

***VERIFICATION REPORT OF THE “CHOL
CHAROEN GROUP WASTEWATER
TREATMENT WITH BIOGAS SYSTEM I
(CHOLBURI)”***



Voluntary Carbon Standard 2007.1

Monitoring Period: 01 January 2009 – 30 September 2010
(including both days)

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Approved by: Markus Weber	Organizational unit: Greenhouse Gas Services
Client: South Pole Carbon Asset Management Ltd.	Client ref. Mr. Patrick Burgi; Managing Partner
Summary: Germanischer Lloyd Certification GmbH (GLC) has performed the VCS verification of the project "Chol Charoen Group Wastewater Treatment with Biogas System 1 (Cholburi)" with regard to the relevant requirements for VCS project activities. The project was validated and registered with reference no. 430 under VCS (Voluntary Carbon Standard) program on 2010-05-21. This is the second periodic verification of this project which covers the period from 2009-01-01 to 2010-09-30. The project is verified against the VCS 2007.1. The project activity involves recovery of biogas from wastewater generated from starch manufacturing process through Anaerobic Fixed Film Reactor (AFFR) technology. The recovered biogas is used in boiler to generate heat required for starch drying process and in gas engines to produce electricity. Surplus gas, if any, is flared in an enclosed flaring system from safety point of view. The project is a small scale project activity and there are three methodologies applied to estimate the GHG emission reductions. • AMS III.H, version 13: Methane recovery in wastewater treatment • AMS I.D, version 14: Grid connected renewable electricity generation • AMS I.C, version 15: Thermal energy production with or without electricity A risk based approach has been followed in this verification. In the course of verification, 7 Corrective Action Requests (CAR), 4 Clarification Requests (CL) and 2 Forward Action Request (FAR) have been raised. All the CARs and CLs have been closed out successfully. The FARs from previous verification, applicable to the current verification period, have been verified and closed out. The verification is based on the monitoring plan of registered VCS Project Description document (VCS PD) (VCS Ref. No. 430, https://vcsprojectdatabase1.apx.com/mymodule/ProjectDoc/EditProjectDoc.asp?id1=430), monitoring report (MR), Project Description (VCS PD), and other supporting documents made available to the verification team by project participants.	

As a result of the verification, the verifiers confirm that:

The GHG emission reduction in the verification period (2009-01-01 to 2010-09-30, including both the days) is: **46,987 t CO₂e**.

Emission reductions 2009	19,888	t CO ₂ e
Emission reductions 2010	27,099	t CO ₂ e
Emission Reductions Total	46,987	t CO ₂ e

GLC does not assume any responsibility towards the issuance and utilization of VCUs hereby verified and certified. Request for issuance of VCUs shall be made by the project participants to an approved VCS Program Registry based on the requirements set out under the most recent version of the VCS Program Guidelines on VCS Registration and issuance process. The verification of reported emission reductions is based on the information made available to GLC and the engagement conditions detailed in this report. Hence, GLC cannot be held liable by any party for decisions made or not made based on this report.

Report No.: VCS 025		Subject Group: Greenhouse Gas		Indexing terms Voluntary Carbon Standard	
Report title: Chol Charoen Group Wastewater Treatment with Biogas System I (Cholburi)					
Work carried out by: Mr. Markus Weber Mr. Srikanth Meesa Mr. Karunakar Avuram Dr. Stephen P Etheridge Mr. Chotipat Sangmanee					
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Date of this revision: 2011-04-13	Rev. No.: 01	Number of pages: 75		☒ No distribution without permission from the Client or responsible organizational unit ☐ Limited distribution ☐ Unrestricted distribution	

Abbreviations

AFFR	Anaerobic Fixed Film Reactor
BL	Baseline
CAR	Corrective Action Request
CCCL	Chol Charoen Company Limited
CDM	Clean Development Mechanism
CH ₄	Methane
CL	Clarification Request
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
COD	Chemical Oxygen Demand
DOE	Designated Operational Entity
ER	Emission Reduction
FAR	Forward Action Request
FM	Wastewater flow meter
GHG	Green House Gas(es)
GM	Gas flow meter
HFO	Heavy Fuel Oil
ISO	International Organisation for Standardisation
MP	Monitoring Plan
MR	Monitoring Report
PD	Project Description
PP	Project Participant
QA/QC	Quality Assurance / Quality Control
t CO ₂ e	Ton of Carbon dioxide equivalent

UNFCCC	United Nations Framework Convention on Climate Change
VCS	Voluntary Carbon Standard
VCSA	VCS Association
VCS 2007.1	Voluntary Carbon Standard - Version 2007.1
VCS PD	VCS Project Description
VCU	Voluntary Carbon Unit
VER	Voluntary Emission Reduction
VVM	Validation and Verification Manual

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1. INTRODUCTION

South Pole Carbon Asset Management Ltd. has commissioned Germanischer Lloyd Certification GmbH (GLC) to carry out the 2nd periodic verification of the emission reductions reported for the VCS project activity “Chol Charoen Group Wastewater Treatment with Biogas System I (Cholburi)” with regard to the relevant requirements for VCS program as per the Voluntary Carbon Standard 2007.1 (VCS 2007.1).

This verification report summarizes:

- (i) The findings from the VCS verification for the current monitoring period from 2009-01-01 to 2010-09-30; and
- (ii) Certification statement for the emission reductions.

1.1. Objective

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

VCS Certification is the written assurance by a Certification Entity (which is approved/registered as a certifier by VCSA) that, during a specific period in time, a project activity achieved the emission reductions as verified.

The objective of this verification was to verify and certify emission reductions reported for the project activity “Chol Charoen Group Wastewater Treatment with Biogas System I (Cholburi)” for the monitoring period from 2009-01-01 to 2010-09-30.

One of the objectives is also to confirm that the monitoring system is implemented and fully functional to generate Voluntary Emission Reductions (VERs/VCUs) without any double counting.

1.2. Scope and Criteria

1.2.1. Scope of the verification

The scope of the verification is:

- To ensure that the project activity has been implemented and operated as per the registered VCS PD and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place.
- To verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan as per the registered VCS PD.

- To evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance whether the reported GHG emission reduction data is free from material misstatement.
- To verify that the reported GHG emission data is sufficiently supported by evidence.¹

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

The project design, its eligibility as project activity under VCS 2007.1 guidelines and the correct application of the approved CDM baseline and monitoring methodologies have already been validated and registered (Report No. 53208109–08/510 issued on 2009-11-14)^{/12/}. As stated in the validation report, the validation opinion of the DOE is that the project activity as described in the registered VCS PD, version 3.1 dated 2009-09-16^{/2/} meets all VCS Program requirements as set out in the VCSA Rules (Voluntary Carbon Standard – 2007.1 and Voluntary Carbon Standard Program Guidelines 2007.1) and correctly applies the CDM approved baseline and monitoring methodologies.

1.2.2.Verification Criteria

The verification team has focused on the identification of significant reporting risks and verifying the mitigation measures for these risks based on the recommendations in the latest version of the “Validation and Verification Manual (VVM)”^{/1/}, “ISO 14064-3 “Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions and employed a risk-based approach”^{/11/}.

According to the requirements and guidance of VCS 2007.1, the criteria of this verification include the relevant applicable rules and steps for VER verification under the CDM excluding the following:

- The public availability of the VER/VCS Monitoring Report;
- Confirmation of contribution of the project activity towards sustainable development in the country where the project is located
- The public availability of the Verification Report and Certification Statement.

¹ As per VCS, Verified Emission Reductions (VERs) are considered to be VCUs only after successful registration in an approved VCU Registry

1.3. VCS Project Description:

1.3.1. Project Characteristics

Table 1-1: Project Characteristics

Item	Data
Title of the project activity	Chol Charoen Group Wastewater Treatment with Biogas System I (Cholburi)
Project Location (specific Address, Country)	Address: 204 Moo 3 Nongchak, Banbung, Cholburi, 20170 – Thailand Country: Thailand
Project participants	Chol Charoen Co. Ltd. South Pole Carbon Asset Management Ltd.
Project Entities	Chol Charoen Co. Ltd. 1004/200 Rama 3 Road Bangpongpan, Yannawa, 10120 Bangkok Thailand South Pole Carbon Asset Management Ltd. Technoparkstrasse 1 Zurich-8005 Switzerland
Applied Methodology	AMS III.H., version 13: Methane recovery in wastewater treatment AMS I.D., version 14: Grid connected renewable electricity generation AMS I.C., version 15: Thermal energy production with or without electricity
Sectoral Scope	13 & 1
Project crediting period	2007-01-01 to 2016-12-31
Period verified in this verification	2009-01-01 to 2010-09-30

1.3.2. Project Background

The project activity involves installation of an anaerobic wastewater treatment facility at Chol Charoen Co. Ltd., a tapioca starch factory in Cholburi, Thailand. The starch factory has a total design production capacity of 240 tonnes of dried starch per day generating approximately 2400 m³ of wastewater every production day.

Prior to project implementation, the wastewater released from the plant was treated with an open anaerobic lagoon system consisting of 13 cascading open lagoons. With the depth of these ponds being greater than 2 m from the water surface and the mean temperature of the area in the range of 29 °C, there is a suitable anaerobic environment within the ponds for anaerobic bacteria. This results in the breakdown of organic compounds in the wastewater, which consequently leads to methane generation that is released into the atmosphere.

The project activity involves modification of previous open lagoon system into closed anaerobic system for treatment of wastewater containing high organic matter. The modified system is based on the Anaerobic Fixed Film Reactor (AFFR) technology. The use of AFFR technology to treat wastewater enables capturing of methane that would have been released into the atmosphere. The captured methane (biogas) is utilised as fuel in existing boiler and gas engines to generate thermal and electrical energy respectively. The project activity, thereby, contributes to green house gas (GHG) emission reduction.

As per the registered VCS PD (VCS Ref No: 430) of the VCS project, total baseline emissions are calculated as the sum of baseline emissions of the wastewater treatment system affected by the project activity, baseline emissions from electricity generation and baseline emissions from heat displacement by the project activity. Project emissions are calculated as the sum of emissions from electricity or fuel consumption, methane emissions from wastewater treatment system affected by the project activity, fugitive methane emissions released from capturing system and methane emissions from flaring. The emission reduction is calculated as the difference of baseline emissions and the project emissions as the leakage emissions are considered to be negligible for the project activity as per the applied methodologies.

Further background information on the project activity can be found in the VCS PD as well as the Validation and the first Verification reports which are available on the VCS website at:

<https://vcsprojectdatabase1.apx.com/mymodule/ProjectDoc/EditProjectDoc.asp?id1=430>

The first verification corresponds to the monitoring period from 2007-01-01 to 2008-12-31.

This is the second verification period and the total emission reduction for the current verification period (2009-01-01 to 2010-09-30) is 46,987 tCO₂e. The emission reduction is calculated conservatively as per the applied methodologies.

The project activity is located at the industrial facility of Chol Charoen Co. Ltd., 204 Moo 3 Nongchak, Banbung, Choburi, 20170 – Thailand.

Main components of the project activity include AFFR, Covered lagoons, Hot oil boiler, Gas engines, Cascading lagoons (Evaporation ponds) and Flaring system.

Table 1-2: Brief technical description of the project components

Component	Description
AFFR	There are two AFFR based digesters with a total volumetric capacity of about 10,000 m ³ . The design COD removal efficiency is 80%. The hydraulic retention time is approximately 5 days as per the design provided by the supplier.
Boiler	This is a dual fired boiler with a thermal capacity of 3.78 MW _{th} . The boiler has biogas consumption capacity of 834 Nm ³ /hr at full operation capacity.
Gas Engines	There are three gas engines as part of the project activity; one of them has a rated capacity of 952 kW and two of them have 500 kW each. The total biogas consumption rate at full load is 926 Nm ³ /hr
Auxiliary drives	The total capacity of auxiliary drives installed under the project activity is 139.35 kW
Gas storage system	Three covered lagoons and two AFFR are used as gas storage system

1.3.3. Level of Assurance

As VCS 2007.1 only recognizes verified emission reductions, GLC has focused on providing a reasonable level of assurance that the emission reduction calculation methodologies used are appropriate and correctly applied, and that emission reductions have been accurately monitored.

In accordance with the recommendation in the latest version of the Validation and Verification Manual ^{/1/}, GLC may “discount verified emission reductions or request a

discount of these by using conservative assumptions for uncertainties in emission reduction calculations that cannot be fully quantified or that cannot give a desired level of assurance". For verifying/certifying VERs, the desired level of assurance was based on the combined quantitative assessment of the accuracy of monitoring project performance and the identification of material risks. For this verification, GLC is able to give a reasonable level of assurance.

2. METHODOLOGY

2.1. Verification Process Summary

The verification process was carried out inline with the requirements VCS 2007.1. In addition, the verification team followed the guidelines of the latest version of the Validation and Verification Manual ^{/1/}. Standard auditing techniques were also applied during the verification. The verification team performed first a desk review, followed by an on-site visit to review the project realization.

The verification process was based on assessment of the validated and registered VCS PD ^{/2/}, the monitoring report (MR) ^{/3/}, emission reduction calculation spreadsheet ^{/4/}, supporting documents made available to the verifier and information collected through performing interviews during the on-site assessment. Furthermore publicly available information was considered as far as available and required.

The verification was carried out on the basis of the following requirements, applicable for this project activity:

- Requirements and guidance of VCS 2007.1 ^{/22/23/}
- Applicable CDM guidelines and requirements, including applicable relevant methodological decisions made by the CDM Executive Board
- CDM Validation and Verification Manual ^{/1/}
- Other relevant rules, including the host country legislation
- Monitoring plan as given in the registered VCS PD ^{/2/}
- Approved CDM Methodologies (AMS III.H., AMS I.D., & AMS I.C.) ^{/14/}

2.2. Verification Team

A competent team with relevant knowledge and experience in the specific scopes and sectors is appointed.

The verification team consists of the following members:

Table 2-1: Verification Team

	Name	Function ¹⁾	Scope Specific Knowledge	Sector Specific Knowledge	Host Country Knowledge	Type of involvement					
						Desk Review	On-site visit / interviews	Reporting	Expert input	Technical review	Approval
☒ Mr. ☐ Ms.	Markus Weber	ATL	x	x							x
☒ Mr. ☐ Ms.	Srikanth Meesa	A	x	x	x	x	x	x			
☒ Mr. ☐ Ms.	Karunakar Avuram	A	x	x		x	x	x			
☒ Mr. ☐ Ms.	Stephen P. Etheridge	E	x	x	x		x		x		
☒ Mr. ☐ Ms.	Chotipat Sangmanee	E			x		x		x		
☒ Mr. ☐ Ms.	Jose-Emilio Moreno	TR	x	x						x	
☐ Mr. ☒ Ms.	Anu Chaudhary	TR	x	x						x	

1) ATL: Assessment Team Leader; A: Auditor, E: Expert; TR: Technical Reviewer

Duration of the verification

- Preparations : from 2010-10-29 to 2010-11-05
- On-site verification: from 2010-12-01 to 2010-12-02
- Reporting/QA : from 2010- 12-06 to 2011-04-13

2.3. Review of Documentation

During the desk review all documents initially provided by the client and publicly available documents relevant for the verification were reviewed. The main documents are listed below:

- Monitoring report ^{/3/}
- Emission reduction calculation sheet ^{/4/}
- The validated VCS PD, ^{/2/} including the monitoring plan and the corresponding validation report ^{/12/}
- Previous verification report ^{/13/}
- The applied monitoring methodologies ^{/14/}
- Requirements and guidance of VCS 2007.1 as well as applicable methodological relevant decisions, clarifications and guidance from the CDM Executive Board
- Any other information and references relevant to the project activity's resulting emission reductions (e.g., IPCC reports, data on electricity generation in the national grid or laboratory analysis and national regulations)
- Addressing of FARs identified during previous verification

2.4. On-site assessment

On 2010-12-01 and 2010-12-02, GLC carried out an on-site visit to Chol Chareon Co. Ltd. (CCCL) site where the project is implemented. During the visit, GLC verified that the actual implementation of the project was as described in the registered VCS PD.

On-site inspection included review of data and records, interviews with shift engineer, section manager and plant managers, operations and maintenance personnel, confirming all data sources and constants used in the Monitoring Report.

The main tasks covered during the on-site visit included, but were not limited to:

- Confirmation that all project equipments have been installed and are operated as per the monitoring plan in the VCS PD.
- The operating staff was interviewed and observed in order to check the risks of inappropriate operation and data collection procedures
- Information processes for generating, aggregating and reporting the selected monitored parameters were reviewed
- Calibration records of all metering equipment were checked
- Monitoring processes, routines and documentations were audited

- The monitored data was checked completely

Representatives of CCCL including the operational staff of the plant and South Pole Carbon Asset Management Ltd. (project consultant) were interviewed to confirm selected information and to resolve issues identified in the document review.

The main topics of the interviews are summarized in Table 2-2.

Interview Topic	Interviewed persons and source of information
- General aspects of the project	Ms. Kamontorn Muckvichit, Quality Control Supervisor, CCCL.
- Technical equipment and operation	Ms. Arporn Drsee, Quality Control, CCCL
- Changes since validation	Mr. Kasin Kamsuk, Quality Control, CCCL
- Monitoring and measurement equipment	Mr. Patrick Burgi, Managing Partner, South Pole Carbon Asset Management Ltd.
- Remaining issues from validation	Ms. Nattaya Lonawan, M & V Project Manager, South Pole Carbon Asset Management Ltd.
- Calibration procedures	Mr. Harshpreet Singh, CDM Project Manager, South Pole Carbon Asset Management Ltd.
- Quality management system	
- Involved personnel and responsibilities	
- Training and practice of the operational personnel	
- Implementation of the monitoring plan	
- Monitoring data management	
- Data uncertainty and residual risks	
- GHG calculation	
- Procedural aspects of the verification	
- Maintenance	
- Environmental aspects	

2.5. Reporting of Findings and Resolution of Outstanding Issues

On the basis of the desk review, the on-site visit, follow-up interviews and further background investigation the verification report is completed.

Findings established during the verification may be that:

- i) The verification is not able to obtain sufficient evidence for the reported emission reductions or part of the reported emission reductions. In this case these emission reductions shall not be verified and certified;
- ii) The verification has identified material misstatements in the reported emission reductions.

A detailed list of verification findings form the findings report, which is sent to the client for resolution of raised CARs, CLs and FARs.

Nonconformities raised during the verification can either be seen as a non-fulfillment of criteria ensuring the proper implementation of a project or where a risk to deliver high quality emission reductions is identified.

Corrective Action Requests (CARs) are issued, if:

- 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 that will impair the estimate of emission reductions;
- issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants

Clarification Request (CL) is raised if the information is insufficient or not clear enough to determine whether the applicable VCS or CDM requirements have been met.

Forward Action Request (FAR) is raised if the monitoring and reporting require attention and/or adjustment for the next verification period.

For a detailed list of all CARs, CLs and FARs raised in the course of current verification please refer to Annex-1.

2.6. Technical Review

Before submission of the final report a technical review of the verification report is carried out. The technical reviewer is a competent GHG auditor appointed for the scope the project activity falls under.

As a result of the internal review process the verification opinion and the topic specific assessments as prepared by the verification team leader may be confirmed or revised. Furthermore reporting improvements might be achieved.

3. VERIFICATION FINDINGS

3.1. Remaining issues, FARs from previous validation or verification

The verification team has reviewed validation report and previous verification report available on VCS database at

<https://vcsprojectdatabase1.apx.com/mymodule/ProjectDoc/EditProjectDoc.asp?id1=430>

Four forward action requests (FARs) were raised during the previous verification ^{/13/} as mentioned below:

Table 3.1: Pending issues from previous verification

FAR Ref No. from previous verification report	Description of FAR	Status
3.2-1	Marking of flow direction and name of the fluid on all HDPE pipelines (wastewater & biogas) within the project boundary are requested to facilitate easy traceability during next verification	This FAR is being carried forward. Kindly refer FAR 2 in Annex-1 of this report.
3.3-3	Gas flow meter for the measurement of flaring gas and wastewater flow meters need to be installed for the next verification period.	This issue is closed. Gas flow meter for flaring and wastewater flow meters have already been installed. Kindly refer section 3.3 below for details.
3.3-4	The operational conditions of the dual fuel boiler need to be verified during the subsequent verifications. In case it is found that the existing boiler is replaced with new boiler during any monitoring period, no emission reduction shall be claimed for heat displacement.	This FAR is being carried forward. Kindly refer FAR 1 in Annex-1 of this report.
3.3-5	Flame detection system and temperature monitoring device need to be in place as per the	This issue is closed as the temperature detection system is provided for flaring. CL-1 in

	requirement of flare tool for the enclosed flare.	Annex-1 of the report may be referred.
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3.2. Project implementation in accordance with the previously validated VCS PD

On the basis of the on-site visit and the reviewed project documentation, the verification team confirms that the project was implemented as described in the registered VCS PD. All the physical components and project boundary are in conformity with the description in the registered VCS PD.

The project activity involves capturing of methane generated from the wastewater treatment through AFFR technology. The captured methane (biogas) is utilized as fuel in hot oil boiler and gas engines replacing conventional fossil fuel.

GLC verification team has also verified that all the parameters are monitored as described in the monitoring plan of the VCS PD in order to calculate the achieved emission reductions.

3.2.1. Eligible GHGs

Table 3.2: Emission sources and gases included in the project boundary

	GHGs involved	Description
Baseline emissions	CH ₄	Major green house gas that is emitted from the wastewater due to decomposition of organic matter
	CO ₂	Fossil fuel based grid electricity is consumed for the operation of wastewater treatment system
		Emissions from fossil fuel (HFO) used to produce thermal energy in the baseline scenario
Project emissions	CH ₄	Emissions from wastewater treatment in the project activity which include decomposition of organic matter in the open lagoons, physical leakage in the biogas digesters and incomplete flaring
	CO ₂	Onsite electricity consumed by project activity which is not generated from biogas

		<i>Emissions from onsite fossil fuel (fuel oil) consumption in the project activity</i>
<i>Leakage</i>	<i>Nil</i>	<i>No leakage emissions are associated with the project activity.</i>

3.2.2. Project Starting Date and Emission Reduction Start Date

According to the VCS Program the project start date is the date the project activity began reducing or removing GHG emissions.

The project start date was 2006-07-01 ^{/12/}, the date on which emission reduction began. However, due to insufficiency of monitoring equipment, the operational period in the year 2006 was neglected claiming for the emission reduction. Therefore, the starting date of the crediting period was considered as, 2007-01-01.

3.2.3. Project Boundary

As per the AMS III.H., AMS I.D. and AMS I.C., the project boundary shall respectively include the following:

“The project boundary is the physical, geographical site where the wastewater and sludge treatment takes place in baseline and project situation. It covers all facilities affected by the project activity including sites where the processing, transportation and application or disposal of waste products as well as biogas takes place”.

“The physical, geographical site of the renewable energy generation source delineates the project boundary”.

“The physical, geographical site of the project equipment producing the renewable energy delineates the project boundary. The boundary also extends to the industrial, commercial or residential facility, or facilities, consuming energy generated by the system and the processes or equipment that is affected by the project activity.”

The project boundary was clearly described in the registered PD section 2.3. For emission sources and gases included in the project boundary, see Section 3.2.1.

3.2.4. Baseline Determination

While the baseline determination for the project activity was previously assessed as part of the validation of the project under VCS 2007.1, it is confirmed that:

- i) The project fulfills the criteria of VCS 2007.1 and the additionality is sufficiently justified
- ii) The monitoring plan is transparent, adequate and inline with the applied baseline and monitoring methodologies; AMS III.H version 13: “Methane Recovery in Wastewater Treatment”, AMS I.D version 14: “Grid Connected

Renewable Electricity Generation” and AMS I.C version 15: “Thermal energy production with or without electricity.”

- iii) The baseline and monitoring methodologies have been correctly applied.

Methane avoidance component:

The baseline scenario, as per the VCS PD, to the project activity is defined as *“Introduction of a sequential stage of wastewater treatment with biogas recovery and combustion, with or without sludge treatment, to an existing anaerobic wastewater treatment system without biogas recovery”*. At the project location, open anaerobic lagoons without biogas recovery represent the existing wastewater treatment system and the biogas reactor system is being introduced as a sequential stage with methane recovery to the existing lagoon system.

The baseline scenario consists of 13 open lagoons, which were used to treat wastewater prior to project implementation. These lagoons had depth of around 6 m, thus they can all be considered as anaerobic lagoons according to methodology AMS III.H.

Electricity generation component:

In the absence of the project activity, equivalent electrical energy would have been consumed from the existing fossil fuel grid.

Thermal energy generation component:

In the absence of project activity, this process would have been done through utilisation of fuel oil. This is thus in accordance to paragraph 6 in AMS I.C (Version 15), that renewable energy technology is being used to displace technology using fossil fuel.

Baseline emissions are estimated inline with the applied methodologies. Baseline emissions include emission reduction from capturing of methane generated from wastewater, electricity generated from gas engines replacing equivalent energy from the grid and replacing of fuel oil with biogas in heat generating equipment.

Detailed information regarding baseline determination for project activity is available in the VCS PD, Version 3.1 dated 2009-09-16 ^{/2/}.

3.2.5. GHG Emission

As the project description document was previously assessed by another DOE as part of the validation of the project under VCS 2007.1, it is thus confirmed that the approach for determining project and baseline emissions are appropriate and in accordance with the selected baseline and monitoring methodologies. Project emissions include emissions from electricity consumption in project activity, emissions from wastewater treatment system affected by the project activity and not equipped with biogas recovery in the project situation, fugitive emissions through capture

inefficiencies in the anaerobic wastewater treatment and methane emissions due to incomplete flaring.

3.2.6. Leakage Emission

As there was no transfer or shifting of equipment from another activity to the project activity, according to the applied methodologies, leakage emission is not considered.

3.3. Completeness of monitoring

The monitoring report ^{/3/} submitted to the verification team is in line with the requirements of the monitoring plan of the registered VCS PD^{/2/} as well as with the applied methodologies – AMS III.H. version 13, AMS I.D. version 14 and AMS I.C. version 15. ^{/14/}

The verification team has followed two steps to assess the completeness of the monitoring. The first step is document review and the second one is on-site interviews and observations. As a part of the step 1, the verification team has reviewed the submitted documents; MR^{/3/}, ER sheets^{/4/} and supporting documents stated in section 5. On-site visit was conducted on 01 & 02 December 2010. Based on the document review and site visit observations, verification team has raised findings as stated in Annex-1.

As per the applied methodology, AMS III.H., the baseline emissions are determined by measuring flow rate of wastewater and COD of wastewater at inlet and outlet of the AFFR. As per the methodology achieved emission reductions are the lowest of the emission reductions determined using ex-post calculated baseline, project and leakage emissions based on actual monitored data for the project activity (COD approach) and the amount of biogas recovered and fuelled or flared (MDy) during the crediting period, that is monitored ex post (biogas approach). These calculations are transparently presented in the provided final emission reduction sheet.

According to AMS I.D., the electricity component of the baseline emission is calculated as the product of net electricity generation and the grid emission factor.

As per the applied methodology AMS I.C., the baseline emissions are estimated for heat replacement as difference of fossil fuel (fuel oil) consumption in baseline scenario and in project scenario. The fuel oil consumption in the baseline scenario is estimated by taking the historical value of specific fuel consumption and the starch production during the monitoring period. This approach is inline with the deviation-2 stated in the registered VCS PD. ^{/2/}

Emission reduction is calculated as the difference between baseline emissions and project emissions. The procedure to estimate the baseline and project emissions is detailed in the VCS PD ^{/2/}. Detailed calculation of baseline and project emissions are presented in the emission reduction spread sheets ^{/4/} in an understandable format.

During the site visit, verification team has verified the “Quantity of wastewater treated through AFFR technology”, “COD of wastewater at inlet and outlet of the AFFR”, “Total

biogas consumption", "Methane content of biogas", "Energy generation", "Quantity of fuel oil consumption", etc. with the log books. The plant personnel involved in monitoring of the VCS project were interviewed and found competent enough to maintain the required data. The data provided in the MR and ER sheet was also verified. The calibration certificates^{/5/} of all the measuring instruments (wastewater flow meters, biogas flow meters, gas analyser, COD measuring equipment, fuel oil meter and power meter) were also verified during the site visit.

The flow meters to measure the quantity of wastewater were installed on 2009-11-08. During the period from 2009-01-01 to 2009-11-08, the wastewater quantity was estimated based on the rated capacity of the pump and the operating hours as per the deviation-1 stated in the registered VCS PD.^{/2/}

The monitoring report and the monitoring plan of the registered VCS PD^{/2/}, states that the following parameters mentioned in the Table shall be monitored:

	Assessment/ Observation
Data / Parameter: (as per the registered VCS PD):	Q _{ww} (Volume of wastewater treated, m ³)
Measuring frequency:	Continuously. The parameter is measured on a continuous basis and recorded by the flow meters (FM1, FM2 & FM3). The measured data is logged in on a daily basis. The verification team has checked the log books ^{/9/} and interviewed the site personnel and found that the log book data is consistent with the data provided in the final ER sheet and the plant operating personnel are competent.
Reporting frequency:	Daily
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The measuring and reporting frequency is inline with the monitoring plan of the registered VCS PD. ^{/2/}
Type of monitoring equipment:	Electromagnetic liquid flow meters of accuracy $\pm 0.2\%$. The serial numbers of the meters are YAL1263, YAL1264 and YAL1265.
Is accuracy of the monitoring equipment as stated in the VCS PD? If the VCS PD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring	Yes. The accuracy of the meters is as specified in the VCS PD. ^{/2/}

practice?	
Calibration frequency /interval:	The flow meters are calibrated at least once in 3 years. All the three flow meters (FM1, FM2 & FM3) are calibrated on 2010-10-21 and the initial calibration was carried on 2009-07-07. ^{/5/}
Is the calibration interval in line with the monitoring plan of the VCS PD? If the VCS PD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	Yes. The defined calibration frequency is inline with the monitoring plan of registered VCS PD. As mentioned above, the actual calibration frequency is less than 3 years which represents a good practice.
Company performing the calibration:	The calibration was carried out by "Miracle International Technology Co. Ltd", Bangkok.
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes. The calibration certificates were checked and the meter was found functioning properly.
Is (are) calibration(s) valid for the whole reporting period?	Yes. As discussed above all the calibration certificates ^{/5/} were verified and valid for the whole reporting period.
If applicable, has the reported data been cross-checked with other available data?	Yes. The reported data was cross checked with the daily log sheets during the verification site visit. All the reported values were found correct.
How were the values in the monitoring report verified?	Please see 3.5 and 3.6
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Please see 3.5 and 3.6

	Assessment/ Observation
Data / Parameter: (as per the registered VCS PD):	HR _{ww} (Running hours of wastewater pumps, Hour)

Measuring frequency:	Measured continuously using hourly meters. Measurement is made continuously and the cumulative reading is recorded daily.
Reporting frequency:	Daily.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The measuring and reporting frequency is inline with the monitoring plan of the VCS PD. ^{12/}
Type of monitoring equipment:	Electromechanical counter. There are three counters (HM1, HM2 & HM3) for three pumps.
Is accuracy of the monitoring equipment as stated in the VCS PD? If the VCS PD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practice?	VCS PD does not specify the accuracy of counters.
Calibration frequency /interval:	The performance of electromechanical counters is cross checked with the help of a web based counter on. A latest report dated 2009-09-13 was submitted to GLC. It was found that the performance of the counters was satisfactory.
Is the calibration interval in line with the monitoring plan of the VCS PD? If the VCS PD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	The monitoring plan does not specify anything about calibration. The counters were in use till the time of flow meters installation i.e. 2009-11-08.
Company performing the calibration:	NA.
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Based on the performance cross check report, it was found that the counters were functioning properly.
Is (are) calibration(s) valid for the whole reporting period?	The counters are not in use after the installation of flow meters.
If applicable, has the reported data been cross-checked with other	Yes. The reported data was cross checked with the daily log sheets during the verification site visit. Some of the values

available data?	were found to be different. A CAR was raised (please refer CAR 3 in Annex 1) to correct the data. The values were corrected and the emission reduction was re-calculated.
How were the values in the monitoring report verified?	Please see 3.5 and 3.6
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Please see 3.5 and 3.6

	Assessment/ Observation							
Data / Parameter: (as in monitoring plan of the VCS PD):	COD _{ww, untreated} (COD of wastewater entering the treatment plant, mg/l)							
Measuring frequency:	Every operational daily. The COD content is analyzed using a colorimetric method in the on-site laboratory of the treatment plant. The results are logged by the operators in the plant operation report on a daily basis.							
Reporting frequency:	Daily							
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The measuring and reporting frequency is in accordance with the monitoring plan of the VCS PD. ^{/2/}							
Type of monitoring equipment:	<table><tr><td>Type of meter</td><td>Spectrophotometer</td></tr><tr><td>Serial number</td><td>050100006010</td></tr><tr><td>Accuracy</td><td><u>+1</u> nm of wave length or <u>±</u> 0.13% ^{/6/}</td></tr></table>		Type of meter	Spectrophotometer	Serial number	050100006010	Accuracy	<u>+1</u> nm of wave length or <u>±</u> 0.13% ^{/6/}
Type of meter	Spectrophotometer							
Serial number	050100006010							
Accuracy	<u>+1</u> nm of wave length or <u>±</u> 0.13% ^{/6/}							
Is accuracy of the monitoring equipment as stated in the VCS PD? If the VCS PD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring	VCS PD does not specify the accuracy of monitoring equipment. However the accuracy of the instrument, as mentioned above, represents a good practice.							

practice?	
Calibration frequency /interval:	The spectrophotometer which is used to measure COD is calibrated at least once a year. It was calibrated on 2010-05-14, 2009-06-04 and on 2007-10-03. This shows that there is a calibration gap of 8 months between the previous two calibrations. Though the error is within the limits as per the calibration report of 2009-06-04, the PP has applied maximum permissible error of 0.13% for the period from 2009-01-01 to 2009-06-04 as per the guidelines stated in EB 52, Annex 60. Please refer CAR 4 in Annex-1.
Is the calibration interval in line with the monitoring plan of the VCS PD? If the VCS PD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	Yes. The calibration frequency is inline with the monitoring plan of registered VCS PD.
Company performing the calibration:	SPC Calibration Centre Co. Ltd., Bangkok ^{/5/} .
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes. The calibration certificates ^{/5/} were checked and it was evident that the meter is functioning properly.
Is (are) calibration(s) valid for the whole reporting period?	As mentioned above, for the delayed calibration period, the PP has applied maximum permissible error for calculating emission reduction. PP has applied -0.13% for BE calculation and +0.13% for PE calculation. The latest calibration is valid till the end of reporting period.
If applicable, has the reported data been cross-checked with other available data?	Yes. The reported data was cross checked with the daily log sheets during the site visit. Deviation of values was observed on few days. The same was notified to PP and the PP has corrected the values and re-submitted the data sheets, ER calculation sheet and MR (please refer CAR 3 in Annex 1). All the values in the final MR and ER sheets were

	found correct.
How were the values in the monitoring report verified?	Please see 3.5 and 3.6
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Please see 3.5 and 3.6

	Assessment/ Observation							
Data / Parameter: (as in monitoring plan of the VCS PD):	COD _{removed, PJ} (COD of water exiting the AFFR treatment process, tonnes/m ³)							
Measuring frequency:	The parameter is calculated as the difference between inflow COD and the outflow COD of the AFFR system. The COD content is analyzed using a colorimetric method in the on-site laboratory of the treatment plant. The results are logged by the operators in the plant operation report on a daily basis. The inlet and outlet COD of the AFFR system is measured on every operational day.							
Reporting frequency:	Daily							
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The measuring and reporting frequency is in accordance with the monitoring plan of the VCS PD.							
Type of monitoring equipment:	<table><tr><td>Type of meter</td><td>Spectrophotometer</td></tr><tr><td>Serial number</td><td>050100006010</td></tr><tr><td>Accuracy</td><td><u>±</u>1 nm of wave length or <u>±</u> 0.13% ^{/6/}</td></tr></table>		Type of meter	Spectrophotometer	Serial number	050100006010	Accuracy	<u>±</u> 1 nm of wave length or <u>±</u> 0.13% ^{/6/}
Type of meter	Spectrophotometer							
Serial number	050100006010							
Accuracy	<u>±</u> 1 nm of wave length or <u>±</u> 0.13% ^{/6/}							
Is accuracy of the monitoring equipment as stated in the VCS PD? If the VCS PD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring	VCS PD does not specify the accuracy of monitoring equipment. However the accuracy of the instrument, as mentioned above, represents a good practice.							

practice?	
Calibration frequency /interval:	The spectrophotometer is calibrated at least once a year. It was calibrated on 2010-05-14, 2009-06-04 and on 2007-10-03. This shows that there is a calibration gap of 8 months between the previous two calibrations. Though the error is within the limits as per the calibration report of 2009-06-04, the PP has applied maximum permissible error of 0.13% for the period from 2009-01-01 to 2009-06-04 as per the guidelines stated in EB 52, Annex 60.
Is the calibration interval in line with the monitoring plan of the VCS PD? If the VCS PD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	Yes. The calibration frequency is inline with the monitoring plan of registered VCS PD.
Company performing the calibration:	SPC Calibration Centre Co. Ltd., Bangkok ^{/5/} .
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes. The calibration certificates ^{/5/} were checked and it was evident that the meter is functioning properly.
Is(are) calibration(s) valid for the whole reporting period?	As mentioned above, for the delayed calibration period, the PP has applied maximum permissible error for calculating emission reduction. PP has applied -0.13% for BE calculation and +0.13% for PE calculation. The latest calibration is valid till the end of reporting period.
If applicable, has the reported data been cross-checked with other available data?	Yes. The reported data was cross checked with the daily log sheets during the site visit. Deviation of values was observed on few days. The same was notified to PP and the PP corrected the values and re-submitted the data sheets, ER calculation sheet and MR. All the values in the final MR and ER sheets were found correct.
How were the values in the	Please see 3.5 and 3.6

monitoring report verified?	
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Please see 3.5 and 3.6

	Assessment/ Observation																
Data / Parameter: (as in monitoring plan of the VCS PD):	BG _{combusted} (Amount of biogas combusted for gainful use, Nm ³)																
Measuring frequency:	The parameter indicates the sum of biogas utilized for boiler and gas engines. Biogas utilized for boiler and gas engines is measured continuously by gas flow meters, GM1 and GM3 respectively.																
Reporting frequency:	Daily. The measured data is logged in on a daily basis. The verification team has checked the log books ^{/9/} and interviewed the site personnel and found that the plant operating personnel are competent.																
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The measuring and reporting frequency is in accordance with the monitoring plan of the VCS PD.																
Type of monitoring equipment:	<table> <tr> <th>Meter</th><th>GM1</th></tr> <tr> <td>Type of meter</td><td>Differential Pressure transmitter</td></tr> <tr> <td>Serial number</td><td>FE-102</td></tr> <tr> <td>Accuracy</td><td>$\pm 1.0\%$ ^{/6/}</td></tr> <tr> <th>Meter</th><th>GM3</th></tr> <tr> <td>Type of meter</td><td>Thermal mass flow meter</td></tr> <tr> <td>Serial number</td><td>7565</td></tr> <tr> <td>Accuracy</td><td>$\pm 1.0\%$ ^{/6/}</td></tr> </table>	Meter	GM1	Type of meter	Differential Pressure transmitter	Serial number	FE-102	Accuracy	$\pm 1.0\%$ ^{/6/}	Meter	GM3	Type of meter	Thermal mass flow meter	Serial number	7565	Accuracy	$\pm 1.0\%$ ^{/6/}
Meter	GM1																
Type of meter	Differential Pressure transmitter																
Serial number	FE-102																
Accuracy	$\pm 1.0\%$ ^{/6/}																
Meter	GM3																
Type of meter	Thermal mass flow meter																
Serial number	7565																
Accuracy	$\pm 1.0\%$ ^{/6/}																
Is accuracy of the monitoring equipment as stated in the VCS PD? If the VCS PD does not specify the	Yes. The accuracy of the meters is as specified in the monitoring plan of registered																

accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practice?	VCS PD.
Calibration frequency /interval:	The calibration frequency for GM1 is 3 years and for GM3 is 2 years. GM1 was calibrated on 2010-01-12 and 2009-06-10. GM3 was calibrated on 2010-10-27 and 2009-05-27 ^{/5/} .
Is the calibration interval in line with the monitoring plan of the VCS PD? If the VCS PD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	As per the monitoring plan of the VCS PD, the gas flow meters are calibrated once in every 3 years according to equipment's specifications and industrial standards. However, the calibration frequency specified by the equipment manufacturer for GM3 is 2 years. The actual calibration frequency for both the meters is less than 2 years which represents good practice.
Company performing the calibration:	The gas flow meters are calibrated by Miracle International Technology Co. Ltd., Bangkok ^{/5/}
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes. The calibration certificates ^{/5/} were checked and found that the meter was functioning properly.
Is(are) calibration(s) valid for the whole reporting period?	Yes. As discussed above all the calibration certificates were verified and found valid.
If applicable, has the reported data been cross-checked with other available data?	Yes. The reported data in the final MR was crosschecked with the log books during site visit. The data reported was observed to be correct.
How were the values in the monitoring report verified?	Please see 3.5 and 3.6
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Please see 3.5 and 3.6

	Assessment/ Observation								
Data / Parameter: (as in monitoring plan of the VCS PD):	BG _{TOFlare} (Amount of biogas flared, Nm ³)								
Measuring frequency:	Gas flow meter (GM2) was installed to measure continuously and to record the cumulative reading daily. However, the flaring system was not operated even once during the last 3 years. The reason as understood by interviewing the plant personnel during the site visit was that the biogas requirement for boiler and gas engines is more than the biogas generation.								
Reporting frequency:	Not applicable for this monitoring period								
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Not applicable for this monitoring period								
Type of monitoring equipment:	<table border="1"> <thead> <tr> <th>Meter</th><th>GM2</th></tr> </thead> <tbody> <tr> <td>Type of meter</td><td>Differential pressure transmitter</td></tr> <tr> <td>Serial number</td><td>FE-01</td></tr> <tr> <td>Accuracy</td><td>± 1.0%</td></tr> </tbody> </table>	Meter	GM2	Type of meter	Differential pressure transmitter	Serial number	FE-01	Accuracy	± 1.0%
Meter	GM2								
Type of meter	Differential pressure transmitter								
Serial number	FE-01								
Accuracy	± 1.0%								
Is accuracy of the monitoring equipment as stated in the VCS PD? If the VCS PD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practice?	Yes. The accuracy of the meter is as stated in the monitoring plant VCS PD.								
Calibration frequency /interval:	The gas flow meter (GM2) is calibrated at least once in every 3 years. GM2 was calibrated on 2010-01-12 and on 2009-06-10. The calibration frequency is within the specified period. The verification team verified the calibration reports of the meter ^{/5/} .								
Is the calibration interval in line with the monitoring plan of the VCS PD? If	Yes. As per the VCS PD, the calibration is carried out at least once in 3 years by								

the VCS PD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	external agency.
Company performing the calibration:	Miracle International Technology Co. Ltd., Bangkok
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes. The calibration certificates ^{15/} were checked and found that the meter is functioning properly.
Is(are) calibration(s) valid for the whole reporting period?	Yes. As discussed above all the calibration certificates were verified and found valid.
If applicable, has the reported data been cross-checked with other available data?	Not applicable for this monitoring period.
How were the values in the monitoring report verified?	Please see 3.5 and 3.6
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Please see 3.5 and 3.6

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of the VCS PD):	W _{CH4} (Methane content in biogas, %)
Measuring frequency:	Daily. The parameter is measured by a portable gas analyzer and the values are recorded in the log books on a daily basis.
Reporting frequency:	Daily. The reported values were cross checked with the log books. The verification team interviewed the site personnel and found the plant operating personnel are competent.
Is measuring and reporting frequency in accordance with the monitoring	According to the monitoring plan, online gas analyzer is used for continuous monitoring of

plan and monitoring methodology? (Yes / No)	the parameter and portable gas analyzer is also stated. However a CL is raised to clarify the usage of online gas analyzer. As per that PP is willing to use portable gas analyzer to measure the methane content. PP has informed that the online gas analyzer is not functioning well and it is difficult to calibrate. Hence, portable gas analyzer is used to measure the methane content during the current verification period.	
Type of monitoring equipment:	Type of meter	Portable gas analyzer
	Serial number	VI3-3005
	Accuracy	$\pm 2\%$ ^{/6/}
Is accuracy of the monitoring equipment as stated in the VCS PD? If the VCS PD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practice?	VCS PD does not specify the accuracy of monitoring equipment. However, it was observed during the verification site visit that the PP has an adequate monitoring system.	
Calibration frequency /interval:	The gas analyser is calibrated at least once in every 3 years. It was calibrated on 2010-09-01 and on 2008-09-10 ^{/5/} .	
Is the calibration interval in line with the monitoring plan of the VCS PD? If the VCS PD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	Yes. As per the monitoring plan the calibration is carried out once in 3 years by an external agency. The actual calibration frequency, from the above mentioned calibration dates, is less than 3 years which represents a good practice.	
Company performing the calibration:	The calibration is carried out by Thai Steam Service & Supply Co. Ltd.	
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes. The calibration reports ^{/5/} were checked and the meter was found functioning properly.	
Is (are) calibration(s) valid for the whole reporting period?	Yes. As discussed above the calibration certificates were verified and found valid for the whole monitoring period. Hence the observed measurement represent good quality.	
If applicable, has the reported data	Yes. The reported values in the final MR and	

been cross-checked with other available data?	ER sheet were cross checked with log books and found correct.
How were the values in the monitoring report verified?	Please see 3.5 and 3.6
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Please see 3.5 and 3.6

	Assessment/ Observation		
Data / Parameter: (as in monitoring plan of the VCS PD):	Q _{FO} (Quantity of fossil fuel used in boiler, Litres)		
Measuring frequency:	Measured continuously with liquid flow meter		
Reporting frequency:	Daily. The recorded parameter by the flow meters is archived into log sheets on a daily basis by plant's operators. The archived data is then transferred to the computer electronically. The reported data was cross checked with the log sheets and the plant's team was interviewed. It was found that the data is correct and the plant personnel are competent.		
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. It is inline with the monitoring plan of registered VCS PD.		
Type of monitoring equipment:	Meter	HFO meter	
	Type of meter	Liquid flow meter	
	Serial number	92049	
	Accuarcy	<u>+ 1 %</u> ^{/6/}	
Is accuracy of the monitoring equipment as stated in the VCS PD? If the VCS PD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring	The VCS PD does not specify accuracy of oil flow meter. However, the PP has a good monitoring practice in place. Accuracy of 1% for the oil flow meter also represents good practice.		

practice?	
Calibration frequency /interval:	The flow meter is calibrated at least once in every three years. It was calibrated on 2009-07-10 and 2010-07-01 ^{15/}
Is the calibration interval in line with the monitoring plan of the VCS PD? If the VCS PD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	The VCS PD does not specify the calibration frequency. As the calibration frequency was also not specified by the equipment supplier, PP has chosen a calibration frequency of 3 years which is inline with Para 17 C of General guidelines to SSC methodologies (EB 59, Annex 9). The error from the available calibration reports was found to be within the limits.
Company performing the calibration:	Miracle International Technology Co. Ltd., Bangkok
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes. The calibration report was checked and the meter was found functioning properly.
Is (are) calibration(s) valid for the whole reporting period?	Yes. As mentioned above, the calibration is valid for the whole monitoring period.
If applicable, has the reported data been cross-checked with other available data?	Yes. The reported data was cross checked with the log sheet and found correct.
How were the values in the monitoring report verified?	Please see 3.5 and 3.6
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Please see 3.5 and 3.6

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of the VCS PD):	Q _{starch} (Quantity of dry starch produced, Tonnes)
Measuring frequency:	Monitored daily.

Reporting frequency:	The data is recorded and reported on a daily basis based on operational log sheets at the plant
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The measuring and reporting is inline with the monitoring plan of VCS PD.
Type of monitoring equipment:	Log sheets
Is accuracy of the monitoring equipment as stated in the VCS PD? If the VCS PD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practice?	NA
Calibration frequency /interval:	NA
Is the calibration interval in line with the monitoring plan of the VCS PD? If the VCS PD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	NA
Company performing the calibration:	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is (are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	The reported data was cross checked with the log sheets and found to be correct.
How were the values in the monitoring report verified?	Please see 3.5 and 3.6
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are	Please see 3.5 and 3.6

necessary QA/QC processes in place?																									
	Assessment/ Observation																								
Data / Parameter: (as in monitoring plan of the VCS PD):	EG _y (Net electricity production by the generators, MWh)																								
Measuring frequency:	Continuously. The parameter is measured electronically with energy meters on a continuous basis																								
Reporting frequency:	Daily. The measured data is archived into log sheets on a daily basis. The reported data was cross checked with log sheets and it was found to be correct.																								
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The measuring frequency is in accordance with the monitoring plan of VCS PD.																								
Type of monitoring equipment:	<table border="1"> <thead> <tr> <th>Meter</th><th>EM1</th></tr> </thead> <tbody> <tr> <td>Type of meter</td><td>3-phase power meter</td></tr> <tr> <td>Serial number</td><td>61580000N0050</td></tr> <tr> <td>Accuracy</td><td>$\pm 0.2\%$ ^{/6/}</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Meter</th><th>EM2</th></tr> </thead> <tbody> <tr> <td>Type of meter</td><td>Multi-function power monitor</td></tr> <tr> <td>Serial number</td><td>HT08051884</td></tr> <tr> <td>Accuracy</td><td>$\pm 0.2\%$ for voltage / current ^{/6/} $\pm 0.5\%$ for other electric data</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Meter</th><th>EM3</th></tr> </thead> <tbody> <tr> <td>Type of meter</td><td>Multi-function power monitor</td></tr> <tr> <td>Serial number</td><td>HT09050004</td></tr> <tr> <td>Accuracy</td><td>$\pm 0.2\%$ for voltage / current ^{/6/} $\pm 0.5\%$ for other electric data</td></tr> </tbody> </table>	Meter	EM1	Type of meter	3-phase power meter	Serial number	61580000N0050	Accuracy	$\pm 0.2\%$ ^{/6/}	Meter	EM2	Type of meter	Multi-function power monitor	Serial number	HT08051884	Accuracy	$\pm 0.2\%$ for voltage / current ^{/6/} $\pm 0.5\%$ for other electric data	Meter	EM3	Type of meter	Multi-function power monitor	Serial number	HT09050004	Accuracy	$\pm 0.2\%$ for voltage / current ^{/6/} $\pm 0.5\%$ for other electric data
Meter	EM1																								
Type of meter	3-phase power meter																								
Serial number	61580000N0050																								
Accuracy	$\pm 0.2\%$ ^{/6/}																								
Meter	EM2																								
Type of meter	Multi-function power monitor																								
Serial number	HT08051884																								
Accuracy	$\pm 0.2\%$ for voltage / current ^{/6/} $\pm 0.5\%$ for other electric data																								
Meter	EM3																								
Type of meter	Multi-function power monitor																								
Serial number	HT09050004																								
Accuracy	$\pm 0.2\%$ for voltage / current ^{/6/} $\pm 0.5\%$ for other electric data																								
Is accuracy of the monitoring	The VCS PD does not specify any accuracy for																								

equipment as stated in the VCS PD? If the VCS PD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practice?	power meters. However, from the specifications of the installed meters it shows that the PP has a good monitoring practice.
Calibration frequency /interval:	The power meter EM1 is calibrated once in three years; it was calibrated on 2010-11-06. No previous calibration report was available as there was no supplier who could do calibration of this meter. The generator manufacturer could not provide the certificate. Therefore, the calibration in 2010 is the 1st calibration for EM1 since its installation. The EM1 was installed on 2006-12-22. A CAR was raised to address the calibration gap (please refer CAR 7) and closed out upon addressing. EM2 & EM3 were calibrated on 2006-03-03 which was the initial calibration at the time of installation. As per the initial certificate provided by the supplier, it was mentioned that the life time is 10 years. Moreover, PP has a contract agreement with the supplier for maintenance of generators (EG-2 & EG-3) and metering systems. ^{/24/}
Is the calibration interval in line with the monitoring plan of the VCS PD? If the VCS PD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	As per the VCS PD, the calibration is carried out once in three years. However, as mentioned above, there is a deviation in calibration frequency of EM1. Therefore, a CAR was raised to apply the calibration guidelines as per EB 52, Annex 60 and to calculate the emission reductions conservatively. The verification team has verified the service contract documents of EG-2 & EG-3 and it has been observed that the contract was extended for another 1 year on 2010-03-01. Therefore, it represents that PP has good monitoring practice.
Company performing the calibration:	For EM1, calibration was done by Calibration Laboratory Co. Ltd. ^{/5/}

	For EM2, EM3, it was done by the supplier (Shengli Oilfield Shengli Power Machinery Group) ^{/5/}
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes. The calibration reports were verified and the meters were found functioning properly.
Is (are) calibration(s) valid for the whole reporting period?	Yes. As mentioned above, the calibration is valid for the whole monitoring period.
If applicable, has the reported data been cross-checked with other available data?	Yes. The reported data was cross checked with the daily log sheets. The data was found correct. EM4 records the net electricity produced by Generator-4. As the Generator-4 was installed after the installation of the project activity, the generation from this generator was not included in the emission reduction calculation. Therefore, the estimated emission reduction is a conservative value.
How were the values in the monitoring report verified?	Please see 3.5 and 3.6
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Please see 3.5 and 3.6

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of the VCS PD):	EC _y (Electricity consumption by wastewater treatment plant, MWh)
Measuring frequency:	Calculated value. It is calculated as maximum rated consumption based on total electrical capacity of the entire waste water treatment plant and operation period.
Reporting frequency:	NA
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology?	NA

(Yes / No)	
Type of monitoring equipment:	NA
Is accuracy of the monitoring equipment as stated in the VCS PD? If the VCS PD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practice?	The calculation approach is as described in the monitoring plan of the VCS PD ^[2] . It results in conservative estimation of emission reduction.
Calibration frequency /interval:	NA
Is the calibration interval in line with the monitoring plan of the VCS PD? If the VCS PD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	NA
Company performing the calibration:	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is (are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	The name plate rating of the equipment of the project activity was checked during the verification site visit. It was observed that the capacity of the water pumps was taken wrongly. Therefore, a CAR was raised (please refer CAR 2 in Annex-1) and closed upon correction.
How were the values in the monitoring report verified?	Please see 3.5 and 3.6
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Please see 3.5 and 3.6

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of the VCS PD):	Sludge removed and its application
Measuring frequency:	Measured by weighing equipment at the time of sludge removal
Reporting frequency:	Every time when the sludge is removed. However, the quantity of sludge removed is 'zero' during the current monitoring period.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Measuring frequency is not applicable. However, the approach is inline with the VCS PD.
Type of monitoring equipment:	NA
Is accuracy of the monitoring equipment as stated in the VCS PD? If the VCS PD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practice?	NA
Calibration frequency /interval:	NA
Is the calibration interval in line with the monitoring plan of the VCS PD? If the VCS PD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	NA
Company performing the calibration:	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is (are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other	NA

available data?	
How were the values in the monitoring report verified?	NA
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Please see 3.5 and 3.6

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of the VCS PD):	T _{flare, h} (Temperature at the flame of flare, Deg C)
Measuring frequency:	Measured continuously during the time of flaring
Reporting frequency:	As the flaring was not operated in last 3 years, no data of flame temperature of flaring is available.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	NA
Type of monitoring equipment:	Enclosed flaring with temperature detection system ^{/10/}
Is accuracy of the monitoring equipment as stated in the VCS PD? If the VCS PD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practice?	NA
Calibration frequency /interval:	NA
Is the calibration interval in line with the monitoring plan of the VCS PD? If the VCS PD does not specify the frequency of calibration, does the	NA

selected frequency represent good monitoring practice?	
Company performing the calibration:	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is (are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	NA
How were the values in the monitoring report verified?	NA
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Please see 3.5 and 3.6

3.4. Accuracy of GHG emission reduction calculations

GHG emissions reductions for the project and the baseline scenario were correctly calculated using the formulae described in the applied methodologies for this project. The verification team has reviewed the emission reduction (ER) spread sheet and checked all the formulae and found they are correct and inline with the monitoring plan of the registered PD and the applied monitoring methodologies ^{/14/}.

The emission reduction due to methane capturing was estimated by two approaches. One of the approaches is by measuring the COD reduction and the quantity of wastewater treated. The other approach is from the total biogas consumption. The formulae have been correctly applied as stated in the methodology, AMS III.H., Version 13 for both the approaches. It was observed that the emission reduction estimated by COD measurement method is lesser than the emission reduction estimated from the total biogas consumption. Thus, the verification team is of the opinion that the emission reductions determined using COD measurement approach is more conservative and accurate.

The emission reduction due to electricity generation is estimated by measuring the total net electricity produced and taking the ex-ante grid emission factor. The estimated approach is inline with the methodology AMS I.D., version 14. There are

four gas engines (generators) at present. According to the registered VCS PD, there were only three gas engines and the fourth gas engine (Generator-4) was installed after the implementation of the project activity. Therefore, the energy generated by the fourth gas engine is not included in the emission reduction calculation.

The emission reduction due to thermal energy production is estimated according to the methodology, AMS I.C., version 15. The biogas recovered is also used in the hot oil boilers replacing part of the heavy fuel oil used in the baseline scenario. Specific fuel consumption in the hot oil boiler (ltr/ton of starch production) was estimated as ex-ante from the historical data of fuel consumption and starch production. Fuel oil consumption in the project activity situation (i.e. current scenario) is measured by a flow meter. Therefore, the amount of fuel oil replaced by biogas is estimated from the total starch production and the amount of fuel oil used in the current situation.

The detailed emission reduction calculation is presented in the ER spread sheet. All the formulae and the calculation procedure were checked by the verification team. It was observed that the emission reduction was determined in a conservative manner.

The total emission reduction achieved for the current monitoring period (2009-01-01 to 2010-09-30) is compared with the annual emission reduction estimated in the VCS PD and is presented below.

Table 3.3: Comparison emission reductions

	Annual VERs as per the VCS PD	Achieved VERs as per the MR in 2009	Achieved VERs as per the MR in 2010 (annualized)	Achieved VERs for the current monitoring period (annualized)
Emission Reductions	28,881	19,888	36,132*	26,850*
% Deviation (+/-)	0	- 31.1%	+ 25.1%	- 7%

* The achieved emission reduction during 2010 i.e. from 2010-01-01 to 2010-09-30 is 27,099 VERs which corresponds to annualized VERs of 36,132. Similarly, total achieved VERs for the current monitoring period are 46,987 which correspond to annualized VERs of 26,850.

The reduction in emission reduction in 2009 is due to conservative approach in estimating the wastewater quantity. The wastewater quantity was calculated for a period from 2009-01-01 to 2009-11-08 by taking the rated flow of the pump and multiplied by a factor of 0.65. This is as per the deviation-2 in the VCS PD. Another reason was the quantity of wastewater flow indicated by FM2 & FM3 was not taken into account during 2009-11-09 and 2009-12-31 due to unavailability of COD data.

The increase in emission reduction during 2010 is due to increased availability and number of monitoring equipments. The ex-post emission reduction during the current monitoring period is 7% less than the ex-ante emission reduction. Hence, verification team is of the opinion this kind of variation is reasonable and acceptable.

The emission reductions claimed during the current monitoring period (2009-01-01 – 2010-09-30) are 46,987 tCO₂e.

3.5. Quality of evidence to determine emission reductions

During the verification site visit, all relevant documents as included in “Section 5 : References” were checked to assess the correctness and quality of data submitted by the project participant which are used to determine emission reductions as discussed in section 3.3 and 3.4 above.

During the verification site visit, quantity of wastewater treated, COD of wastewater inlet to AFFR and closed lagoon, COD of wastewater outlet, biogas consumption of boiler and gas engines, methane concentration of biogas, fuel oil consumption in boiler, electricity generation, etc. were cross checked with the log book values to ensure that there is no over estimation of the VERs. The provided data was found to be of adequate quality.

All records needed for monitoring are archived in line with the requirements of the registered monitoring plan^{/2/}. No significant, lack of evidence and missing data were detected during on-site verification. Hence, the verification team confirms that the monitoring system ensures required quality of the monitoring system to ensure the quality of the monitored data. All internal data are subjected to QA/QC measures.

All the meters (wastewater flow meters, biogas flow meters, COD measuring equipment, gas analyser and oil meter)^{/5/} are calibrated as per the manufacturers' specifications or best practices in the industry (described in section 3.3) to ensure the quality of data. In case of delay in calibration, the PP has considered the maximum permissible error or error as per the delayed calibration report, whichever is higher, inline with the annex 60 of EB 52 guidelines (kindly refer CAR 4 in Annex-1). Hence the verification team confirms that the quality of data is good and the emission reductions are determined in a conservative manner.

The monitoring personnel at site are well experienced and follow established and documented routines. This was verified during the verification site interview. Hence, the verification team concludes that competent staff is employed by the project participant to carry out the relevant tasks with sufficient accuracy.

The PP has taken three additional deviations apart from the deviations described in the registered VCS PD for this monitoring period. The deviation is described in Annex-1 of the monitoring report. The gist of deviations is as follows:

Table 3.4: Assessment of deviations applied during the current verification period

Deviation	Description	Assessment
Deviation-1: Missing the COD result of sampling point CS2 during the period from 2009-Nov-09 to 2009-Dec-31.	It was observed that there are two wastewater pipelines coming from the starch factory (please refer figure 2 in the MR). One of the lines goes to the pump sump from where it is pumped to AFFRs. The COD sampling point CS1 and the flow meter FM1 are located at the inlet of pump sump. The sampling point CS2 is located in another wastewater line coming out from the factory. This line is sub-divided into two lines and the wastewater from these two lines is fed to the three covered lagoons which are part of the project activity. Flow meters FM2 & FM3 are located on these two lines. As only the COD from sampling point CS1 is available. The wastewater volume (Q_{ww}) is based on the reading of FM1. The reading from FM2 and FM3 is not taken into account.	As the COD reading only from CS1 is available during the period specified, the PP has considered the wastewater quantity indicated by the flow meter FM1 only. Wastewater quantity indicated by FM2 and FM3 is not taken into account. It results in reduced emission reduction as the whole quantity of wastewater treated is not taken into account. This approach is conservative and GLC understands that the deviation does not result in a negative impact on the conservativeness in estimating emission reduction. The approach also meets the deviation requirements as per VCS 2007.1 (refer section 5.3, page 13 of VCS 2007.1)
Deviation-2: The Methane content in biogas is not daily measured for 3 sampling points.	The methane content in the biogas is required to be monitored daily for the project activity. However, during the monitoring period from 2009-01-01 to 2010-09-30, the PP did not carry out regular daily monitoring of methane content in biogas. The data was scattered over days and there were 2 sampling points in 2009 and 3 sampling points in 2010. Therefore, with the measured values of CH_4 content, the PP has plotted normal distribution curve over a year. By applying	The available measured values of methane content in biogas were verified during the verification site visit. As described in Annex 3 of the MR, the values of W_{CH_4} for most of the days are close to the mean value. Therefore, the followed approach is reasonable. This approach of 95% confidence level is also inline with the methodology (Para 36, AMS III.H./version 13). As lower bound value of the

	95% confidence interval, the lowest bound of the interval was used for calculating baseline emissions and the highest bound was used for project emissions.	interval is used for baseline emissions and higher value for project emissions, it results in conservative emission reduction. GLC understands that the deviation does not result in negative impact on the conservativeness in estimating emission reduction. The approach also meets the deviation requirements as per VCS 2007.1 (refer section 5.3, page 13 of VCS 2007.1)
Deviation-3: COD readings are not monitored as per the monitoring plan in validated PD from 2010-Jul-11 to 2010-Aug-31.	For the project activity, the COD values have to be monitored on a daily basis. However, the COD data is not available for the period from 2010-07-11 to 2010-08-31 as the COD measuring equipment was sent to repair. The available COD data has been plotted in a graph against the time axis (please refer annex-3, deviation-3 in the MR). From the graph, assuming normal distribution over the year, it is clear that for most of the days the COD values are close to the mean. The approach is aimed to estimate the 95% confidence interval for the COD values for period of 11-Jul-10 to 31-Aug-10. The lower bound of the interval of the incoming COD values, the lower confidence limit, is used for the days when COD-in values are not monitored. Additionally, the higher bound of the interval of outgoing COD values, the higher confidence limit, is used for the days when no COD-out values are	The approach in this case, 95% confidence interval, ensures a higher conservativeness as compared to the EB guidance of 90% confidence level and 10% precession (EB 50, Annex 30). It was also confirmed from the plant's team that the production process was normal during the above mentioned period and no major variation in wastewater characteristics could be expected. Therefore, the applied deviation does not impact the conservativeness of the emission reduction. GLC understands that the deviation does not result in negative impact on the conservativeness in estimating emission reduction. The approach also meets the deviation requirements as per VCS 2007.1 (refer section 5.3, page 13 of VCS 2007.1)

	monitored.	
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GLC is of the opinion that this method of determination is accurate and results in conservative estimation of emission reduction and is line with the applicable VCS requirements.

3.6. Management and quality assurance

The allocation of responsibilities is documented in a written form and is followed as described in the registered PD^{/2/}. Data acquisition for the wastewater flow meters and gas flow meters is executed through the manual process control unit of biogas plant and then integrated with plant operation software. The plant is operated by well trained personnel. The data is collected and stored under the supervision of QC officer. During the site visit all the required plant records were verified and found that the data is consistent with the provided in the final MR and ER sheets. Hence, the DOE confirms that the calculations laid down in the monitoring report^{/3/} are in line with the actual data verified on site.

The verification team interviewed the site personnel who are involved in the monitoring of the parameters used to determine the emission reductions of the VER project. The verification team was convinced that the organisation structure is followed as per the monitoring plan of the registered PD.

All internal data are subjected to QA/QC measures. During verification site visit, the verification team has verified the various documents which are included in the references: section 5 and interviewed the site personnel and convinced that the project participant is following the required QA-QC measures as per the monitoring plan of the registered VCS PD. All monitored data is achieved physically and stored electronically. The data will be kept for the whole crediting period and additional 2 years as mentioned in the VCS PD^{/2/}.

As discussed above, the verification team concludes that management and operational system of the project is implemented and operated well. Thus it adequately ensures the quality of data required for calculating the emission reductions.

3.7. Project Scorecard

Risk Areas		Conclusions			Summary of findings and comments	Error/Discounted Uncertainty
		Baseline Emissions	Project Emissions	Calculated Emission Reductions		
Completeness	Source coverage/ boundary definition	Good	Good	Good	The source coverage was complete as per the registered PD and validation report.	No error was found
Accuracy	Physical Measurement and Analysis	Reasonable	Reasonable	Reasonable	The physical measurement / recording of data were found to be accurate.	No error was found
	Data calculations	Reasonable	Reasonable	Reasonable and acceptable	Formulae and calculation of VERs and relevant data were found to be accurate. Three deviations were applied to calculate the emission reductions. However they did not impact the conservativeness of the calculated emission reduction. They were in line with the relevant VCS requirements.	No error was found

Risk Areas		Conclusions			Summary of findings and comments	Error/Discounted Uncertainty
		Baseline Emissions	Project Emissions	Calculated Emission Reductions		
	Data management & reporting	Good	Good	Good	The relevant GHG data was achieved and readily retrievable.	No error was found
Consistency	Changes in the project	Good	Good	Good	No changes in the project. However, 3 deviations were opted to determine the emission reductions. But the deviations are in line with the VCS requirements and the deviations do not have any impact on the conservativeness of the emission reductions.	No error was found

4. VERIFICATION STATEMENT

Germanischer Lloyd Certification GmbH (GLC) has performed the verification of the project: "Chol Charoen Group Wastewater Treatment with Biogas System I (Cholburi)", with regard to the applicable relevant requirements for VCS project activity. The project activity involves treatment of wastewater produced in a starch manufacturing process at Chol Charoen Co. Ltd through AFFR and covered lagoon technology. Use of this technology enables capturing of methane produced from highly organic wastewater characterised by its COD and thereby avoiding it to be released into the atmosphere. The captured methane is utilised as fuel in existing boiler replacing heavy fuel oil and also in gas engines in the plant.

This verification covers the period from 2009-01-01 to 2010-09-30 (including both days).

South Pole Carbon Asset Management Ltd. and Chol Charoen Co. Ltd. are responsible for the collection of data in accordance with the validated monitoring plan and the reporting of GHG emission reductions from the project.

It is GLC's responsibility to express an independent verification statement on the reported GHG emission reductions from the project.

The scope of this verification covers the determination of voluntary greenhouse gas emission reductions generated by the above mentioned project. The verification is based on the registered VCS PD^{/2/}, validation report^{/12/}, monitoring report^{/3/} and supporting documents made available to the verifiers by the project participants.

As a result of the verification, the verifier confirms that;

- All operations of the project are implemented and installed as planned and described in the project design document.
- The monitoring system is in place and functional.
- The installed equipments essential for estimating emission reductions work reliable and are calibrated appropriately.
- The verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. Also all the documents checked during on-site visit and verification process will be kept confidential and will not be disclosed without the Project Participant's consent as required by VCSA.
- The verification of reported emission reductions is based on the information made available to GLC and the engagement conditions detailed in this report. Hence, GLC cannot be held liable by any party for decisions made or not made based on this report.

Germanischer Lloyd Certification GmbH herewith confirms that the project has achieved emission reductions during the reporting period from 2009-01-01 to 2010-09-30 (including both days) as follows:

Emission reductions 2009	19,888	t CO ₂ e
Emission reductions 2010	27,099	t CO ₂ e
Emission Reductions Total	46,987	t CO ₂ e



Markus Weber

Verification Team Leader

Hamburg, 2011-04-13

5. REFERENCES

Reference	Document																																	
1.	Clean Development Mechanism Validation and Verification Manual (Version 01.2 as per EB 55)																																	
2.	VCS registered Project Description document for project: “Chol Charoen Group Wastewater Treatment with Biogas System I (Cholburi)”, (VCS PD Version 3.1, dated 2009-09-16)																																	
3.	Draft Monitoring Report of “Chol Charoen Group Wastewater Treatment with Biogas System I (Cholburi)”, Version no. 1, 2010-10-29. Final Monitoring Report of “Chol Charoen Group Wastewater Treatment with Biogas System I (Cholburi)”, Version no. 6, 2011-03-10.																																	
4.	Draft Emission reduction calculation spreadsheet dated 2010-10-29. Final Emission reduction calculation spreadsheet dated 2011-03-10.																																	
5.	Calibration Certificates of all the meters; wastewater flow meters, COD measuring equipment, gas flow meters, gas analyser and master calibrator for the current verification period (2009-09-01 – 2010-08-31) <table><tr><th>ID</th><th>Description</th><th>Calibration date</th></tr><tr><td>FM1</td><td>Wastewater flow meter-1</td><td>2010-10-21</td></tr><tr><td>FM2</td><td>Wastewater flow meter-2</td><td>2010-10-21</td></tr><tr><td>FM3</td><td>Wastewater flow meter-3</td><td>2010-10-21</td></tr><tr><td>COD</td><td>Spectrophotometer</td><td>2010-05-14, 2009-06-04 & 2007-10-03</td></tr><tr><td>GM1</td><td>Biogas flow meter to boiler</td><td>Differential Pressure transmitter: 2010-01-12 & 2009-06-10</td></tr><tr><td>GM3</td><td>Biogas flow meter to gas engines</td><td>2010-10-27 & 2009-05-27</td></tr><tr><td>GM2</td><td>Biogas flow meter to flare</td><td>2010-01-12 & 2009-06-10</td></tr><tr><td>W_{CH4}</td><td>Gas analyzer</td><td>2010-09-01 & 2008-09-10</td></tr><tr><td>OM</td><td>HFO meter</td><td>2009-07-10</td></tr><tr><td>EM1</td><td>Power meter for Gen-1</td><td>2010-11-06</td></tr></table>	ID	Description	Calibration date	FM1	Wastewater flow meter-1	2010-10-21	FM2	Wastewater flow meter-2	2010-10-21	FM3	Wastewater flow meter-3	2010-10-21	COD	Spectrophotometer	2010-05-14, 2009-06-04 & 2007-10-03	GM1	Biogas flow meter to boiler	Differential Pressure transmitter: 2010-01-12 & 2009-06-10	GM3	Biogas flow meter to gas engines	2010-10-27 & 2009-05-27	GM2	Biogas flow meter to flare	2010-01-12 & 2009-06-10	W _{CH4}	Gas analyzer	2010-09-01 & 2008-09-10	OM	HFO meter	2009-07-10	EM1	Power meter for Gen-1	2010-11-06
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Reference	Document									
	<table><tr><td>EM2</td><td>Power meter for Gen-2</td><td>2006-03-03</td></tr><tr><td>EM3</td><td>Power meter for Gen-3</td><td>2006-03-03</td></tr><tr><td>HR</td><td>Electromechanical counter</td><td>2009-09-13</td></tr></table>	EM2	Power meter for Gen-2	2006-03-03	EM3	Power meter for Gen-3	2006-03-03	HR	Electromechanical counter	2009-09-13
EM2	Power meter for Gen-2	2006-03-03								
EM3	Power meter for Gen-3	2006-03-03								
HR	Electromechanical counter	2009-09-13								
6.	Equipment specifications - Generator-1 - Power meter (EM-1) - Certificate of Power meters (EM-2 & EM-3) - Gas analyzer - Gas flow meters (GM1 & GM2) - Gas flow meter (GM3) - Spectrophotometer - HFO flow meter - Wastewater flow meter - Electromechanical counter									
7.	Daily reports compilation for 2010									
8.	Memo for COD reactor damage									
9.	Sample daily log sheets for the month of September 2010 - % CH4 measurement in biogas - COD measurement - Wastewater flow meter readings - Biogas consumption									
10.	Operation of closed flare system document dated 2009-05-29									
11.	ISO 14064-3:2006; Greenhouse gases -- Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions; http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm									

Reference	Document
	?csnumber=38700
12.	Validation report for the VER project “Chol Charoen Group Wastewater Treatment with Biogas System I (Cholburi)”, dated 2009-11-14
13.	Verification report of the VER project “Chol Charoen Group Wastewater Treatment with Biogas System I (Cholburi)”, for the 1 st periodic verification: 2007-01-01 to 2008-12-31 (dated 2010-11-18)
14.	Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories: AMS III.H.: Methane recovery in wastewater Treatment, Version 13 AMS I.D.: Grid connected renewable electricity generation, Version 14 AMS I.C.: Thermal energy production with or without electricity, Version 15
15.	Methodological “Tool to determine project emissions from flaring gases containing methane” (EB 28, Annex 13)
16.	Guidelines for assessing compliance with the calibration frequency requirements (EB 52, Annex 60) Ver.01, 2010-02-12
17.	General guidelines to SSC CDM methodologies (EB 59, Annex 9)
18.	General guidelines for sampling and surveys for small scale CDM project activities, Version 01 (EB 50, Annex 30)
19.	Guidelines to calculate the fraction of methane in the landfill gas from periodical measurements, Version 01 (EB 48, Annex 13)
20.	GLC GmbH: Germanischer Lloyd CDM Procedures

Reference	Document
21.	IPCC: 1996 IPCC Guidelines for National Greenhouse Gas Inventories: work book IPCC: 2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book
22.	Voluntary Carbon Standard Program Guidelines dated 2008-11-18
23.	Voluntary Carbon Standard 2007.1 dated 2008-11-18
24.	1) Service contract documents of Generator-2 & Generator-3 with the supplier (including EM-2 & EM-3) 2) Sample service reports (dated 2010-04-19 of Gen-2 and 2010-03-29 of Gen-3) 3) Log book record of the first day of the gas engine operation dated 2006-12-22



ANNEX – 1
List of CARs,CLs and FARs



Corrective Action Requests (CAR), Clarification Requests (CL) and Forward Action Requests (FAR)

Description of Finding (CAR, CL, FAR) <i>Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)</i>	Date <i>(yyyy-mm-dd)</i>	Project Participants Response <i>This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence</i>	Date <i>(yyyy-mm-dd)</i>	GLC Assessment <i>The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.</i>	Date <i>(yyyy-mm-dd)</i>
CAR 1 GLC carried out a site visit at Chol Charoen Co Ltd, Cholburi for verification of the VCS project. Project Participant (PP) is requested to address the following points in fig.2 in the monitoring report (MR) for the sake of transparency and completeness. Two COD sampling (CS) points (CS2 and CS3) have been indicated on two separate waste water lines coming from Starch factory to covered lagoon (CL2). However, during the site visit, it was observed that there is only	2010-12-20	CAR 1 The monitoring diagram is revised as shown in figure 1, 2 of the MR. The sampling point of COD inlet to covered lagoon is changed from 2 points (CS2, CS3) to only one point as CS2. The calculations already consider a single point sampling.	2011-01-05	OK. The diagram has been corrected to include the actual location of COD sampling point s and the flow meter. The final discharge point of effluent is indicated in the diagram. Hence, the CAR is closed.	2011-01-19

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one sampling point common for both lines. - Location of the flow meters (FM1, FM2 & FM3) is indicated before the sampling points. However, the flow meters are located after the sampling points. - The final discharge source should be included.		- The location of flow meter FM1, FM2 and FM3 is moved from before COD sampling point to after the sampling point. - Add the final discharge destination for gardening proposes inside the plant premises.			
CAR 2 For calculating project emissions due to energy consumption of the project activity, rated kW of the equipment (i.e. name plate rating of the motors) has been used. However, for H ₂ S removal pumps (5 No's) a rated capacity of 35 W for each pump has been	2010-12-20	CAR 2 The rated power capacity of all equipment in biogas is updated in the spread sheet, "name plate capacity". The update total rated power is 139.25 kW (previous value is 116 kW). The updated value is used to estimate the project	2011-01-05	OK. The rated capacity of the equipment has been corrected and updated in the emission reduction calculation. Therefore, the CAR is closed.	2011-01-19

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considered which is not realistic. The verification team has also verified the name plate rating of the pumps during the site visit. It was found that four pumps have the power rating of 5.5 HP and one pump has 4 HP. Therefore, PP is requested to take the name plate rating of all the motors (usually motor rating is slightly higher than the power rating of the pump) and recalculate the project emissions so as to result in conservative emission reduction.		emissions in the revised version of monitoring report. The used value is more conservative than the value in PD.			
CAR 3 The verification team has cross checked following during the site visit: the COD values presented in the spreadsheet with the	2010-12-20	CAR 3 The calculation spreadsheet is rechecked with log sheet and revised accordingly.	2011-01-05	OK. The ER calculation spread sheet has been updated. Therefore, the CAR is closed.	2011-01-19

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daily log sheets the waste water quantity calculated before the installation of flow meters has been cross checked with hourly counter Though majority of the values are matching with the log sheet readings, some of the values have been found deviating. The deviated values have been highlighted in the enclosed spreadsheet. PP is requested to verify the values with the log sheets and correct them.					
CAR 4 As per the registered VCS PD and the MR the COD measuring equipment should be calibrated once in a year. PP has provided the calibration certificates of the COD measuring equipment and as	2010-12-20	CAR 4 The calibration report on 04-Jun-09 shows the error is within acceptance limit.	2011-01-05	Not OK. It is stated in the MR that accuracy is + 1 nm of wave length or + 0.13%. Verification team has checked the manual and found that + 1 nm of wave length. However + 0.13% was not available in the equipment	2011-01-19

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per that it was calibrated during March 2007, June 2009 and May 2010. Though the recent calibration was done with in a period one year, there is a gap of more than 1 year before June 2009. The period before June 2009 i.e. Jan – 4 June 2009, the error should be checked and COD values for the period 1 Jan 2009- 4 June 2009 should be adjusted to take into account the permissible error with respect to the available guidelines EB 52, Annex 60. PP is requested to submit the revised emission reduction calculation sheet.		The correction factor from the accuracy of the spectrophotometer is applied for monitoring period 01-Jan-09 to 04-Jun-09 for conservativeness approach as per EB 52 , annex 60.		manual. Hence PP is requested to clarify the same.	
CAR 4 Continued		The sensitivity of 1 nm for COD measurement is 20 mg/l COD. While the maximum COD reading is 15,000 mg/l. So the error is 20/15,000 or 0.13%.	2011-01-24	OK. The CAR is closed	

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		The clarification is provided in MR page 24.												
CAR 5 As per para 18 of AMS I.D. Version 14, “for projects consuming biomass a specific fuel consumption of each type of fuel to be used should be specified ex ante”. Therefore, PP is requested to compare the ex ante and ex post specific fuel consumption for gas engines.	2010-12-20	CAR 5 <table><tr><th>Nm3/k Wh</th><th>Spec</th><th>Actual</th></tr><tr><td>Gen#1</td><td>0.455</td><td>0.508</td></tr><tr><td>Gen#2&3</td><td>0.468</td><td>0.604</td></tr></table> <u>Generator #1</u> Guascor model SFGLD 560/55 Ex-ante : From the technical specification document* , the	Nm3/k Wh	Spec	Actual	Gen#1	0.455	0.508	Gen#2&3	0.468	0.604	2011-01-05	Not OK. Please include the same in MR also.	2011-01-19
Nm3/k Wh	Spec	Actual												
Gen#1	0.455	0.508												
Gen#2&3	0.468	0.604												

* Reference file : spec_gen 1.pdf

† Reference file : report_generator.pdf

‡ <http://www.shengli-machinery.com/Biogas-Genset.html>

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		fuel consumption is 2520 kW or 433.44 Nm³ of biogas at 952 kW. The unit conversion for fuel consumption is based on the assumption ; 1 watt = 1 J/S 1 kW/h = 3.60*10⁶ J/h 2520 kW = 9.072 * 10⁹ J When the LHV of biogas is 20.93 MJ/Nm³. Ex-post : From the service report[†] on 27-Jul-09 , the specific consumption is 479 Nm³ at 943 kW. <u>Generator #2,3</u> Shengli model 500GF1-1RZ			

* Reference file : report_generator.pdf

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		Ex-ante : From the technical specification document[‡] , the fuel consumption is 9.80 MJ/kWh at 500 kW or 234.11 Nm³ of biogas. The unit conversion for fuel consumption is based on the assumption ; LHV of biogas is 20.93 MJ/Nm³. Ex-post : From the service report* on 26-Jul-09 , the specific consumption is 272 Nm³ at 450 kW.			
CAR 5 continued		The information about generator specific consumption is added in MR.	2011-01-24	OK. The information is included in the MR. Therefore, the CAR is closed	2011-02-11
CAR 6 PP is requested to correct the	2010-12-20	CAR 6	2001-01-05		2011-01-



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following with respect to the chosen deviation 2 : - Sampling points are stated as 3 whereas actual sampling points are two during 2009 and three in 2010. - It is stated that the 95% confidence level is conservative in the provided description where as the applied methodology AMS.III.H, version 13 para 36 states, "the fraction of methane in the gas should be measured with a continuous analyser or, alternatively, with periodical measurements at a 95% confidence level." In this context PP is		- The sampling points are revised in the figures. Please find the same in the revised monitoring report. - The 95% confidence approach can even be applied even on quarterly readings for methane percentage monitoring in case the captured gas is used for energy generation or flaring purposes*. - The approach used by project proponent has much more readings than a quarterly sample and uses a large sample set to estimate the 95%		Not OK. Still it is stated as "The data is scattered over days and 3 sampling points" in the provided description on the deviation in the MR, where as the diagrams indicate 2 and 3 sampling points in 2009 and 2010 in the same section. Hence, PP is requested to revise it to maintain the consistency in the provided description. As per the methodology it is clear that in case of periodical measurements 95% confidence level should be applied. Though it is stated that consideration of 95% confidence level is conservative by comparing it	19

* http://cdm.unfccc.int/filestorage/AM_CLAR_L7UMMNNYAN4HNWK9PP811YL4CYM3H8/Clarifications%20to%20ACM0001%20ver.%208?t=bzZ8MTI5NDIxODI2My4xOA==TuXqG6WGkWGK-F4246u4J25WhFg=

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requested to demonstrate how the chosen approach (student-t distribution approach) is suitable and conservative. - Some of the weblinks provided in the references to describe the deviation is not accessible. - For the sake of transparency and completeness, elaborate the reason for the application of deviation and the period of deviation.		confidence interval. In case infinite number of samples is available, the normal distribution curve is achieved for random tests. But in case of limited data values, the student-t distribution represents more conservative approach. This is also explained in the web links provided as reference to deviation. - The web links provided are checked and revised. - The deviation is applied to the period when the methane percentage readings are not available. The simple reason for application of the deviation is to use a conservative value of methane		with the guidance available in the sampling tool. It is to be noted that the tool guidance would be valid when there is no guidance available in the applied version of the methodology. Hence PP is requested to correct the provided description in the MR. OK OK. The provided reason for the deviation is acceptable and the	

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		percentage for the time when no data is available. A more straight forward approach would be to use average methane percentage values. Additional notable point is that the methane percentage has no direct affect on the emission reduction estimation because the COD approach is more conservative than MD_y approach. This protects the emission reduction estimation from the minor change in the methane percentage. The 95% approach already represents a very conservative value for estimation of baseline emissions using MD_y approach.		data for certain period was not available. Moreover the note made by the PP in the response is reasonable and valid. Hence verification team is of the opinion the chosen deviation would not effect the accuracy and quality of the emission reductions.	

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CAR 6 continued		The MR is revised according to the recommendation.	2011-01-24	OK. The MR has been revised. Hence, the CAR can be closed	2011-02-11
CAR 7 It was evident from the available documents that the calibration of EM-1 (i.e. power meter of Generator-1) was not carried until 2010-11-06 since the installation on 2006-12-22. As per the monitoring plan in the registered VCS PD, the calibration frequency of the power meter is 3 years. As the calibration gap is more than 3 years, PP is requested to apply the maximum permissible error of the meter or the error observed during the latest calibration, whichever is higher, as per EB 52, Annex 60 guidelines for the period for which calibration was not carried out. As per the latest calibration	2011-03-09	The correction -0.2% for baseline emission calculation is applied for the electricity produced from generator no.1 as per EB 52, annex 60. The MR and calculation spreadsheet is updated accordingly.	2011-03-10	OK. As the latest calibration report indicates the good functioning of meter and the error is within the limits, PP has applied maximum permissible error of -0.2% for the energy measured by EM-1. The error has been applied for the whole monitoring period in order to be conservative. Therefore, the CAR has been closed.	2011-02-11

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report, the condition of the meter is good. Therefore, PP is requested to apply the maximum permissible error of the meter and re-calculate the emission reductions conservatively for the period from 2009-12-22 to 2010-09-30.					
CL 1 FAR 4 from previous verification: Flame detection system and temperature monitoring device need to be in place as per the requirement of flare tool for the enclosed flare Temperature monitoring device is in place for monitoring the temperature of the flare. No	2010-12-20	CL 1 FAR 4 from previous verification: As per the instruction manual* of the flare manufacturer. The flame detection system is the temperature detection device which is already installed at the project facility. The language of the FAR in the	2011-01-05	OK. The temperature detection system can indicate if there is any flaring or not. As per the applied tool flame detection system is not required. Therefore, the CL is closed.	2011-01-19

* Reference : file / Flare_specification.pdf

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flame detection system is in place. Therefore, PP is requested to provide proper justification for not installing flame detection system.		validation report is not transparent and creates a bit of confusion. This however can be easily clarified using the tool for estimating flare emissions as a reference.			
CL 2 The accuracy class of the measuring instruments has not been mentioned in the monitoring report and is also not available on site to verify. Therefore, for the sake of transparency, PP is requested to include the accuracy class of all the measuring instruments in the monitoring report. This information would be useful to verify whether the actual error of the instruments is within the limits or not.	2010-12-20	CL 2 The accuracy of measuring equipment is added in the table of MR.	2011-01-05	OK. Accuracy class of the instruments has been included in the MR. The same has been verified by GLC with the help of supporting documents provided. Therefore, the CL is closed.	2011-01-19

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CL 3 This is related to deviation 3 regarding the consideration of COD data from 11 July 2010-31 August 2010 when it was sent to repair. As it was sent to repair, PP is requested to state the reason of repair and provide the related documents. Clarify whether it ensures the quality of the data measured before it was sent for repair. PP is requested to provide additional information on the functioning of starch plant in the MR during that period when COD data was estimated using the student-t-distribution	2010-12-20	CL 3 The COD reactor block* which is used for heating the COD sample for close flux digestion, was out of order since 11-Jul-10. The PP had contacted the supplier and sent the equipment for repair on 14-Aug-10. The repaired equipment returned on 31-Aug-10[†]. This equipment is used in process for the COD testing. However the actual measuring equipment is spectrophotometer. The test report of spectrophotometer assures that the COD	2011-01-05	Not OK. These dates do not match with the dates provided in the supporting document. It was also requested to provide additional information on the functioning of starch plant in the MR during that period when COD data was estimated using the student-t-distribution approach. However, this is not found in the MR.	2011-01-19

*

<http://www.hach.com/hc/search.product.details.invoker/PackagingCode=LTV082.52.42001/NewLinkLabel=DRB200%3A+Digital+Reactor+Block%3A+21+x+16+mm+vial+wells%2C+4+x+20+mm+vial+wells%2C+230+Vac/SESSIONID|CE9UWTVNVE0ySm1kMVpYTjBUMWxMUIVneE1nPT1Cemt6TVRjeA==>

[†] Reference : file / memo_COD reactor repair.pdf

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approach		measurement is still within accepted levels of accuracy. The information from starch plant production during this period confirms that the production process is normal during this period and no big variation is expected in the waste water characteristic. The reference letter is provided in file : memo_production.pdf			
CL 3 Continued		The date in calcification is revised as per the supporting document. The information of starch production plant functioning is also added in MR – Deviation 3.	2011-01-24	OK. The dates have been corrected and the MR has been updated. Hence, the CL is closed	2011-02-11
CL 4 As per the monitoring plan in the registered VCS PD, it was stated that portable gas	2010-12-20	The online gas analyser was showing erroneous readings all the time. The supplier could not calibrate and make it stable.	2011-01-05	OK. As per the applied monitoring methodology, 'the fraction of methane in the gas should be measured with a	2011-01-19

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analysed would be used for periodical measurement of methane content in biogas during the first verification period; later, the already installed online gas analyser would be used for continuous monitoring. However, it was observed that the PP has used portable gas analyser only during the current verification period. Therefore, PP is requested to clarify for not using the online gas analyser.		The supplier proposed to use the new portable gas analyser which is easier for maintenance. Therefore, the portable gas analyser is the main equipment for monitoring methane content. The PP has decided to use the portable gas analyser in future also.		continuous analyser or, alternatively, with periodical measurements at a 95% confidence level'. The PP has used portable gas analyser and applied 95% confidence level. The followed approach is inline with the methodology requirement. Therefore, the CL is closed.	
FAR 1 The operational conditions of the dual fuel boiler need to be verified during the subsequent verifications. In case it is found that the existing boiler is replaced with new boiler during any monitoring period, no emission reduction shall be claimed for heat displacement.	2010-12-20	This shall be part of the monitoring report in the following monitoring periods.		It has to be verified during the subsequent periodic verifications.	2011-01-19

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FAR 2 FAR 1 from previous verification is carried over to the next periodic verification : Marking of flow direction and name of the fluid on all HDPE pipelines It was observed during the site visit that the flow direction and name of the fluid was indicated on HDPE pipelines. However, the marking is not visible at some of the locations. Therefore, PP is requested to mark the fluid and its direction clearly at all locations for easy traceability. This would be verified during the next periodic verification.	2010-12-20	As stated, the markings were made but have been erased due to heavy rains experienced over last few months. The markings shall be re done at the project site.		The marking of name and direction of fluid on all HDPE pipelines has to be verified during the subsequent verification.	2011-01-19