omega_{CH4,\ y} \times D_{CH4}) - (PE_{flare,\ y} / GWP_{CH4}) \quad 4)$$

$$PE_{flare,\ y} = \sum TM_{RG,\ h} \times (1 - \eta_{flare,\ h}) \times GWP_{CH4} / 1000 \quad 5)$$

$$TM_{RG,\ h} = FV_{RG,\ h} \times fv_{CH4,\ RG,\ h} \times \rho_{CH4,\ n} \quad 6)$$

$$EL_y = EL_{EX,\ LFG} - EL_{IMP} \quad 7)$$

The PP adopted the above formulas in the MR and the ER calculation sheet. CQC verification team cross-checked the *Grid connection layout drawing*[/36/], PPA[/38/], *Electricity sales invoices and balance bills* (from and to the grid)[/40/] against the operational records[/29/]. As per the description of the PPA[/38/], the reading time of the electricity meter is 24:00 of the 23rd day of every month during this monitoring period (25th February 2011 ~ 24th August 2011). However, a CL (**CL2**) was raised here as follows: in Annex F – Special events table and missing CDM data, there are some special events during this monitoring period missing, i.e., 12:09~12:16 14th March 2011; the cause from 21:00 17th June 2011 to 01:00am 18th June 2011 was not consistent with the daily log book. The PP then revised the MR as version 2.0 and the special events had been included in according to the log books and this CL was closed successfully (ref. Appendix A – Verification Protocol, Table 2).

In the above formula, the parameters: $LFG_{total,\ y}$, $LFG_{electricity,\ y}$, $LFG_{flared,\ y}$, $EL_{EX,\ LFG}$, EL_{IMP} and $\omega_{CH4,\ y}$ have been aggregated and reported. The value of D_{CH4} is under standard temperature and air pressure (1.013bar and 0°C) ($\rho_{CH4,\ n}$) is 0.0007168 tCH_4/m^3CH_4. $EL_y = EL_{EX,\ LFG} - EL_{IMP}$ and ET_y is zero.

According to the applied methodology – ACM0001 (version 05), there is no requirement on the efficiency of the generators, and the amount of LFG fed into the generators is required to be monitored; meanwhile, the PP considered the 0.995 efficiency of the generator as per the technical data from Engine-generator sets purchasing contracts in the ER calculation and conducted a 0.005 value as PE. CQC verification team confirmed this with the PP according

to the purchasing contracts, MR and the ER calculation sheet that this is acceptable and conservativeness.

The total emission reduction has been confirmed as follows:

Parameter	*Reported value*	Verified value
$MD_{project, y}$	2,119.33	2,119.33
$MD_{reg, y}$	0	0
$EL_{EX, LFG}$	6,020	6,020
EL_{IMP}	0.71	0.71

Thus total emission reductions achieved in this monitoring period is calculated as follows:

$ER_y = (MD_{project, y} - MD_{reg, y}) \times GWP_{CH4} + EL_y \times CEF_{electricity, y}$

= (2,119.33- 0) tCH_4 × 21tCO_2e/tCH_4 + (6,020- 0.71) MWh × 0.97455 tCO_2e/MWh

=**50,372** tCO_2e

As per the requirements of Paragraph 209 of VVM version 01.2, CQC verification team confirms the following information:

- The reported ER during this monitoring period is lower than the estimated value (estimated **61,786** tCO_2e, i.e., 124,596×181÷365=61,786 in the registered PDD);
- The parameters were measured and monitored correctly by the PP and the operational and measurement equipments were well maintained and calibrated;
- The recorded values were cross-checked with the daily operational log book, electricity sales invoices and balance bills;
- The formulas and emission factors used were consistent with the registered PDD and the applied methodologies.

APPENDIX A: CDM Verification Protocol

Table 1 verification checklist for Clean Development Mechanism (CDM) Project Activities

Verification checklists MoV =Means of Verification, DR=Document Review, I=Interview,	Ref	Mov	Verification findings	Draft. Concl.	Final Concl.
1. Project implementation in accordance with the registered PDD					
1.1 The detailed information on the site(s) of the project being implemented and starting date of operation for each site	PDD MR	DR, I	The project is located at Mianyang Landfill, Loufang Village, Mianyang City, Sichuan Province, P. R. China. The geographical co-ordinates are: longitude 104°43′06″E, latitude of 31°24′50″N. The project was registered as a CDM project on 26th May 2008; the crediting period of the project activity is a fix 10-year period from 1st June 2008 to 31st May 2018. This monitoring period covers from 25th February 2011 to 24th August 2011, and this is the 6th verification request. **Clarification Request 1:** Figure 1 of MR version 1.0 has 2 maps, while there are 3 maps in the registered PDD, which indicates the location of the project site, this is an inconsistence.	CL 1	OK
1.2 For CDM project activities with phased implementation, describe the progress of the proposed CDM project activity	PDD MR /3/~/8/	DR, I	The project was completely implementation during the 4th monitoring period; the LFG was used for both flare and electricity generation in this proposed monitoring period.	OK	OK

Verification checklists MoV =Means of Verification, DR=Document Review, I=Interview,	Ref	Mov	Verification findings	Draft. Concl.	Final Concl.
achieved in the each phase under verification			The 4 internal-combustion engines were installed and started operation on 12th and 13th March 2010 (Engines #1 & #2) and 15th September 2010 (Engines #3 & #4), respectively.		
1.3 Are all physical features of the proposed CDM project activity, proposed in the registered PDD, in place? (the detailed information on title, specification, installation time and operation status of the equipments installed)	PDD MR /3/~/8/	DR, I	The equipments were installed on-site as the description of the registered PDD.	OK	OK
1.4 Is there any information (data and variables) provided in the monitoring report that is different from that stated in the registered PDD? If so, - Has it has caused an increase in estimates of the emission reductions in the current monitoring period? - Is it highly likely to increase the estimates of emission reductions in the future monitoring periods?	PDD MR	DR, I	All the data and variables provided in the Monitoring Report (Version 1) are consistent with the registered PDD.	OK	OK

Verification checklists MoV =Means of Verification, DR=Document Review, I=Interview,	Ref	Mov	Verification findings	Draft. Concl.	Final Concl.
1.5 Are there any approvals of the necessary request of notification or request for approval of changes from the project activity as described in the registered PDD?	PDD MR	DR, I	No, all the equipments are installed on-site as per the description of the registered PDD and not necessary to have any request of notification or request for approval of changes from the project activity.	OK	OK
1.6 Has the CDM project activity been implemented and operated as per the registered PDD?	PDD MR	DR, I	Yes, the CDM project activity had been implemented and operated as per the registered PDD.	OK	OK
2. Compliance of the monitoring plan with the monitoring methodology					
2.1 Which approved monitoring methodology has been applied by the project?	PDD MR /9/	DR	The approved methodology ACM0001 (Version 05) and AMS-I.D (Version 12) have been applied by the project.	OK	OK
2.2 Is the MP complied with the monitoring methodology?	PDD MR /9/	DR, I	Yes. The registered monitoring plan in accordance with the methodologies ACM0001 (version 05) and AMS-I.D. (Version 12) has been applied by the CDM project activity.	OK	OK
2.3 Is necessary to request PP for revision of MP? If yes, what is the reason for CQC to request PP to revision of MP?	PDD MR /9/	DR, I	No.	OK	OK

Verification checklists MoV =Means of Verification, DR=Document Review, I=Interview,	Ref	Mov	Verification findings	Draft. Concl.	Final Concl.
2.4 Are there any monitoring aspects that are not specified in the methodology, particularly in the case of small-scale methodologies (e.g. additional monitoring parameters, monitoring frequency and calibration frequency)? If yes, will CQC bring to the attention of the Board issues to enhance the level of accuracy and completeness of the monitoring plan?	PDD MR /9/		No.	OK	OK
3. Compliance of monitoring with the monitoring plan					
3.1 management system of Monitoring					
3.1.1 Have the project operator established management and operational system for the monitoring?	PDD MR /9/	DR, I	Yes. PP has established management and operational system for the monitoring which is described in the CDM monitoring & quality control manual (MQCM Version 7).	OK	OK
3.1.2 Responsibilities and authorities - What are the responsibilities and authorities for monitoring and reporting described in the management system - Are the above responsibilities in	PDD MR /9/	DR, I	MQCM describes the responsibilities of PP from China (Mianyang Taidu Environmental Energy Technical Development Company Ltd.) which is day to day running of the landfill gas utilisation plant & equipment and other roles as specified by Plant manager. MQCM describes the responsibilities of PP from Annex I	OK	OK

Verification checklists MoV =Means of Verification, DR=Document Review, I=Interview,	Ref	Mov	Verification findings	Draft. Concl.	Final Concl.
accordance with those in actual operation?			country. - Climate Change Officer: Project internal and external reporting, including monthly and annual reports, arranging internal audits by independent staff and other roles as specified by Technical Manager or Chief Climate Change Officer - CDM Manager: Compiling CDM Information, data quality checks and signing off of results for SCC. Supervision of CDM site engineers and instrumentation engineer and other roles as specified by SCC Management - Technical (Project) Manager: Overall responsibility for landfill gas collection and extraction, CDM Monitoring Equipment, data acquisition and project CDM reporting - CDM Site Engineers Operation of the landfill gas collection and extraction equipment, meter readings, data recording, production of daily reports, daily entry of manual monitoring results, routine monitoring equipment maintenance and calibration checks and other roles as specified by SCC Management		

<table>
<tr><th>Verification checklists
MoV =Means of Verification,
DR=Document Review, I=Interview,</th><th>Ref</th><th>Mov</th><th>Verification findings</th><th>Draft. Concl.</th><th>Final Concl.</th></tr>
<tr><td></td><td></td><td></td><td>- IT Technician
Maintenance and security of data servers/storage and internet communications for data acquisition and other roles as specified by SCC Management.
Through on-site visit and document review, CQC verification team has confirmed that all the above responsibilities are in accordance with those in actual operation.</td><td></td><td></td></tr>
<tr><td>3.1.3 Equipment calibration and maintenance
- Are the calibration and maintenance specifications of the above equipments appropriate?
- Have the project operator calibrated and maintained the equipments as per the related specifications?</td><td>PDD
MR
/11/~
/27/</td><td>DR, I</td><td>The calibration and maintenance specifications of the equipments are appropriate according to the technical requirements of the manufacturers; and the project operator calibrated and maintained the equipments as per the related specifications. Detailed information see Appendix B of this verification report.</td><td>OK</td><td>OK</td></tr>
<tr><td>3.1.4 Are monitoring results consistently recorded as per approved frequency?</td><td>PDD
MR
/11/~/27/</td><td>DR, I</td><td>All of the monitoring results consistently recorded as per approved frequency. The detailed information is as follows:
<table>
<tr><th>Parameter</th><th>Monitoring/recording frequency</th><th>Required frequency</th></tr>
<tr><td>$LFG_{total, y}$</td><td>Continuously/
Every minute</td><td>Continuously/
Monthly aggregation</td></tr>
<tr><td>$LFG_{electricity, y}$</td><td>Continuously/</td><td>Continuously/</td></tr>
</table></td><td>OK</td><td>OK</td></tr>
</table>

Verification checklists MoV =Means of Verification, DR=Document Review, I=Interview,	Ref	Mov	Verification findings			Draft. Concl.	Final Concl.
				Every minute	Monthly aggregation		
			$LFG_{flare, y}$	Continuously/ Every minute	Continuously/ Monthly aggregation		
			$\omega_{CH4, y}$	Continuously/ Every mi ute	ontinuously		
			$FV_{RG, h}$	Same as $LFG_{total, y}$	Continuously/ Aver ged hourly or at a shorter ime		
			$fv_{i, h}$	/	/		
			$fv_{CH4, RG, h}$	Same as $\omega_{CH4,y}$	Continuously/ Averaged hourly or at a shorter time		
			$EL_{EX, LFG}$	Continuously/mont hly	Continuously/monthly		
			EL_{IMP}	Continuously /Monthly	Continuously/ Recorded daily		
			Annual operation hours	Yearly	Yearly		
			P	Continuously/ Every minute	Continuously/ Recorded hourly		
			$T_{total, y}$	Continuously/ Every minute	Continuously/ Recorded hourly		
			$PE_{flare, y}$	/	/		
			T_{flare}	Continuously/ Every minute	Continuously		
			laws and regulations	Yearly	Yearly		
3.1.5 Have quality assurance and quality	PDD	DR, I	Yes.			OK	OK

Verification checklists MoV =Means of Verification, DR=Document Review, I=Interview,	Ref	Mov	Verification findings	Draft. Concl.	Final Concl.
control procedures been applied in accordance with the monitoring plan?	MR /11/~/13/ , /28/		The MQCM has been documented and applied by PP in accordance with the monitoring plan. The PP has annual internal audits for QC/QA, which is accordance with the monitoring plan. The 2011 internal audit was conducted on 13th April of 2010 and reported on 14th of April; the management review was conducted on 25th March 2011. CQC verification team confirms the validity of these actions during the on-site visit.		
3.2 implementation and quality control of monitoring					
3.2.1 Project emission parameter:	PDD MR /30/~/33/	DR	See the discussion of **CL2** and Section 3.4.1.1-3.4.1.15	**CL2**	OK
3.2.2 Baseline emission parameters:	PDD MR /3/, /30/~/33/	DR	See the discussion of **CL2** and Section 3.4.1.1-3.4.1.15	**CL2**	OK
3.2.3 Leakage parameters:	PDD MR	DR, I	The leakage is considered as zero, according to the applied methodology.	OK	OK
3.3 Has the actual monitoring been implemented	PDD	DR, I	Yes. The actual monitoring has been implemented	OK	OK

Verification checklists MoV =Means of Verification, DR=Document Review, I=Interview,	Ref	Mov	Verification findings	Draft. Concl.	Final Concl.
in accordance with the monitoring plan contained in the registered PDD (or the accepted revised monitoring plan)?	MR /9/		according to the monitoring plan contained in the registered PDD.		
4. Assessment of data and calculation of GHG emission reductions					
4.1 Is a complete set of data for the specified monitoring period available?	PDD MR /9/	DR, I	Yes. A completed set of data from 25th February 2011 to 24th August 2011, which can cover the monitoring period of this monitoring report have been provided to the verification team. **Clarification Request 2:** In Annex F – Special events table and missing CDM data, there are some special events during this monitoring period missed i.e., 12:09~12:16 14th March 2011; the cause from 21:00 17th June 2011 to 01:00am 18th June 2011 was not consistent with the daily log book.	**CL2**	OK
4.2 Are there any data not available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan? If so, - How to make the most conservative assumption?	PDD MR /9/	DR, I	Yes, all of the parameters have been measured and are available.	OK	OK

Verification checklists MoV =Means of Verification, DR=Document Review, I=Interview,	Ref	Mov	Verification findings	Draft. Concl.	Final Concl.
- Is it necessary to raise a request for deviation from the MP?					
4.3 Has monitoring report been cross-checked with other sources such as plant log books, inventories, purchase records, laboratory analysis?	PDD MR /9/, /38/~/40/	DR, I	CQC verification team cross-checked the MR and the ER calculation sheet with the plant log books, PPA and electricity sales invoices. Also see **CL2** and 3.1.5.	**CL2**	OK
4.4 Have the calculations of baseline emissions, project emissions and leakage been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology document?	PDD MR /3/ /9/ /42/	DR, I	Yes. The calculations of baseline emissions, project emissions have been carried out in accordance with the formula and methods described in the monitoring plan and then applied methodology document. The leakage emission is 0. According to the applied methodology – ACM0001 (version 05), there is no requirement on the efficiency of the generators, and the amount of LFG fed into the generators is required to be monitored; meanwhile, the PP considered the 0.995 efficiency of the generator as per the technical data from Engine-generator sets purchasing contracts in the ER calculation and conducted a 0.005 value as PE. CQC verification team confirmed this with the PP according to the purchasing contracts, MR and the ER calculation sheet that this is acceptable and conservativeness.	**CL2**	OK

Verification checklists MoV =Means of Verification, DR=Document Review, I=Interview,	Ref	Mov	Verification findings	Draft. Concl.	Final Concl.
			Also see **CL2**.		
4.5 Have any assumptions used in emission calculations been justified?	PDD MR	DR, I	N/A. There are no any assumptions in emission calculations.	OK	OK
4.6 Have appropriate emission factors, IPCC default values and other reference values been correctly applied?	PDD MR	DR	The emission factor of electricity (CEF electricity), which was determined ex-ante and was fixed as 0.97455tCO_2/MWh. Methane density and GWP_{CH4} are applied correctly.	OK	OK
5. Addition verification activities					
5.1 Is it necessary to request for deviation of the MP? If so, - What is the impact of the deviation on the emission reductions from the project? - Is the deviation due to the changes in the conditions or circumstances of the project? - Is the request for deviation suitable? - Has EB approved the deviation? Whether and how the MR reflects the application of the approved guidance from EB?	PDD MR	DR, I	N/A. There is no any deviation need of the MP.	OK	OK
5.2 Is it necessary to request for revision of the MP? If so,	PDD	DR, I	N/A.	OK	OK

Verification checklists **MoV =Means of Verification,** **DR=Document Review, I=Interview,**	**Ref**	**Mov**	**Verification findings**	**Draft. Concl.**	**Final Concl.**
- Will the level of accuracy and completeness in the monitoring and verification be reduced as a result of the proposed revision? - Is the revision to the MP accurate and completeness (including the frequency of measurements, the quality of monitoring equipment)? - Has EB approved the revision? Whether and how the MR reflects the application y the pp of the approved guidance from EB?	MR		There is no any revision need of the MP.		

Table 2 Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 2	Summary of project owner response	Verification conclusion
Clarification Requests			
CL1 Figure 1 of MR version 1.0 has 2 maps, while there are 3 maps in the registered PDD, which indicates the location of the project site, this is an inconsistence.	1.1	This was an edited mistake, and the revised map in the revised MR Version 2.0 was consistent with the registered PDD.	OK. This is confirmed that the map in the revised PDD (version 2.0) is consistent with the registered PDD and this CL can be closed.
CL2 In Annex F – Special events table and missing CDM data, there are some special events during this monitoring period missed i.e., 12:09~12:16 14th March 2011; the cause from 21:00 17th June 2011 to 01:00am 18th June 2011 was not consistent with the daily log book.	3.2, 4.1, 4.3, 4.4	This was an edited mistake, and the revised MR (version 2.0) had included these events and resubmitted to CQC validation team.	OK. This is confirmed that the special events had been included in the revised MR (version 2.0) according to the log books and this CL can be closed.

APPENDIX B: MEASUREMENT EQUIPMENTS LIST

In the host country China, the measurement equipments used for trade are required to take compulsively verification during the usage period according to *Metrology Law of the People's Republic of China*[18] and *Rules for the Implementation of the Metrology Law of the People's Republic of China*[19]. The measurement equipments of this project activity are in accordance with the requirements mentioned above. The equipments were verified by qualified labs and the detailed technical standards are listed in Appendix D as reference (reference code 21~27). CQC verification team confirms the verification certificates of the measurement equipments during the on-site visit.

Measured Parameter	Tag No.	Serial No.	Working period in this monitoring period	Verification/calibration valid period	Calibration entity
LFG_{total}	F-FT-1	FT101-8031601	25/02/2011 ~ 24/08/2011	18/05/2010 ~ 17/05/2012	National Institute of Measurement and Testing Technology
$LFG_{electricity}$	E-FT1	FT110A-100407001	25/02/2011 ~ 24/08/2011	05/05/2010~04/05/2012	Shanghai Inspection and Testing Institute of Instruments and Automation Systems
	E-FT2	FT110B-100407002	25/02/2011 ~ 24/08/2011	05/05/2010 ~ 04/05/2012	
	E-FT3	FT108-8092301	25/02/2011 ~ 16/08/2011	08/03/2010 ~ 07/03/2012	National Institute of Measurement and Testing Technology
		FT109-8092302	16/08/2011 ~ 24/08/2011	20/07/2011 ~ 19/07/2013	
	E-FT4	FT110C-100407003	25/02/2011 ~ 16/08/2011	05/05/2010 ~ 04/05/2012	Shanghai Inspection and Testing Institute of Instruments and Automation Systems
		FT110-8092303	16/08/2011 ~ 24/08/2011	20/07/2011 ~ 19/07/2013	
LFG_{flare}	F-FT2	FT102-8031602	25/02/2011 ~ 24/08/2011	18/05/2010 ~ 17/05/2012	Shanghai Inspection and Testing Institute of Instruments and Automation Systems
$\omega_{CH4, y}$	F-CH_4	27053	25/02/2011 ~ 16/08/2011	09/09/2010 ~ 08/09/2011	National Institute of Measurement and

		26949	16/08/2011 ~ 24/08/2011	15/03/2011 ~ 14/03/2012	Testing Technology
$EL_{EX, LFG}$	Substation	207515174	25/02/2011 ~ 24/08/2011	25/07/2008 ~ 24/07/2013	Sichuan Electric Power Test and Research Institute
EL_{IMP}	Substation	207515174	25/02/2011 ~ 24/08/2011	25/07/2008 ~ 24/07/2013	
P*	F–PT1	4925643	25/02/2011 ~ 16/08/2011	08/09/2010 ~ 07/09/2011	National Institute of Measurement and Testing Technology
		4925641	16/08/2011 ~ 24/08/2011	04/03/2011 ~ 03/03/2012	
	F–PT2	4925650	25/02/2011 ~ 16/08/2011	08/09/2010 ~ 07/09/2011	
		4925653	16/08/2011 ~ 24/08/2011	04/03/2011 ~ 03/03/2012	
	E–PT1	4888695	25/02/2011 ~ 01/03/2011	26/05/2010 ~ 25/05/2011	
		5006234	01/03/2011 ~ 15/08/2011	08/09/2010 ~ 07/09/2011	
		4888694	15/08/2011 ~ 24/08/2011	28/03/2011 ~ 27/03/2012	
	E–PT2	4888696	25/02/2011 ~ 01/03/2011	26/05/2010 ~ 25/05/2011	
		4925651	01/03/2011 ~ 15/08/2011	15/09/2010 ~ 14/09/2011	
		4888695	15/08/2011 ~ 24/08/2011	28/03/2011 ~ 27/03/2012	
	E–PT3	5006233	25/02/2011 ~ 16/08/2011	08/09/2010 ~ 07/09/2011	
		4888696	16/08/2011 ~ 24/08/2011	28/03/2011 ~ 27/03/2012	
	E–PT4	4925652	25/02/2011 ~ 16/08/2011	15/09/2010 ~ 14/09/2011	National Institute of Metrology, China
		5006235	16/08/2011 ~ 24/08/2011	04/03/2011 ~ 03/03/2012	
$T_{total, y}$	F-TT1	509-TT6	25/02/2011 ~ 01/03/2011	06/05/2010 ~ 05/05/2011	National Institute of Measurement and

* Only F-PT1 (SN: 4925641/4925643) was used in calculating the emission reductions; the rest of the meters for the parameter ***P*** in both of Figure B.4-1 of the MR and in this list.

		509-TT12	01/03/2011 ~ 16/08/2011	10/09/2010 ~ 09/09/2011	Testing Technology
		509-TT13	16/08/2011 ~ 24/08/2011	27/04/2011 ~ 26/04/2012	
	E-TT1	509-TT7	25/02/2011 ~ 01/03/2011	06/05/2010 ~ 05/05/2011	
		509-TT3	01/03/2011 ~ 15/08/2011	10/09/2010 ~ 09/09/2011	
		509-TT14	15/08/2011 ~ 24/08/2011	27/04/2011 ~ 26/04/2012	
	E-TT2	509-TT8	25/02/2011 ~ 01/03/2011	06/05/2010 ~ 05/05/2011	
		509-TT4	01/03/2011 ~ 15/08/2011	10/09/2010 ~ 09/09/2011	
		509-TT15	15/08/2011 ~ 24/08/2011	27/04/2011 ~ 26/04/2012	
	E-TT3	509-TT10	25/02/2011 ~ 01/03/2011	06/05/2010 ~ 05/05/2011	
		509-TT11	01/03/2011 ~ 16/08/2011	10/09/2010 ~ 09/09/2011	
		509-TT16	16/08/2011 ~ 24/08/2011	27/04/2011 ~ 26/04/2012	
	E-TT4	509-TT9	25/02/2011 ~ 28/04/2011	06/05/2010 ~ 05/05/2011	
		509-TT10	28/04/2011 ~ 16/08/2011	29/03/2011 ~ 28/03/2012	
		509-TT17	16/08/2011 ~ 24/08/2011	27/04/2011 ~ 26/04/2012	
T_{flare}	TCT	TCT 12	25/02/2011 ~ 01/03/2011	28/05/2010 ~ 27/05/2011	National Institute of Measurement and Testing Technology
		TCT 14	25/02/2011 ~ 01/03/2011	28/05/2010 ~ 27/05/2011	
		TCT 15	25/02/2011 ~ 01/03/2011	28/05/2010 ~ 27/05/2011	
		TCT 3	25/02/2011 ~ 16/08/2011	16/09/2010 ~ 15/09/2011	
		TCT 4	01/03/2011 ~ 16/08/2011	16/09/2010 ~ 15/09/2011	
		TCT 9	01/03/2011 ~ 16/08/2011	16/09/2010 ~ 15/09/2011	

		TCT 18	01/03/2011 ~ 16/08/2011	16/09/2010 ~ 15/09/2011	
		TCT 15	16/08/2011 ~ 24/08/2011	06/04/2011 ~ 05/04/2012	
		TCT 20	16/08/2011 ~ 24/08/2011	06/04/2011 ~ 05/04/2012	
		TCT 12	16/08/2011 ~ 24/08/2011	06/04/2011 ~ 05/04/2012	
		TCT 22	16/08/2011 ~ 24/08/2011	06/04/2011 ~ 05/04/2012	

Based on the above information and the interview with the PP during the on-site visit, CQC verification team confirmed the calibration of monitored equipments with the calibration requirements (EB52/Annex 60 Para. (8))[41] as per VVM version 1.2, Para. 184 (a) (ii).

APPENDIX C: CERTIFICATES OF COMPETENCE

中国质量认证中心
CHINA QUALITY CERTIFICATION CENTRE

CERTIFICATE OF COMPETENCE

Qualification in accordance with CQC's procedure for Qualifications and Training Management (CDMP01):

Name: Gu Liran
CDM validator: Yes
CDM verifier: Yes
Technical expert: /
Technical areas: TA1.2:Energy generation from renewable energy sources
TA13.2/TA15.2: Animal waste management

Approved by:
(Quality manager)

Date: 2011-03-17

中国质量认证中心
CHINA QUALITY CERTIFICATION CENTRE

CERTIFICATE OF COMPETENCE

Qualification in accordance with CQC's procedure for Qualifications and Training Management (CDMP01):

Name: Dong Chunsong
CDM validator: Yes
CDM verifier: Yes
Technical expert: /
Technical areas: TA1.2:Energy generation from renewable energy sources
TA13.1: Waste handling and disposal

Approved by:
(Quality manager)

Date: 2011-03-17

中国质量认证中心
CHINA QUALITY CERTIFICATION CENTRE

CERTIFICATE OF COMPETENCE

Qualification in accordance with CQC's procedure for Qualifications and Training Management (CDMP01):

Name: Zhang Lixin
CDM validator: Yes
CDM verifier: Yes
Technical expert: /
Technical areas: TA1.2:Energy generation from renewable energy sources
TA13.1: Waste handling and disposal

Approved by:
(Quality manager)

Date: 2011-03-17

中国质量认证中心
CHINA QUALITY CERTIFICATION CENTRE

CERTIFICATE OF COMPETENCE

Qualification in accordance with CQC's procedure for Qualifications and Training Management (CDMP01):

Name: Wang Zhenyang
CDM validator: Yes
CDM verifier: Yes
Technical expert: /
Technical areas: TA1.2:Energy generation from renewable energy sources
TA 8.1:Mining and mineral processes, excluding those included in TA 8.2
TA 10.1:Mining and mineral processes, exduding those included in TA 10.2

Approved by:
(Quality manager)

Date: 2011-03-17

APPENDIX D: REFERENCE LIST

Code	Document
/1/	CER Monitoring report (MP: 25th February 2011 ~ 24th August 2011), Version 1.0, 9th September 2011
/2/	CER monitoring report (MP: 25th February 2011 ~ 24th August 2011), Version 2.0, 4th November 2011
/3/	ACM0001 – Consolidated baseline and monitoring methodology for landfill gas project activities, Version 5
/4/	AMS-I.D. – Grid connected electricity generation from renewable sources, Version12
/5/	CDM Validation and verification manual, Version 01.2
/6/	● The 1st and 2nd periodic Monitoring report developed by PP and related verification and certification report issued by SGS ● The 3rd ~ 5th periodic monitoring report developed by PP and related verification and certification report issued by CQC
/7/	Tool to determine project emissions from flaring gases containing methane, Version 1
/8/	Registered PDD of Mianyang landfill gas utilization project, Version 06
/9/	CDM monitoring & quality control manual for Mianyang landfill gas utilization project, Version 7, 11th January 2011
/10/	Hourly data to determine the project emission and CER calculation sheet, version 1, 9th September 2011
/11/	Type N thermocouple WRMK-331 user manual
/12/	Explosion prevention thermal resistance WZP-341 user manual
/13/	Kingways V-cone flow meter user manual
/14/	Rosemount 3051 Pressure Transmitter user manual
/15/	Mianyang landfill gas utilization plant CDM monitoring equipment calibration record (unique site meter codes, Instrument& Calibration File)
/16/	Mianyang landfill flare design drawing
/17/	Guardin plus infra-red gas monitor operating manual
/18/	Metrology law of the People's Republic of China
/19/	Rules for the Implementation of the Metrology Law of the People's Republic of China
/20/	● Chinese national standard GB16889-1997 – Standard for pollution control on the landfill site of municipal solid waste ● Chinese national standard GB16889-2008 – Standard for pollution control on the landfill site of municipal solid waste
/21/	JJG640-1994 - Verification regulation of differential pressure type flow meters
/22/	JJG874-2007 - Verification Regulation of Temperature Indication Controller
/23/	JJF1076-2001 – Verification regulation of humidity sensor

/24/	JJG351-1996 - Verification Regulation of Working Base Metal Thermocouple
/25/	JJG229-1998 – Verification regulation of industry platinum copper resistance thermometers
/26/	JJG693-2004 – Verification regulation of the alarm detectors of combustible gas
/27/	JJG882-2004 – Verification regulation of the pressure transmitter
/28/	Internal audit report, March 2011 Management review report, 25th March 2011
/29/	Daily operational log book (February ~ August, 2011)
/30/	Flare operational manual
/31/	Flare system purchasing contract
/32/	Flare system specification sheet
/33/	AM_CLA_0047_Temperature of the exhaust gases at the sampling point inside the flare
/34/	● A research of Landfill Gas Production and Usage in China, Journal of Sichuan University of Science & Engineering (Natural Science Edition), by Huang Yi & He Qiang, February 2008 ● Gas Generation and Pollution in Sanitary Landfill Site, Environmental Science and Technology (Vol. 28, No.1, January 2005), by SHI Qian & LIU Li-xia ● Research into Transport Law of Landfill Gas under Temperature Effect, Journal of Liaoning Technical University (Vol. 23 No. 1, February 2004), by CAO Guo-qiang, LIANG Bing, BAO Ming-yu ● Recovery and landfill gas, Environmental protection (Aug 2001) by Zhouhongjun, Wuquangui ● Optimum design of landfill gas collection system with vertical extraction well, Techniques and Equipment for Environmental Pollution Control, Vol. 4, No.3, March 2003), by Peng Xuya, Liu Guotao & Yu Yi
/35/	LFG Collecting Pipelines layout drawing
/36/	Grid connection layout drawing
/37/	JJG596-1999 – Verification regulation of electrical energy meters with electronics
/38/	Power purchase agreement (PPA) for Year 2011
/39/	Internal combustion engines purchase contract
/40/	Electricity sales invoices and balance bills (electricity power supplied to the grid company, February ~ August, 2011)
/41/	Guidelines for assessing compliance with the calibration frequency requirements, version 01, EB52 report Annex 60, 12/02/2010
/42/	Engine-Generator sets purchasing contracts