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# VERIFICATION / CERTIFICATION REPORT

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## “SIAM QUALITY STARCH WASTEWATER TREATMENT AND ENERGY GENERATION PROJECT IN CHAIYAPHUM, THAILAND”

(UNFCCC Registration Ref. No. 1993)

Monitoring Period:  
1 December 2009 to 31 December 2012

REPORT No. 2013-1164

REVISION No. 02

DET NORSKE VERITAS<sup>TM</sup>



## MANAGING RISK

Verification/certification of project activity "Siam Quality Starch Wastewater Treatment and Energy Generation Project in Chaiphaphum, Thailand"		DNV CLIMATE CHANGE SERVICES AS
For: Siam Quality Starch Co., Ltd.		Veritasveien 1 1322 Høvik, Norway
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Date of Current Issue:	7 October 2014	ConCert Project No.: PRJC-465699-2013-CCS-MYS
Revision No.:	02	Organisation Unit: Climate Change Services
DNV Reg. No.:	NO 994 774 352 MVA	Report No.: 2013-1164
<p>Summary:</p> <p>DNV Climate Change Services AS (DNV) has performed the verification of the emission reductions reported for the project activity "Siam Quality Starch Wastewater Treatment and Energy Generation Project in Chaiphaphum, Thailand" (UNFCCC Registration Ref. No. 1993) for the period 1 December 2009 to 31 December 2012.</p> <p>In our opinion, the GHG emission reductions reported for the project in the monitoring report (version 1.3) of 19 September 2014 are fairly stated. The GHG emission reductions were calculated correctly on the basis of the approved monitoring methodology AM0013 (version 04) and the monitoring plan contained in the revised Project Design Document of 7 October 2014.</p> <p>DNV Climate Change Services AS is able to certify that the emission reductions from the project activity "Siam Quality Starch Wastewater Treatment and Energy Generation Project in Chaiphaphum, Thailand" during the period 1 December 2009 to 31 December 2012 amount to 184 213 tonnes of CO<sub>2</sub> equivalent.</p>		
Prepared by:	Verified by:	Approved by:
Simon Wong Yon-Sing Denise Lai Siew Sit	Andrea Leiroz	Michael Lehmann
<input checked="" type="checkbox"/> Unrestricted distribution (internal and external) <input type="checkbox"/> Unrestricted distribution within DNV <input type="checkbox"/> Limited distribution within DNV after 3 years <input type="checkbox"/> No distribution (confidential) <input type="checkbox"/> Secret		Keywords Climate Change Kyoto Protocol Validation Clean Development Mechanism
Rev. No.	Date	Reason for Issue
01	4 July 2014	First version of final verification/certification report
02	7 October 2014	Final verification/certification report after incompleteness check issued
Reference to part of this report which may lead to misinterpretation is not permissible.		



<b><i>Table of Content</i></b>	<b><i>Page</i></b>
1 INTRODUCTION .....	1
1.1 Objective	1
1.2 Scope	1
1.3 Description of the project activity	1
1.4 Methodology for determining emission reductions	2
2 METHODOLOGY .....	3
2.1 Desk review	4
2.2 On-site assessment	5
2.3 Closing out of verification findings	5
3 VERIFICATION FINDINGS .....	7
3.1 Remaining issues, CARs, FARs from previous validation / verification	7
3.2 Post registration changes	7
3.3 Project implementation	7
3.4 Information (data and variables) provided in the monitoring report that is different from that stated in the PDD	8
3.5 Compliance of monitoring plan with monitoring methodology	8
3.6 Compliance of monitoring with the monitoring plan	9
3.7 Assessment of data and calculation of emission reductions	39
3.8 Quality of evidence to determine emission reductions	41
3.9 Management system and quality assurance	41
4 CERTIFICATION STATEMENT .....	42
5 REFERENCES .....	43
Appendix A Corrective action requests, clarification requests and forward action requests	
Appendix B Post registration changes	
Appendix C Curricula vitae of the verification team members	



## MANAGING RISK

### *Abbreviations*

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction(s)
CH <sub>4</sub>	Methane
CIGAR	Covered In-Ground Anaerobic Reactor
CL	Clarification request
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	Carbon dioxide equivalent
DNV	Det Norske Veritas
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
MCF	Methane Correction Factor
MoC	Modalities of communication
MP	Monitoring Plan
PDD	Project Design Document
PS	Clean Development Mechanism Project Standard
S/N	Serial Number
SQS	Siam Quality Starch
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Clean Development Mechanism Validation and Verification Standard



## 1 INTRODUCTION

Siam Quality Starch Co., Ltd. has commissioned DNV Climate Change Services AS (DNV) to carry out the verification and certification of emission reductions reported for the CDM project activity 1993 “Siam Quality Starch Wastewater Treatment and Energy Generation Project in Chaiphaphum, Thailand” (the project) for the period 1 December 2009 to 31 December 2012. This report contains the findings from the verification and a certification statement for the certified emission reductions.

### 1.1 Objective

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

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

The objective of this verification was to verify and certify the emission reductions reported for the “Siam Quality Starch Wastewater Treatment and Energy Generation Project in Chaiphaphum, Thailand” for the period 1 December 2009 to 31 December 2012.

### 1.2 Scope

The scope of the verification is to verify that:

- The project activity has been implemented and operated in accordance with the revised PDD / 68/;
- The monitoring plan complies with the monitoring methodology and the actual monitoring complies with the monitoring plan, including compliance with any guidance provided by the Board regarding deviations from the provisions of a registered plan and/or methodology;
- The data and calculation of GHG emission reductions have been assessed to correctly support the emission reductions being claimed.

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

### 1.3 Description of the project activity

Project Parties:	Thailand (Host) and Japan (Annex I Party)
Title of project activity:	Siam Quality Starch Wastewater Treatment and Energy Generation Project in Chaiphaphum, Thailand
UNFCCC registration No:	1993
Baseline and monitoring methodology	AM0013 (version 04)
Sectoral scope(s):	Sectoral scope 13: Waste handling and disposal



## MANAGING RISK

	Sectoral scope 1: Energy industries (renewable/non-renewable sources)
Project Participants:	Siam Quality Starch Co., Ltd. (Thailand) and Mitsubishi UFJ Morgan Stanley Securities Co., Ltd. (Japan)
Location of the project activity:	The Project is located on the premises of Siam Quality Starch Company Limited (SQS) at 222 Moo 100, Suranarai Road, Kokroengrom, Bumnet-Narong, Chaiphum Province, Thailand
Project's crediting period:	15 April 2009 – 14 April 2019 (fixed)
Period verified in this verification:	1 December 2009 to 31 December 2012

The project activity at the location of 15°24'20"N, 101°37'35"E, involves the installation of an anaerobic wastewater treatment facility with methane capture at Siam Quality Starch Company Limited (SQS) in Chaiphum Province, in the North Eastern region of Thailand.

Biogas captured is combusted for thermal energy as fuel for burners that produce heater air for the starch plant drying process, thereby reducing the dependency on the fuel oil in the project scenario. In the thermal energy generation system, the recovered biogas from digester was fed into two dual fuel burners (2 x 3 663 kW) installed at factory 1 and two others (2 x 5 280 kW) installed at factory 2. Biogas not combusted for thermal generation is sent for combustion in an open flare.

### 1.4 Methodology for determining emission reductions

The verification of emission reductions has assessed all factors and issues that constitute the basis for emission reductions from the project according to AM0013 (version 04) / 75/ and AMS-I.C (version 12) / 76/.

As per AM0013 (version 04) paragraph 34 / 75/, the baseline emission (BE) from the lagoon will be based on the lower figure of the following two  $BE_{lagoon,y}$  results computed in the following manner: (i) baseline methane emission less the physical leakage, hereafter referred as ' $BE_{lagoon,theoretical,y}$ ' and (ii) actual methane captured and flared/used for energy generation, hereafter referred as ' $BE_{lagoon,monitored,y}$ '. The baseline emission from the combustion of fuel oil ' $BE_{fuel\_oil,y}$ ' that is displaced have been capped according to the average of historical 3 years consumption which was validated as 140.6 TJ/year, which is equivalent to 10 615 tCO<sub>2</sub>/year.

Project emissions from AM0013 (version 04) / 75/ are due to stack emissions in the burners and flare ' $PE_{stack,m}$ ', physical leakages from anaerobic digester ' $PE_{phys\_leakage,m}$ ', emissions in the secondary treatment open lagoon system ' $PE_{lagoon,m}$ ', land application of sludge ' $PE_{sludge,m}$ ' and consumption of energy due to the project activity ' $PE_{energy\_cons,m}$ '.

As per AM0013 (version 04) / 75/ and AMS-I.C (version 12) / 76/, no leakage is associated with the project activity. The final reported emission reductions (ER) were determined as the difference between baseline emissions and project emissions and leakage ( $ER = BE - PE$ ).

The main parameters monitored are wastewater volume untreated and treated, chemical oxygen demand (COD) of treated and untreated wastewater, biogas sent for combustion in burners and flare, amount of sludge removed and sent for land application, auxiliary electricity consumption, flare temperature and operating parameters, and fraction of methane in the burner stack gas and anaerobic digester outlet.



## MANAGING RISK

Parameters set *ex-ante* in the validation are:

- Global warming potential for methane, 21
- Global warming potential for nitrous oxide, 310
- Oxidation factor for fuel oil, 1
- CO<sub>2</sub> emission factor for thermal energy generation using fuel oil, 77.4 tCO<sub>2</sub>/TJ
- Methane producing capacity of the wastewater, 0.21 kgCH<sub>4</sub>/kgCOD
- Rate of physical leakage from digester, 0.15
- Methane Correction Factor for sludge, 0.05
- COD concentration of final effluent in the baseline, 0.12 kgCOD/m<sup>3</sup>
- Fraction of anaerobic degradation as a function of depth, 0.5
- Maximum quantity of fuel oil consumed in year y in the absence of project activity, 140.6 TJ
- Density of methane, 0.716 kg/m<sup>3</sup>
- Net Calorific Value of methane, 50.4 TJ/Gg

Although the CO<sub>2</sub> emission factor for thermal energy generation using fuel oil was validated and fixed *ex-ante* at 77.4 tCO<sub>2</sub>/TJ in the revised PDD / 68/, for conservativeness purpose the lower value of 75.5 tCO<sub>2</sub>/TJ (Table 2.2 , Chapter 1, Volume 2 of 2006 IPCC Guidelines) / 71/ was applied in the *ex-post* baseline emission calculation.

## 2 METHODOLOGY

DNV has assessed and determined that the implementation and operation of the project activity, and the steps taken to report emission reductions comply with the CDM criteria and relevant guidance provided by the Board.

The assessment involved a desk review of relevant documentation as well as an on-site visit(s).

### Verification team

Role	Last Name	First Name	Country	Type of involvement					
				Desk review	Site visit	Reporting	Supervision of work	Technical review	TA 13.1 competence
Team leader (Verifier)	Wong	Yon Sing (Simon)	Malaysia	✓	✓	✓	✓		✓
Verifier	Lai	Denise Siew Sit	Malaysia	✓	✓				
Technical reviewer	Leiroz	Andrea	Brazil					✓	✓



### ***Duration of verification***

Monitoring report publication:	28 August 2013
Desk review:	28 August 2013 to 10 September 2013
On-site assessment:	12-14 September 2013
Reporting, calculation checks and QA/QC:	28 August 2013 to 7 October 2014

## **2.1 Desk review**

In addition to the monitoring report (webhosted version 1.0 dated 18 July 2013 and final version 1.3 dated 19 September 2014) / 1/, DNV reviewed:

- The PDD for the project activity (version 1.3 dated 30 March 2009) / 67/;
- The revised monitoring plan approved on 3 June 2011 / 67/;
- The previous verification report (DNV Report No. 2010-0124, rev 01) / 69/;
- The validation report SGS Climate Change Programme (Project No. CDM.Val 2167) / 70/;
- Baseline and monitoring methodology AM0013 (version 04) / 75/ and AMS-I.C (version 12) / 76/;
- Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board / 72// 73// 74/;
- IPCC Guidelines on National GHG Inventories, Volume 2 / 71/;
- The raw data comprising the daily records aggregated as part of the continuous recording / 4// 5// 6// 7// 8// 9/;
- The calibration certificates / 19/-/ 63/ and external stack gas test reports / 16/; and
- The emission reductions calculations spread sheets / 2/.

The verification of the emission reductions has assessed all factors and issues that constitute the basis for emission reductions from the project as follows:

- a) Measured COD of the wastewater entering and leaving the digester system analysed every shift (3 shifts in 24 hours) and aggregated daily conducted by internal laboratory from 1 December 2009 to 31 December 2012 / 6/;
- b) Measured ambient temperature and depths of open lagoons / 7/;
- c) Measured COD and Nitrogen Content (NC) of the sludge / 6// 15/;
- d) Measured flow of the wastewater entering the digester system measured by the flow meter / 4/;
- e) Measured every shift (3 shifts in 24 hours) and consolidated daily flow averages of biogas flow to the 4 biogas dual fuel burners and flare prior to combustion from 1 December 2009 to 31 December 2012 / 4/;
- f) Biogas produced and collected in the digester from 1 December 2009 to 31 December 2012 / 4/;
- g) Measured every shift (3 shifts in 24 hours) and consolidated monthly flow averages of methane content of the biogas flow from 1 December 2009 to 31 December 2012 / 4/;





- h) Measured electricity consumption measured with electricity meter for the biogas facility from 1 December 2009 to 31 December 2012 / 8/;
- i) Electricity consumption measured by the electricity meter for the decanter facility from 1 December 2009 to 31 December 2012 / 8/;
- j) Amount of burner stack gas and methane fraction of stack gas from 1 December 2009 to 31 December 2012 determined via multiple measurement campaign conducted on 23 December 2009, 16 February 2010, 23-24 June 2010, 19-20 August 2010, 10 December 2010, 29 March 2011, 28 June 2011, 26 September 2011, 21 December 2011, 13 March 2012, 26-27 June 2012, 7 September 2012 and 12-14 December 2012 / 16/ as proposed and approved by CDM Executive Board in the revised monitoring plan / 67/; and
- k) Data vintages and calculations to determine grid emission factor applicable at the commencement of the verification / 3/.

## 2.2 On-site assessment

From 12-14 September 2013, Mr. Simon Wong and Ms. Denise Lai from DNV Kuala Lumpur performed on-site assessment at Siam Quality Starch Company Limited (SQS) in Chaiphum Province, the North Eastern region of Thailand.. This included confirming the operational stages of the project with physical and documented evidence. During the on-site assessment DNV carried out:

- An assessment of the implementation and operation of the registered project activity is as per the revised PDD for the project activity (version 1.4 dated 7 October 2014) / 68/;
- A review of information flows for generating, aggregating and reporting the monitoring parameters;
- Interviews with relevant personnel / 81/-/ 89/ to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the revised PDD;
- A cross check between information provided in the monitoring report / 1/ and logbooks, inventories, and purchase records / 4// 5// 6// 7// 8// 9/;
- A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of monitoring plan.

## 2.3 Closing out of verification findings

The objective of this phase of the verification was to resolve any issues which needed be clarified prior to DNV's conclusion that i) the project activity has been implemented and operated in accordance with the registered PDD or any approved revised PDD, ii) the monitoring plan complies with the monitoring methodology and the actual monitoring complies with the monitoring plan and iii) the data and calculation of GHG emission reductions are correct.

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

- i. Non-conformities with the monitoring plan or methodology are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;



## MANAGING RISK



- ii. Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;
- iii. Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- iv. Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants.

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

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

The verification identified two CARs, two CLs and no FARs. The CARs and CLs were satisfactorily addressed by the project participants by among other revising the monitoring (please refer to Appendix A for further details). In addition to the changes made to the monitoring report as a result of the verification findings, the following changes to the monitoring report (version 1.3 dated 19 September 2014) / 1/ were made compared to the initial version of the monitoring report received for verification (version 1.0 dated 18 July 2013) / 1/:

- Inconsistency in the calibration dates and serial number of the monitoring equipment.
- Incorporate the changes made in the revised monitoring report (version 1.3 dated 19 September 2014) / 1/ due to the incompleteness message.



## MANAGING RISK

### 3 VERIFICATION FINDINGS

This section summarises the findings from the verification of the emission reductions reported for the “Siam Quality Starch Wastewater Treatment and Energy Generation Project in Chaiphum, Thailand” for the period 1 December 2009 to 31 December 2012.

#### 3.1 Remaining issues, CARs, FARs from previous validation / verification

This is the second verification for the project and there is no outstanding issue (FAR) from the previous verification / 69/ or validation report / 70/.

#### 3.2 Post registration changes

The post registration changes described in Appendix B were identified by DNV during this verification. These post registration changes were assessed by DNV.

The post registration changes do not require prior approval by the CDM EB in accordance with Appendix 1 to the CDM Project Standard / 73/. The assessment of the changes (in the form of a duly completed “Post-registration changes request form” (F-CDM-PRC) and DNV’s assessment opinion on the changes) is submitted together with the revised PDD (version 1.5 of 7 October 2014) / 68/ for acceptance by the CDM EB as part of the request for issuance for this monitoring period.

#### 3.3 Project implementation

As part of the site visit DNV was able to confirm that the project implementation is in accordance with the project description contained in the revised PDD (version 1.4 of 7 October 2014) / 68/.

Project component	Implementation in accordance with PDD	Description of how implementation was assessed by verification team
Biogas collection system	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	The CIGAR reactor was installed and commissioned at the time of validation in 2009. Commissioning began in April 2006 / 70/. Physical inspection confirms the project was implemented as planned.
Open flare system	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	The open biogas flare was installed and commissioned at the time of validation in 2009. Commissioning began in April 2006 / 70/. Physical inspection confirms the project was implemented as planned.
Biogas burner	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<p>The actual installed capacities verified on-site are 3 663 kW (2 units) and 5 280 kW (2 units).</p> <p>This is different to the registered PDD / 67/ which are 3 300 kW (2 units) and 5 234 kW (2 units). The discrepancy has been included in the post registration changes.</p>



## MANAGING RISK

Project component	Implementation in accordance with PDD	Description of how implementation was assessed by verification team
		Physical inspection confirms the project was implemented as planned.
Open anaerobic lagoons	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<p>In the registered PDD / 67/, it was misunderstood that the entire series of open lagoons were to be used after project implementation.</p> <p>In the project scenario, a new open anaerobic lagoon was built as part of the open lagoon syem and this lagoon receives the effluent from the treated wastewater in the Covered In-Ground Anaerobic Reactor (CIGAR) system. The effluent from the new anaerobic lagoon will be routed to the existing open lagoons. The revised PDD / 68/ contains scenarios of before and after project implementation.</p> <p>The descprancy has been included in the post registration changes.</p>

### 3.4 Information (data and variables) provided in the monitoring report that is different from that stated in the PDD

The emission reductions reported in this monitoring period are 184 213 tons of CO<sub>2</sub> equivalents from 1 December 2009 to 31 December 2012 (i.e. 951 days). The yearly expected emission reductions (derived from 330 operation days) in the revised PDD / 68/ 98 372 tonnes of CO<sub>2</sub> equivalents, which corresponds to the emission reductions of 283 490 tonnes of CO<sub>2</sub> equivalents in 951 days. Hence, the reported emission reductions are 35% lower than the expected.

The variation is due to lower volume of wastewater (less than 4 000 m<sup>3</sup>/day on average in actual vs. 6 000 m<sup>3</sup>/day / 4/ anticipated in the PDD). As the thermal generation from biogas combustion is based on the biogas availability in the system, which in turn is based on volume wastewater being sent from treatment, hence the emission reductions claimed in this monitoring period is lower than anticipated in the revised PDD / 68/ and it is considered to be reasonable by DNV.

It is justified that the emission reductions claimed in this monitoring period is lower than anticipated in the revised PDD / 68/ and it is considered to be reasonable by DNV.

### 3.5 Compliance of monitoring plan with monitoring methodology

DNV is able to confirm that the monitoring plan contained in the revised PDD (version 1.4 of 7 October 2014) / 68/ is in accordance with the approved methodology applied by the project activity, i.e. AM0013 (version 04) / 75/ and AMS-I.C (version 12) / 76/.



## MANAGING RISK

### 3.6 Compliance of monitoring with the monitoring plan

The monitoring has been carried out in accordance with the revised monitoring plan contained in the revised PDD of 7 October 2014 / 68/.

The below tables describe for each parameter, which is to be measured according to the monitoring plan, how DNV has verified that i) the actual monitoring complies with the monitoring plan and that ii) data have been assessed to correctly support the emission reductions being claimed.

	Assessment/ Observation																
Data / Parameter: (as in monitoring plan):	<b>F<sub>digester</sub> / F<sub>dig_out,m</sub></b> Flow rate of wastewater fed in to / discharge out of the digester																
Measuring frequency:	Continuously																
Reporting frequency:	Every shift (8 hours), 3 shifts a day																
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, the approved revised monitoring plan and AM0013 methodology / 75/ require continuous measurement but do not define the recording frequency																
Type of monitoring equipment:	<table border="1"> <tr> <td>Equipment name</td><td>Electromagnetic flowmeter</td></tr> <tr> <td>Tag NO</td><td>FIC-001</td></tr> <tr> <td>Manufacturer</td><td>Siemens</td></tr> <tr> <td>Model</td><td>SITRANS F M MAGFLO MAG6000</td></tr> <tr> <td>Serial Number</td><td>7ME633000817N465 265902H181</td></tr> <tr> <td>Calibration frequency</td><td>Yearly</td></tr> <tr> <td>Range</td><td>0-350 m<sup>3</sup>/hour</td></tr> <tr> <td>Accuracy</td><td>±2.5%</td></tr> </table> <p>Both parameters (F<sub>digester</sub> / F<sub>dig_out,m</sub>) are measured by the same meter as the digester is kept in hydraulic balance.</p> <p>S/N: 265902H181 replaced 7ME633000817N465 on 23 June 2012 / 66/.</p>	Equipment name	Electromagnetic flowmeter	Tag NO	FIC-001	Manufacturer	Siemens	Model	SITRANS F M MAGFLO MAG6000	Serial Number	7ME633000817N465 265902H181	Calibration frequency	Yearly	Range	0-350 m <sup>3</sup> /hour	Accuracy	±2.5%
Equipment name	Electromagnetic flowmeter																
Tag NO	FIC-001																
Manufacturer	Siemens																
Model	SITRANS F M MAGFLO MAG6000																
Serial Number	7ME633000817N465 265902H181																
Calibration frequency	Yearly																
Range	0-350 m <sup>3</sup> /hour																
Accuracy	±2.5%																
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's	<p>There is no accuracy indicated in the approved revised monitoring plan.</p> <p>The accuracy of the meter used is ±2.5%, which was checked via the manufacturer's specification / 23/.</p>																



## MANAGING RISK

specification?	
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Accuracy is constant throughout the whole measurement range / 23/.
Calibration frequency /interval:	Yearly.
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications (if local/national standards or the manufacturer's specifications are not available, international standards may be used)?	The monitoring plan requires the calibration interval to be in line with the appropriate industry and international standards. Since similar calibration routine have been carried out for the starch production flow meters on-site, the calibration interval is in line with the recommendation made by the internal procedures / 10/ and accredited calibration entity (Miracle International Technology Co., Ltd.) / 20// 21/.
Is the calibration of measuring equipment carried out by an accredited person or institution?	Internal calibration carried out on 2009 was using SQS internal procedure for calibration of magnetic flow meter, in accordance with ISO 9001 / 10/. The requirement for measuring equipment being calibrated by accredited person/institution is only applicable for Small Scale Methodologies / 73/. The external calibration of measuring equipment was carried out by Miracle International Technology Co., Ltd. which is an accredited calibration institution / 17/ according to ISO/IEC 17025 under Thai Laboratory Accreditation Scheme, Thai Industrial Standards Institute, Ministry of Industry, Thailand / 20// 21/.
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes, the calibration confirms proper functioning of the magnetic flow meter.
Is(are) calibration(s) valid for the whole reporting period?	Yes, calibration was performed internally for (S/N: 7ME633000817N465) on 16 July 2009 (calibration valid until 15 July 2010) / 19/ using the calibrated standard weights which were valid for the calibrations performed on the magnetic flow meter as the weights were calibrated on 21 January 2009 / 22/. The flow meter (S/N: 7ME633000817N465) was then sent for external calibration on 20 April 2010 (calibration valid until 19 April 2011), 5 April 2011 (calibration valid until 4 April 2012), 3 April 2012 (calibration valid until 2 April 2013) / 20/. S/N: 265902H181 replaced S/N:



## MANAGING RISK



	7ME633000817N465 on 23 June 2012 / 66/. 265902H181 was calibrated on and 1 June 2012 (calibration valid until 31 May 2013) / 21/.
If applicable, has the reported data been cross-checked with other available data?	The reported wastewater flow quantity in the monitoring period / 4/ was crosschecked with the amount of starch processed in the production line / 8/ and found to be in direct correlation with the wastewater flow patterns.
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes, calibration was carried out between 0-350 m <sup>3</sup> /hour, the typical measured values on-site is between 150-250 m <sup>3</sup> /hour.
How were the values in the monitoring report verified?	The values in the monitoring report were cross verified via the operator log sheet available in the biogas plant control room / 6/.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. The data management ensures the correct transfer of data and reporting of emission reductions and QA/QC processes are in place as per the monitoring manual.
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Not applicable

	Assessment/ Observation
Data / Parameter: (as in monitoring plan):	<b>Regulations and incentives relevant to wastewater</b> Thai regulations and/or incentives relevant to wastewater that may impact the baseline
Measuring frequency:	Renewal of crediting period
Reporting frequency:	Renewal of crediting period
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, for conservativeness purposes DNV has checked via publicly available resources during the second monitoring period that there were no Thai regulations and incentives relevant to wastewater treatment that may impact the baseline defined during validation.
Type of monitoring equipment:	Qualitative as per the methodology
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national	Not applicable.





## MANAGING RISK

standards, or as per the manufacturer's specification?	
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Not applicable.
Calibration frequency /interval:	Not applicable.
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications (if local/national standards or the manufacturer's specifications are not available, international standards may be used)?	Not applicable.
Is the calibration of measuring equipment carried out by an accredited person or institution?	Not applicable.
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Not applicable.
Is(are) calibration(s) valid for the whole reporting period?	Not applicable.
If applicable, has the reported data been cross-checked with other available data?	Not applicable.
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Not applicable.
How were the values in the monitoring report verified?	Not applicable.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Not applicable.
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Not applicable.





## MANAGING RISK

	Assessment/ Observation	Assessment/ Observation	Assessment/ Observation
Data / Parameter: (as in monitoring plan):	<b>OP<sub>m</sub></b> Number of operation days in month	<b>T<sub>2</sub></b> Ambient Temperature (Tag NO: TIC-001)	<b>D<sub>lagoon,project</sub></b> Depth of open lagoons
Measuring frequency:	Daily	Daily	Daily
Reporting frequency:	Daily	Every shift (8 hours), 3 shifts a day	Every shift (8 hours), 3 shifts a day
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, the approved revised monitoring plan and AM0013 methodology / 75/ require daily monitoring and recording of operation days.	Yes, the approved revised monitoring plan and AM0013 methodology / 75/ require daily monitoring and recording of ambient temperature.	Yes, the approved revised monitoring plan and AM0013 methodology / 75/ require daily monitoring and recording of the seven (7) open lagoons depth.
Type of monitoring equipment:	Based on bio-digester operation	Shengzhan Mercury Thermometer (S/N: UN-02)	On-site marker in each lagoon
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	There is no accuracy indicated in the approved revised monitoring plan nor is applicable for this parameter.	There is no accuracy indicated in the approved revised monitoring plan. The accuracy defined by the manufacturer is $\pm 3^{\circ}\text{C}$ , which is reasonable for the monitoring of this parameter / 25/.	There is no accuracy indicated in the approved revised monitoring plan for this parameter. The methodology requires the depth of the open lagoon system to be above 1 meter, thus the application of on- site markers for the 7 open lagoons represent good monitoring practise.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Not applicable	Measurement range of 0 to 100°C	0 to 15 meters
Calibration frequency /interval:	Not applicable	Yearly	Not applicable
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications (if local/national standards or the manufacturer's specifications are not available, international standards may be used)?	Not applicable	There is no calibration indicated in the approved revised monitoring plan. As the thermometer is measuring ambient temperature and is not subjected to harsh conditions, an annual calibration would be deemed appropriate.	There is no calibration indicated in the approved revised monitoring plan. Since the markers fixed at each pond and only indicates the depth, there is no requirement to calibrate these markers.



## MANAGING RISK

Is the calibration of measuring equipment carried out by an accredited person or institution?	Not applicable	The thermometer is internally calibrated by SQS using SQS internal procedure for calibration of temperature meter (Doc. No. 38-33-F) with master liquid-in-glass-thermometer using, in accordance with ISO 9001 / 10/. The requirement for measuring equipment being calibrated by accredited person/institution is only applicable for Small Scale Methodologies / 73/. The master liquid-in-glass-thermometer is calibrated by accredited laboratory Technology Promotion Association (Thailand-Japan) / 18/.	Not applicable
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Not applicable	Yes.	Not applicable
Is(are) calibration(s) valid for the whole reporting period?	Not applicable	Yes, calibrations were performed on the thermometer with master liquid-in-glass-thermometer using on 20 August 2009 (calibration valid until 19 August 2010), 12 February 2010 (calibration valid until 11 February 2011), 1 September 2010 (calibration valid until 31 August 2011), 30 January 2011 (calibration valid until 29 January 2012), 30 July 2011 (calibration valid until 29 July 2012), 30 January 2012 (calibration valid until 29 January 2013) and 30 July 2012 (calibration valid until 29 July 2013) / 24/. The master liquid-in-glass-thermometer (S/N: 13253) is calibrated by Technology Promotion Association (Thailand-Japan) / 18// 28/.	Not applicable
If applicable, has the	Not applicable	Yes, as per the approved	Not applicable



## MANAGING RISK

reported data been cross-checked with other available data?		revised monitoring plan, the recorded data was checked against local weather data from an official source. ( <a href="http://www.tmd.go.th/en/">http://www.tmd.go.th/en/</a> )	
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Not applicable	Carried out at 30°C, 50°C and 80°C.	Not applicable
How were the values in the monitoring report verified?	Not applicable	The values in the monitoring report were cross verified via the operator log sheet available in the biogas plant control room / 7/.	The values in the monitoring report were cross verified via the operator log sheet available in the biogas plant control room / 7/.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, as SQS is accredited with ISO 9001 / 10/, the same data management practise were applied in ensuring correct transfer of data and reporting of emission reductions and QA/QC processes in place.	Yes, as SQS is accredited with ISO 9001 / 10/, the same data management practise were applied in ensuring correct transfer of data and reporting of emission reductions and QA/QC processes in place.	Yes, as SQS is accredited with ISO 9001 / 10/, the same data management practise were applied in ensuring correct transfer of data and reporting of emission reductions and QA/QC processes in place.
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Not applicable	Not applicable	Not applicable

	Assessment/ Observation	Assessment/ Observation
Data / Parameter: (as in monitoring plan):	<b>COD<sub>conc_in,baseline,m</sub></b> COD concentration of effluent entering the lagoons in the baseline <b>COD<sub>conc_dig_out,m</sub></b> COD concentration of effluent out of biodigester to lagoons	<b>COD<sub>sludge,y</sub></b> Chemical Oxygen Demand of the sludge used for land application
Measuring frequency:	Daily	Once a month
Reporting frequency:	Daily	Once a month
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, the approved revised monitoring plan requires at least once a month measurement and recording, while AM0013 methodology / 75/ require at least monthly measurement of COD.	Yes, the approved revised monitoring plan requires at least once month measurement and recording, while AM0013 methodology / 75/ require at least monthly measurement of COD.



## MANAGING RISK

	The daily measurement and daily recording performed on-site is in compliance with the revised monitoring plan and conservative compared to AM0013 methodology / 75/, which only requires monthly monitoring.	the daily measurement and recording is in compliance with the revised monitoring plan and conservative compared to AM0013 methodology / 75/. Since the system does not discharge sludge ever month, the measurement is performed whenever sludge is being released, which is appropriate.																												
Type of monitoring equipment:	<table><tr><td>Equipment name</td><td>Weighing Scale</td></tr><tr><td>Tag NO</td><td>Not applicable</td></tr><tr><td>Manufacturer</td><td>SATORIUS and PRECISA</td></tr><tr><td>Model</td><td>Sartorius CP224S Precisa/205A</td></tr><tr><td>Serial Number</td><td>SATORIUS (S/N: 17111269) and PRECISA (S/N: 58288)</td></tr><tr><td>Calibration frequency</td><td>Calibrated Monthly</td></tr><tr><td>Range</td><td>SATORIUS 0-220 grams PRECISA 0-205 grams</td></tr></table> <p>Open Reflux Method, i.e. reflux apparatus, conical flask, hot plate COD, weight scale, volumetric pipette and reagentes / 11/</p>	Equipment name	Weighing Scale	Tag NO	Not applicable	Manufacturer	SATORIUS and PRECISA	Model	Sartorius CP224S Precisa/205A	Serial Number	SATORIUS (S/N: 17111269) and PRECISA (S/N: 58288)	Calibration frequency	Calibrated Monthly	Range	SATORIUS 0-220 grams PRECISA 0-205 grams	<table><tr><td>Equipment name</td><td>Weighing Scale</td></tr><tr><td>Tag NO</td><td>Not applicable</td></tr><tr><td>Manufacturer</td><td>SATORIUS and PRECISA</td></tr><tr><td>Model</td><td>Sartorius CP224S Precisa/205A</td></tr><tr><td>Serial Number</td><td>SATORIUS (S/N: 17111269) and PRECISA (S/N: 58288)</td></tr><tr><td>Calibration frequency</td><td>Monthly</td></tr><tr><td>Range</td><td>SATORIUS 0-220 grams PRECISA 0-205 grams</td></tr></table> <p>Open Reflux Method, i.e. reflux apparatus, conical flask, hot plate COD, weight scale, volumetric pipette and reagentes / 11/</p>	Equipment name	Weighing Scale	Tag NO	Not applicable	Manufacturer	SATORIUS and PRECISA	Model	Sartorius CP224S Precisa/205A	Serial Number	SATORIUS (S/N: 17111269) and PRECISA (S/N: 58288)	Calibration frequency	Monthly	Range	SATORIUS 0-220 grams PRECISA 0-205 grams
Equipment name	Weighing Scale																													
Tag NO	Not applicable																													
Manufacturer	SATORIUS and PRECISA																													
Model	Sartorius CP224S Precisa/205A																													
Serial Number	SATORIUS (S/N: 17111269) and PRECISA (S/N: 58288)																													
Calibration frequency	Calibrated Monthly																													
Range	SATORIUS 0-220 grams PRECISA 0-205 grams																													
Equipment name	Weighing Scale																													
Tag NO	Not applicable																													
Manufacturer	SATORIUS and PRECISA																													
Model	Sartorius CP224S Precisa/205A																													
Serial Number	SATORIUS (S/N: 17111269) and PRECISA (S/N: 58288)																													
Calibration frequency	Monthly																													
Range	SATORIUS 0-220 grams PRECISA 0-205 grams																													
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer’s specification?	There is no accuracy indicated in the approved revised monitoring plan. The Sartorius CP 224S (S/N: 17111269) weight has ±0.0005g accuracy at standard weights 1g, 5g, 10g, 20g and 200g, while the Precisa/205 A (S/N: 58288) weight has ±0.0005g accuracy at standard weights 1g, 5g, 10g, 20g and 200g, which are both reasonable for the purpose of testing COD using the open reflux method.	There is no accuracy indicated in the approved revised monitoring plan. The Sartorius CP 224S (S/N: 17111269) weight has ±0.0005g accuracy at standard weights 1g, 5g, 10g, 20g and 200g, while the Precisa/205 A (S/N: 58288) weight has ±0.0005g accuracy at standard weights 1g, 5g, 10g, 20g and 200g, which are both reasonable for the purpose of testing COD using the open reflux method.																												
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes, the accuracy is valid for the entire measuring range.	Yes, the accuracy is valid for the entire measuring range.																												
Calibration frequency /interval:	Monthly for the weighing scales	Monthly for the weighing scales																												



## MANAGING RISK

Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications (if local/national standards or the manufacturer's specifications are not available, international standards may be used)?	There is no calibration requirement identified in the approved revised monitoring plan, SQS has adopted the calibration interval of once a month according to SQS internal procedure for calibration of weighing scales for the COD testing, in accordance with ISO 9001 / 10/.	There is no calibration requirement identified in the approved revised monitoring plan, SQS has adopted the calibration interval of once a month according to SQS internal procedure for calibration of weighing scales for the COD testing, in accordance with ISO 9001 / 10/.
Is the calibration of measuring equipment carried out by an accredited person or institution?	SQS calibrating the weighing scales, while Standard weights (S/N: M1443) calibrated by Technology Promotion Association (Thailand – Japan) / 18// 29/	SQS calibrating the weighing scales, while Standard weights (S/N: M1443) calibrated by Technology Promotion Association (Thailand – Japan) / 18// 29/
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes.	Yes.
Is(are) calibration(s) valid for the whole reporting period?	Yes, calibrations were performed throughout the current monitoring period for the weighing scales (S/N: 17111269 and 58288) scales and the standard weights / 26// 27/.	Yes, calibrations were performed throughout the current monitoring period for the weighing scales (S/N: 17111269 and 58288) scales and the standard weights / 26// 27/.
If applicable, has the reported data been cross-checked with other available data?	The values in the monitoring report were cross verified via the lab technician log sheet available in SQS internal laboratory / 6/.	The values in the monitoring report were cross verified via the technician log sheet available in SQS internal laboratory / 6/.
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes, the calibration has covered the range for all measurements made / 27/.	Yes, the calibration has covered the range for all measurements made / 27/.
How were the values in the monitoring report verified?	The values in the monitoring report were cross verified via the lab technician log sheet available in SQS internal laboratory / 6/.	The values in the monitoring report were cross verified via the lab technician log sheet available in SQS internal laboratory / 6/.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, as SQS is accredited with ISO 9001 / 10/, the same data management practise were applied in ensuring correct transfer of data and reporting of emission reductions and QA/QC processes in place.	Yes, as SQS is accredited with ISO 9001 / 10/, the same data management practise were applied in ensuring correct transfer of data and reporting of emission reductions and QA/QC processes in place.
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Not applicable	Not applicable



## MANAGING RISK

	Assessment/ Observation	Assessment/ Observation																												
Data / Parameter: (as in monitoring plan):	NC Nitrogen content of sludge	Q <sub>sludge,m</sub> / Q <sub>sludge,y</sub> Amount of sludge generated and removed in month / year																												
Measuring frequency:	Once a month	When sludge is removed.																												
Reporting frequency:	Once a month	When sludge is removed.																												
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, the approved revised monitoring plan requires measurement and recording at least monthly. Since the system does not discharge sludge ever month, the measurement is performed whenever sludge is being released, which is appropriate.	Yes, the approved revised monitoring plan / 68/ requires measurement and recording when sludge is removed.																												
Type of monitoring equipment:	<table><tr><td>Equipment name</td><td>Weighing Scale</td></tr><tr><td>Tag NO</td><td>Not applicable</td></tr><tr><td>Manufacturer</td><td>SATORIUS and PRECISA</td></tr><tr><td>Model</td><td>Sartorius CP224S Precisa/205A</td></tr><tr><td>Serial Number</td><td>SATORIUS (S/N: 17111269) and PRECISA (S/N: 58288)</td></tr><tr><td>Calibration frequency</td><td>Monthly</td></tr><tr><td>Range</td><td>SATORIUS 0-200 grams PRECISA 1-200 grams</td></tr></table>	Equipment name	Weighing Scale	Tag NO	Not applicable	Manufacturer	SATORIUS and PRECISA	Model	Sartorius CP224S Precisa/205A	Serial Number	SATORIUS (S/N: 17111269) and PRECISA (S/N: 58288)	Calibration frequency	Monthly	Range	SATORIUS 0-200 grams PRECISA 1-200 grams	<table><tr><td>Equipment name</td><td>Weighing station</td></tr><tr><td>Tag NO</td><td>Weighing station 1</td></tr><tr><td>Manufacturer</td><td>Mettler Toledo</td></tr><tr><td>Model</td><td>8142 Pro</td></tr><tr><td>Serial Number</td><td>00240926</td></tr><tr><td>Calibration frequency</td><td>Once every 2 years</td></tr><tr><td>Range</td><td>At 0-10 000 kg, ±10 kg; at &gt;10 000-40 000kg, +20kg; at &gt;40 000-100 000kg, ±30kg</td></tr></table>	Equipment name	Weighing station	Tag NO	Weighing station 1	Manufacturer	Mettler Toledo	Model	8142 Pro	Serial Number	00240926	Calibration frequency	Once every 2 years	Range	At 0-10 000 kg, ±10 kg; at >10 000-40 000kg, +20kg; at >40 000-100 000kg, ±30kg
	Equipment name	Weighing Scale																												
	Tag NO	Not applicable																												
	Manufacturer	SATORIUS and PRECISA																												
	Model	Sartorius CP224S Precisa/205A																												
	Serial Number	SATORIUS (S/N: 17111269) and PRECISA (S/N: 58288)																												
	Calibration frequency	Monthly																												
	Range	SATORIUS 0-200 grams PRECISA 1-200 grams																												
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	Tag NO	Weighing station 1																												
Manufacturer	Mettler Toledo																													
Model	8142 Pro																													
Serial Number	00240926																													
Calibration frequency	Once every 2 years																													
Range	At 0-10 000 kg, ±10 kg; at >10 000-40 000kg, +20kg; at >40 000-100 000kg, ±30kg																													
	<p>The COD measurement on-site uses the above equipment with reference to the Open Reflux Method, i.e. reflux apparatus, conical flask, hot plate COD, weight scale, volumetric pipette and reagentes / 11/.</p>	<table><tr><td>Equipment name</td><td>Weighing station</td></tr><tr><td>Tag NO</td><td>Weighing station 2</td></tr><tr><td>Manufacturer</td><td>Mettler Toledo</td></tr><tr><td>Model</td><td>8142 Pro</td></tr><tr><td>Serial Number</td><td>00241276 FE 00634116FJ</td></tr><tr><td>Calibration frequency</td><td>Once every 2 years</td></tr><tr><td>Range</td><td>At 0-10 000 kg, ±10 kg; at &gt;10 000-40 000kg, +20kg; at &gt;40 000-100 000kg, ±30kg</td></tr></table>	Equipment name	Weighing station	Tag NO	Weighing station 2	Manufacturer	Mettler Toledo	Model	8142 Pro	Serial Number	00241276 FE 00634116FJ	Calibration frequency	Once every 2 years	Range	At 0-10 000 kg, ±10 kg; at >10 000-40 000kg, +20kg; at >40 000-100 000kg, ±30kg														
Equipment name	Weighing station																													
Tag NO	Weighing station 2																													
Manufacturer	Mettler Toledo																													
Model	8142 Pro																													
Serial Number	00241276 FE 00634116FJ																													
Calibration frequency	Once every 2 years																													
Range	At 0-10 000 kg, ±10 kg; at >10 000-40 000kg, +20kg; at >40 000-100 000kg, ±30kg																													



## MANAGING RISK



		Equipment name	Weighing station
		Tag NO	Weighing station 3
		Manufacturer	Mettler Toledo
		Model	8142 Pro
		Serial Number	5454117-5KF
		Calibration frequency	Once every 2 years
		Range	At 0-10 000 kg, $\pm 10$ kg; at >10 000-40 000kg, +20kg; at >40 000-100 000kg, $\pm 30$ kg
		Equipment name	Weighing station
		Tag NO	Weighing station 4
		Manufacturer	Mettler Toledo
		Model	8142 Pro
		Serial Number	5453962-5KF
		Calibration frequency	Once every 2 years
		Range	At 0-10 000 kg, $\pm 10$ kg; at >10 000-40 000kg, +20kg; at >40 000-100 000kg, $\pm 30$ kg
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	There is no accuracy indicated in the approved revised monitoring plan. The Sartorius CP 224S (S/N: 17111269) weight has $\pm 0.0005$ g accuracy at standard weights 1g, 5g, 10g, 20g and 200g, while the Precisa/205 A (S/N: 58288) weight has $\pm 0.0005$ g accuracy at standard weights 1g, 5g, 10g, 20g and 200g, which are both reasonable for the purpose of testing COD using the open reflux method / 11/.	There is no accuracy indicated in the approved revised monitoring plan. The accuracy for the truck scales employed for the purpose of monitoring both SQS's production lines raw and processed products and the sludge removed and sent for land application is a maximum of $\pm 30$ kg at the highest measurement range of 40 000 to 1000 000 kg, which is reasonable for the monitoring of this parameter.	
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes, the accuracy is valid for the entire measuring range.	At 0-10 000 kg, $\pm 10$ kg; at >10 000-40 000kg, +20kg; at >40 000-100 000kg, $\pm 30$ kg	
Calibration frequency /interval:	Monthly for the weighing scales	Once every 2 years	
Is the calibration interval in line with	There is no calibration requirement	There is no calibration interval	





## MANAGING RISK

the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications (if local/national standards or the manufacturer's specifications are not available, international standards may be used)?	identified in the approved revised monitoring plan, SQS has adopted the calibration interval of once a month according to SQS internal procedure for calibration of weighing scales for the COD testing, in accordance with ISO 9001 / 10/.	identified in the approved revised monitoring plan, the PDD refers to relevant industry and international standards. DNV verified that the National Weights and Measures Act 1999 has been adopted in the verification / 37/.
Is the calibration of measuring equipment carried out by an accredited person or institution?	SQS calibrating the weighing scales, while Standard weights (S/N: M1443) calibrated by Technology Promotion Association (Thailand – Japan) / 18// 29/	Weights and Measures Office (District 2-6 Nakorn Ratchasima) / 37
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes.	Yes.
Is(are) calibration(s) valid for the whole reporting period?	Yes, calibrations were performed throughout the current monitoring period for the weighing scales (S/N: 17111269 and 58288) scales and the standard weights / 26// 27/.	Not, all truck scales are valid for the whole reporting period. <b>Scale 1:</b> S/N 00240926 was calibrated on 28 April 2008 9 (calibration is valid until 27 April 2010) / 30/. Subsequent calibrations were carried out on 26 April 2010 (calibration valid until 25 April 2012) / 31/ and on 9 February 2012 (calibration is valid until 8 February 2014) / 32/. <b>Scale 2:</b> S/N 00241276 FE was calibrated on 2 December 2008 and is valid until 1 December 2010. Subsequent calibrations were carried out on 26 April 2010 (calibration valid until 25 April 2012) and on 26 July 2011 (calibration is valid until 25 July 2013) / 33/. The scale was replaced by 00634116FJ on 9 February 2012 / 66/. Calibration for 00634116FJ was conducted on 9 February 2012 (calibration is valid until 8 February 2014) / 34/. <b>Scale 3:</b> S/N 5454117-5KF was calibrated on 28 April 2008 (calibration is valid until 27 April 2010). Subsequent calibrations were carried out on 26 April 2010 (calibration is valid until 25 April 2012 and on 20 April 2011 (calibration valid until 19 April 2013) / 35/.





## MANAGING RISK

		<p><b>Scale 4:</b> S/N 5453962-5KF was calibrated on 28 April 2008 (calibration is valid until 27 April 2010). Subsequent calibrations were carried out on 11 May 2010 (calibration is valid until 10 May 2012) and on 20 April 2011 (calibration valid until 19 April 2013) / 36/. Hence, there are calibration gap between 28 April to 10 May 2010. The delayed calibrations on 11 May 2010 shows no error.</p> <p>A maximum permissible error of 10kg was included to the measured values for Project Emission Calculation and increases the project emissions from this source. This is justified as the delayed calibration revealed that the accuracy of the scale is still within the permissible error for the scale. This is conservative and in accordance with paragraph 238 of Clean Development Mechanism Validation and Verification Standard version 05.0 / 72/.</p>
If applicable, has the reported data been cross-checked with other available data?	The values in the monitoring report were cross verified via the lab technician log sheet available in SQS internal laboratory / 15/.	The values in the monitoring report were cross verified via the log sheets available in SQS office / 5/.
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes, the calibration has covered the range for all measurements made / 26// 27/.	Yes, the calibration has covered the range for all measurements made / 31// 32// 33// 34// 35// 36/.
How were the values in the monitoring report verified?	The values in the monitoring report were cross verified via the lab technician log sheet available in SQS internal laboratory / 15/.	The values in the monitoring report were cross verified via the log sheets available in SQS office / 5/.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, as SQS is accredited with ISO 9001 / 10/, the same data management practise were applied in ensuring correct transfer of data and reporting of emission reductions and QA/QC processes in place.	Yes, as SQS is accredited with ISO 9001 / 10/, the same data management practise were applied in ensuring correct transfer of data and reporting of emission reductions and QA/QC processes in place.
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Not applicable	Not applicable



## MANAGING RISK

	Assessment/ Observation																												
Data / Parameter: (as in monitoring plan of PDD):	$Q_{elec\_cons,y} / Q_{fuel\_cons,y}$ Quantity of electricity / fuel oil consumed due to the project activity in year																												
Measuring frequency:	Continuously																												
Reporting frequency:	Every shift (8 hours), 3 shifts a day																												
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, the approved revised monitoring plan and AM0013 methodology / 75/ require continuous monitoring of the electricity consumed.																												
Type of monitoring equipment:	<table border="1"> <tr> <td>Equipment name</td><td>Electricity meter (biogas)</td></tr> <tr> <td>Tag NO</td><td>WM-01</td></tr> <tr> <td>Manufacturer</td><td>Mitsubishi</td></tr> <tr> <td>Model</td><td>MH96H</td></tr> <tr> <td>Serial Number</td><td>9279973</td></tr> <tr> <td>Calibration frequency</td><td>Yearly</td></tr> <tr> <td>Range</td><td>Not applicable</td></tr> </table> <table border="1"> <tr> <td>Equipment name</td><td>Electricity meter (decanter)</td></tr> <tr> <td>Tag NO</td><td>Not applicable</td></tr> <tr> <td>Manufacturer</td><td>Mitsubishi</td></tr> <tr> <td>Model</td><td>MH96H</td></tr> <tr> <td>Serial Number</td><td>8328033</td></tr> <tr> <td>Calibration frequency</td><td>Yearly</td></tr> <tr> <td>Range</td><td>Not applicable</td></tr> </table>	Equipment name	Electricity meter (biogas)	Tag NO	WM-01	Manufacturer	Mitsubishi	Model	MH96H	Serial Number	9279973	Calibration frequency	Yearly	Range	Not applicable	Equipment name	Electricity meter (decanter)	Tag NO	Not applicable	Manufacturer	Mitsubishi	Model	MH96H	Serial Number	8328033	Calibration frequency	Yearly	Range	Not applicable
Equipment name	Electricity meter (biogas)																												
Tag NO	WM-01																												
Manufacturer	Mitsubishi																												
Model	MH96H																												
Serial Number	9279973																												
Calibration frequency	Yearly																												
Range	Not applicable																												
Equipment name	Electricity meter (decanter)																												
Tag NO	Not applicable																												
Manufacturer	Mitsubishi																												
Model	MH96H																												
Serial Number	8328033																												
Calibration frequency	Yearly																												
Range	Not applicable																												
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	There is no accuracy indicated in the approved revised monitoring plan. The accuracy of the meter used is $\pm 2.0\%$ , which was checked via the manufacturer's specification / 40/.																												
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	The accuracy is valid throughout the measurement range.																												
Calibration frequency /interval:	Yearly																												
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications (if local/national standards or the	The calibration interval defined in the approved revised monitoring plan is either a frequency defined by the Provincial Electricity Authority (PEA) or 12 months, whichever is earlier. Thus in the absence of the standard from PEA, SQS has adopted 12 months interval.																												



## MANAGING RISK

manufacturer's specifications are not available, international standards may be used)?	
Is the calibration of measuring equipment carried out by an accredited person or institution?	Meter Division, Provincial Electricity Authority (PEA)
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes, the calibration confirms proper functioning of the electricity meter.
Is(are) calibration(s) valid for the whole reporting period?	<p>No. The calibration for 9279973 was performed on 15 March 2010 after the start of this monitoring period and is valid until 14 March 2011. Subsequent calibrations were carried out on 9 May 2011 (valid until 8 May 2012) and 15 May 2012 (valid until 14 May 2013). Hence, there are calibration gaps a) between 15 March 2011 to 8 May 2011 and b) between 9 to 14 May 2012 / 38/.</p> <p>The delayed calibrations on 9 May 2011 and 15 May 2012 shows the meter has errors of 0.24% and 0.26% respectively, well within its accuracy range at <math>\pm 2\%</math> / 38/.</p> <p>A maximum permissible error of 2% was included to the measured values for Project Emission Calculation and increases the project emissions from this source. This is justified as the delayed calibration revealed that the accuracy of the electricity meter is still within the permissible error for the meter. This is conservative and in accordance with paragraph 238 of Clean Development Mechanism Validation and Verification Standard version 05.0 / 72/.</p> <p>The calibration for 8328033 was performed on 9 May 2011 (valid until 8 May 2012) and 15 May 2012 (valid until 14 May 2013). Hence, there are calibration gaps a) between 4 January 2011 to 8 May 2011 and b) between 9 to 14 May 2012 / 39/.</p> <p>The delayed calibrations on 9 May 2011 and 15 May 2012 show the meter has errors of 0.21% and 0.27% respectively, well within its accuracy range at <math>\pm 2\%</math> / 39/.</p> <p>A maximum permissible error of 2% was included to the measured values for Project Emission Calculation and increases the project emissions from this source. This is justified as the delayed calibration revealed that the accuracy of the electricity meter is still within the permissible error for the meter. This is conservative and in accordance with paragraph 238 of Clean Development Mechanism Validation and Verification Standard version 05.0 / 72/.</p>
If applicable, has the reported data been cross-checked with other available data?	The values in the monitoring report were cross verified via the log sheets available in SQS office / 5/.
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes the calibration was carried out covering the typical measurement range on-site.
How were the values in the	The values in the monitoring report were cross verified via



## MANAGING RISK

monitoring report verified?	the operator log sheet available in the biogas plant control room / 8/.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, as SQS is accredited with ISO 9001 / 10/, the same data management practise were applied in ensuring correct transfer of data and reporting of emission reductions and QA/QC processes in place.
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Not applicable.

	Assessment/ Observation	Assessment/ Observation		
Data / Parameter: (as in monitoring plan of PDD):	<b>Q<sub>biogas_total,y</sub></b> Quantity of biogas produced and collected in the digester in year y (wet or dry basis)	<b>W<sub>CH4</sub></b> Fraction of methane in the biogas from the digester (wet or dry basis)		
Measuring frequency:	Continuously	Continuously		
Reporting frequency:	Every shift (8 hours), 3 shifts a day	Every shift (8 hours), 3 shifts a day		
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, the approved revised monitoring plan and AM0013 methodology / 75/ require continuous measurement but did not define the recording frequency.	Yes, the approved revised monitoring plan and AM0013 methodology / 75/ require at least quarterly measuring and reporting frequency.		
Type of monitoring equipment:	Equipment name	Total gas flow meter	Equipment name	Methane analyser
	Tag NO	GFM-008	Tag NO	MTA-001
	Manufacturer	Fluid Components International LLC (FCI)	Manufacturer	Anri Instruments and Control Pty. Ltd. Methane analyser
	Model	ST51/ST512	Model	CAM-3L
	Serial Number	306094 325060	Serial Number	LFB-1718 LFB-072
	Calibration frequency	18 months	Calibration frequency	Yearly
	Range	0.3 sfps to 400 sfps	Range	Not applicable
	Equipment name	Methane analyser	Equipment name	Methane analyser
	Tag NO	MTA-001	Tag NO	MTA-001
	Manufacturer	JE	Manufacturer	JE
	Model	JE	Model	JE
	Serial Number	31167 (JE)	Serial Number	31167 (JE)



## MANAGING RISK

		<table><tr><td>Calibration frequency</td><td>Yearly</td></tr><tr><td>Range</td><td>Not applicable</td></tr></table> Replacement of the methane analyzer LFB-1718 took place on 5 November 2010, replaced by 31167 / 66/ which was in service until 13 March 2012 before being replaced by LFB-072 66/.	Calibration frequency	Yearly	Range	Not applicable
Calibration frequency	Yearly					
Range	Not applicable					
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	There is no accuracy indicated in the approved revised monitoring plan. The accuracy of the meter used were checked via the manufacturer's specification as follows: Type: FCI/ST51 and FCI/ST52 At > 0.21 nmps ±2% reading ±0.5% full scale / 44/	There is no accuracy indicated in the approved revised monitoring plan. The accuracy of the meter used is ±2%, which was checked via the manufacturer's specification.				
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	The accuracy levels apply to different measuring ranges as stated above.	The accuracy level is valid for the entire measuring range.				
Calibration frequency /interval:	18 months / 45/	12 months				
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications (if local/national standards or the manufacturer's specifications are not available, international standards may be used)?	The calibration interval of the approved revised monitoring plan refers to appropriate industry/international standards. Since there is no industry or international standards, SQS has adopted the calibration interval of 18 months recommended by the equipment manufacturer FCI.	The calibration interval of the approved revised monitoring plan refers to appropriate industry/international standards for internally carried out measurement. Since there is no industry or international standards, SQS has adopted the calibration interval of 12 months according to SQS internal procedure for calibration of methane analyser, in accordance with ISO 9001 / 10/.				
Is the calibration of measuring equipment carried out by an accredited person or institution?	Initial calibration was carried out by FCI. Subsequent calibrations were carried out by Miracle International Technology Co., Ltd. / 17/ which is an accredited calibration institution according to ISO/IEC 17025 under Thai Laboratory Accreditation Scheme, Thai Industrial Standards Institute, Ministry of Industry, Thailand / 41// 42// 43/.	JE and Anri Instruments and Control Pty. Ltd. The requirement for measuring equipment being calibrated by accredited person/institution is only applicable for Small Scale Methodologies / 73/.				
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes, the calibration confirms proper functioning of the FCI flow meters.	Yes, the calibrations confirm proper functioning of the Anri and JE methane analysers.				
Is(are) calibration(s) valid for the whole reporting period?	Yes, calibrations for S/N: 306094 were performed on 22 June 2009	The calibration was performed for (LFB-1718) on 5 November 2009				



## MANAGING RISK

	(calibration valid until 21 December 2010) / 41/, 28 April 2010 (calibration valid until 27 October 2011), 8 December 2010 (calibration valid until 7 June 2012), 9 December 2011 (calibration valid until 8 June 2013), and 8 December 2012 (calibration valid until 7 June 2014) / 42/. Yes, calibrations for 325060 were performed on 12 May 2010 (calibration valid until 11 November 2011), 29 April 2011 (calibration valid until 28 October 2012) and 30 April 2012 (calibration valid until 29 October 2013) / 43/.	(calibration valid until 4 November 2010) / 59/. The calibration was performed for (31167) on 5 November 2010 (calibration valid until 4 November 2011) and subsequent calibration conducted on 14 March 2011 (calibration valid until 13 March 2012). This analyser was valid at time of being operational starting from 5 November 2010 until 13 March 2012 / 60/. The calibration was performed for (LFB-072) on 20 February 2012 (calibration valid until 19 February 2013). This analyser was valid at time of being operational starting from 14 March 2012 until 31 December 2012 / 59/.
If applicable, has the reported data been cross-checked with other available data?	The values in the monitoring report were cross verified via the operator log sheet available in the biogas plant control room / 4/.	The values in the monitoring report were cross verified via the operator log sheet available in the biogas plant control room / 4/.
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes, the calibration is carried out covering the typical measurement range on-site.	Yes, the calibration is carried out covering the typical measurement range on-site.
How were the values in the monitoring report verified?	The values in the monitoring report were cross verified via the operator log sheet available in the biogas plant control room / 4/.	The values in the monitoring report were cross verified via the operator log sheet available in the biogas plant control room / 4/.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, as SQS is accredited with ISO 9001 / 10/, the same data management practise were applied in ensuring correct transfer of data and reporting of emission reductions and QA/QC processes in place.	Yes, as SQS is accredited with ISO 9001 / 10/, the same data management practise were applied in ensuring correct transfer of data and reporting of emission reductions and QA/QC processes in place.
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Not applicable.	Not applicable.

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	$Q_{\text{biogas\_burner,y}} / Q_{\text{biogas\_flare,y}}$ Volumetric flow rate of the biogas at normal conditions in the hour h. Same basis measurement (dry or wet) for all component in biogas
Measuring frequency:	Continuously



## MANAGING RISK

Reporting frequency:	Every shift (8 hours), 3 shifts a day																																																																			
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, the approved revised monitoring plan and AM0013 methodology / 75/ require continuous measurement but did not define the recording frequency.																																																																			
Type of monitoring equipment:	<table><tr><td>Equipment name</td><td>Gas flow meter for burner 1</td></tr><tr><td>Tag NO</td><td>GFM-003</td></tr><tr><td>Manufacturer</td><td>Alia Group Inc.</td></tr><tr><td>Model</td><td>AVF7000</td></tr><tr><td>Serial Number</td><td>09110106</td></tr><tr><td>Calibration frequency</td><td>Yearly</td></tr><tr><td>Range</td><td>0.3 to 4 950 m<sup>3</sup>/hr</td></tr></table> <table><tr><td>Equipment name</td><td>Gas flow meter for burner 2</td></tr><tr><td>Tag NO</td><td>GFM-004</td></tr><tr><td>Manufacturer</td><td>Alia Group Inc.</td></tr><tr><td>Model</td><td>AVF7000</td></tr><tr><td>Serial Number</td><td>09110005</td></tr><tr><td>Calibration frequency</td><td>Yearly</td></tr><tr><td>Range</td><td>0.3 to 4 950 m<sup>3</sup>/hr</td></tr></table> <table><tr><td>Equipment name</td><td>Gas flow meter for burner 1</td></tr><tr><td>Tag NO</td><td>GFM-005</td></tr><tr><td>Manufacturer</td><td>Alia Group Inc.</td></tr><tr><td>Model</td><td>AVF7000</td></tr><tr><td>Serial Number</td><td>09109904 12169402</td></tr><tr><td>Calibration frequency</td><td>Yearly</td></tr><tr><td>Range</td><td>0.3 to 4 950 m<sup>3</sup>/hr</td></tr></table> <table><tr><td>Equipment name</td><td>Gas flow meter for burner 2</td></tr><tr><td>Tag NO</td><td>GFM-006</td></tr><tr><td>Manufacturer</td><td>Alia Group Inc.</td></tr><tr><td>Model</td><td>AVF7000</td></tr><tr><td>Serial Number</td><td>09110207</td></tr><tr><td>Calibration frequency</td><td>Yearly</td></tr><tr><td>Range</td><td>0.3 to 4 950 m<sup>3</sup>/hr</td></tr></table> <p>S/N: 12169402 replaced S/N: 09119904 on 25 November 2012 / 66/.</p> <table><tr><td>Equipment name</td><td>Gas flow meter for flare</td></tr><tr><td>Tag NO</td><td>GFM-007</td></tr><tr><td>Manufacturer</td><td>Eldridge Products; Inc. (EPI)F FCI</td></tr><tr><td>Model</td><td>8240MP FCI/ST51</td></tr><tr><td>Serial Number</td><td>25100705/26120501</td></tr></table>		Equipment name	Gas flow meter for burner 1	Tag NO	GFM-003	Manufacturer	Alia Group Inc.	Model	AVF7000	Serial Number	09110106	Calibration frequency	Yearly	Range	0.3 to 4 950 m <sup>3</sup> /hr	Equipment name	Gas flow meter for burner 2	Tag NO	GFM-004	Manufacturer	Alia Group Inc.	Model	AVF7000	Serial Number	09110005	Calibration frequency	Yearly	Range	0.3 to 4 950 m <sup>3</sup> /hr	Equipment name	Gas flow meter for burner 1	Tag NO	GFM-005	Manufacturer	Alia Group Inc.	Model	AVF7000	Serial Number	09109904 12169402	Calibration frequency	Yearly	Range	0.3 to 4 950 m <sup>3</sup> /hr	Equipment name	Gas flow meter for burner 2	Tag NO	GFM-006	Manufacturer	Alia Group Inc.	Model	AVF7000	Serial Number	09110207	Calibration frequency	Yearly	Range	0.3 to 4 950 m <sup>3</sup> /hr	Equipment name	Gas flow meter for flare	Tag NO	GFM-007	Manufacturer	Eldridge Products; Inc. (EPI)F FCI	Model	8240MP FCI/ST51	Serial Number	25100705/26120501
Equipment name	Gas flow meter for burner 1																																																																			
Tag NO	GFM-003																																																																			
Manufacturer	Alia Group Inc.																																																																			
Model	AVF7000																																																																			
Serial Number	09110106																																																																			
Calibration frequency	Yearly																																																																			
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## MANAGING RISK

	<table> <tr> <td></td><td>27031212 306094 (FCI)</td></tr> <tr> <td>Calibration frequency</td><td>Yearly</td></tr> <tr> <td>Range</td><td>Not applicable</td></tr> </table> <p>Replacement of S/N: 25100705/26120501 took place on 18 May 2010, replaced by S/N: 27031212 / 66/ which was in service until 3 August 2011 before being replaced by S/N: 306094 / 66/.</p>		27031212 306094 (FCI)	Calibration frequency	Yearly	Range	Not applicable
	27031212 306094 (FCI)						
Calibration frequency	Yearly						
Range	Not applicable						
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	<p>There is no accuracy indicated in the approved revised monitoring plan. The accuracy of the Alia meter used is <math>\pm 1.0\%</math>, which were checked via the manufacturer's specification / 52/.</p> <p>The accuracy of the FCI meter used were checked via the manufacturer's specification as follows (Ref. 21C) <math>\pm (1\% \text{ of reading} + (0.5\% + 0.02\%/\text{C of Full scale}))</math> / 54/</p>						
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	<p>For Alia, the accuracy is valid for the entire measuring range.</p> <p>For EPI flowmeters, the accuracy levels apply to different measuring ranges: (Ref. 21C) <math>\pm (1\% \text{ of reading} + (0.5\% + 0.02\%/\text{C of Full scale}))</math> / 54/</p> <p>The accuracy of the meter used were checked via the manufacturer's specification as follows:</p> <p>Type: FCI/ST51</p> <p>At <math>&gt; 0.21 \text{ nmps}</math> <math>\pm 2\%</math> reading <math>\pm 0.5\%</math> full scale / 44/</p>						
Calibration frequency /interval:	<p>12 months for Alia</p> <p>12 months for EPI / 55/</p> <p>18 months (FCI) / 45/</p>						
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications (if local/national standards or the manufacturer's specifications are not available, international standards may be used)?	<p>The calibration interval of the approved revised monitoring plan refers to appropriate industry/international standards. Since there are no industry or international standards, SQS has employed their internally defined calibration interval of 12 months which is reasonable considering the other flow meter used for the same purpose employs 12 months calibration interval as well.</p> <p>SQS has adopted the calibration interval of 12 months recommended by the equipment manufacturer EPI and 18 months recommended by FCI.</p>						
Is the calibration of measuring equipment carried out by an accredited person or institution?	<p>The flow meters are initially calibrated by the manufacturer, Alia Group Inc / 46/. Subsequent calibrations were carried out by Miracle International Technology Co., Ltd. / 17/ which is an accredited calibration institution according to ISO/IEC 17025 under Thai Laboratory Accreditation Scheme, Thai Industrial Standards Institute, Ministry of Industry, Thailand.</p> <p>Eldridge Products; Inc. (EPI) and Miracle International Technology Co., Ltd.</p>						





## MANAGING RISK

	<p>The requirement for measuring equipment being calibrated by accredited person/institution is only applicable for Small Scale Methodologies / 73/. Subsequent calibrations were carried out by Miracle International Technology Co., Ltd. / 17/ which is an accredited calibration institution according to ISO/IEC 17025 under Thai Laboratory Accreditation Scheme, Thai Industrial Standards Institute, Ministry of Industry, Thailand</p>
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes, the calibration confirms proper functioning of the Alia Group Inc., EPI and FCI flow meters.
Is(are) calibration(s) valid for the whole reporting period?	<p>Alia Group Inc. AVF7000 vortex flow meter (S/N: 09110106) was calibrated on 1 April 2009 (calibration valid until 31 March 2010) / 46/. Subsequent calibrations were performed on 2 May 2010 (calibration valid until 1 May 2011), 4 May 2011 (calibration valid until 3 May 2012) and 7 May 2012 (calibration valid until 6 May 2013) / 50/. Calibration gaps were found between 1 April 2010 and 1 May 2010, and 3 May 2011 and the period between 4 May 2012 and 6 May 2012. The delayed calibration on 2 May 2010 shows an error of 0.25%, delayed calibration on 4 May 2011 shows an error of 0.22% while the delayed calibration on 7 May 2012 shows an error of 0.29%, A maximum permissible error of 1% was included to the measured values resulting in a lower emission reduction. This is justified as all the delayed calibration revealed that the accuracy of the flow meter is still within the permissible error for the flow meter. This is conservative and in accordance with paragraph 238 of Clean Development Mechanism Validation and Verification Standard version 05.0 / 72/.</p> <p>Alia Group Inc. AVF7000 vortex flow meter (S/N: 09110005) was calibrated on 1 April 2009 (calibration valid until 31 March 2010) / 46/. Subsequent calibrations were performed on 30 April 2010 (calibration valid until 29 April 2011), 3 May 2011 (calibration valid until 2 May 2012) and 7 May 2012 (calibration valid until 6 May 2013) / 51/. Calibration gaps were found between 1 April 2010 and 29 April 2010, 30 April 2011 and 2 May 2011 and the period between 3 May 2012 and 6 May 2012. The delayed calibration on 30 April 2010 shows an error of 0.48%, delayed calibration on 3 May 2011 shows an error of 0.28% while the delayed calibration on 7 May 2012 shows an error of 0.23%, A maximum permissible error of 1% was included to the measured values resulting in a lower emission reduction. This is justified as all the delayed calibration revealed that the accuracy of the flow meter is still within the permissible error for the flow meter. This is conservative and in accordance with paragraph 238 of Clean Development Mechanism Validation and Verification Standard version 05.0 / 72/.</p> <p>Alia Group Inc. AVF7000 vortex flow meter (S/N: 09119904) was calibrated on 1 April 2009 (calibration valid until 31 March 2010) / 46/. Subsequent calibrations were performed on 30 April 2010 (calibration valid until 29 April 2011), 4 May 2011 (calibration valid until 3 May 2012) and 7 May 2012 (calibration valid until 6 May 2013) / 47/. Calibration gaps were found between 1 April 2010 and 29 April 2010, 30</p>



## MANAGING RISK

	<p>April 2011 and 3 May 2011 and the period between 4 May 2012 and 6 May 2012.</p> <p>The delayed calibration on 30 April 2010 shows an error of 0.38%, delayed calibration on 3 May 2011 shows an error of 0.25% while the delayed calibration on 7 May 2012 shows an error of 0.22%,</p> <p>A maximum permissible error of 1% was included to the measured values resulting in a lower emission reduction. This is justified as all the delayed calibration revealed that the accuracy of the flow meter is still within the permissible error for the flow meter. This is conservative and in accordance with paragraph 238 of Clean Development Mechanism Validation and Verification Standard version 05.0 / 72/.</p> <p>S/N: 12169402 replaced S/N: 09119904 on 25 November 2012 / 66/. S/N: 12169402 was calibrated on 25 October 2012 and is valid until 24 October 2013. This meter is valid throughout its installation and replacement since 25 November 2012 / 48/.</p> <p>Alia Group Inc. AVF7000 vortex flow meter (S/N: 09110207) was calibrated on 1 April 2009 (calibration valid until 31 March 2010) / 46/.</p> <p>Subsequent calibrations were performed on 29 April 2010 (calibration valid until 28 April 2011), 5 May 2011 (calibration valid until 4 May 2012) and 7 May 2012 (calibration valid until 6 May 2013 / 49/.</p> <p>Calibration gaps were found between 1 April 2010 and 28 April 2010, 29 April 2011 and 4 May 2011 and the period between 5 May 2012 and 6 May 2012.</p> <p>The delayed calibration on 29 April 2010 shows an error of 0.43%, delayed calibration on 5 May 2011 shows an error of 0.20% while the delayed calibration on 7 May 2012 shows an error of 0.23%,</p> <p>A maximum permissible error of 1% was included to the measured values resulting in a lower emission reduction. This is justified as all the delayed calibration revealed that the accuracy of the flow meter is still within the permissible error for the flow meter. This is conservative and in accordance with paragraph 238 of Clean Development Mechanism Validation and Verification Standard version 05.0 / 72/.</p> <p>Eldridge Products; Inc. (EPI) flow meter (S/N: 25100705/26120501) was initially calibrated on 9 November 2009 (calibration valid until 8 November 2010) / 53/.</p> <p>S/N: 27031212 was calibrated on 28 April 2010 (calibration valid until 27 April 2011) / 61/.</p> <p>S/N: 306094 was calibrated on 22 June 2009 (calibration valid until 21 December 2010), 28 April 2010 (calibration valid until 27 October 2011), 8 December 2010 (calibration valid until 7 June 2012), 9 December 2011 (calibration valid until 8 June 2013) and 8 December 2012 (calibration valid until 7 June 2014) / 42/.</p>
If applicable, has the reported data been cross-checked with other available data?	The values in the monitoring report were cross verified via the operator log sheet available in the biogas plant control room / 4/.
Is the calibration carried out for a measuring range	Yes, calibration was carried out throughout the range, the typical measured values on-site is between 200-2000 m <sup>3</sup> /hour



## MANAGING RISK

comparable with the range for which measurements have been carried out?	
How were the values in the monitoring report verified?	The values in the monitoring report were cross verified via the operator log sheet available in the biogas plant control room / 4/.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, as SQS is accredited with ISO 9001 / 10/, the same data management practise were applied in ensuring correct transfer of data and reporting of emission reductions and QA/QC processes in place.
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Not applicable.

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	<b>W<sub>CH<sub>4</sub>_stack</sub></b> Fraction of methane in burner stack gas
Measuring frequency:	Every quarter
Reporting frequency:	Every quarter
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. This parameter was measured by an external laboratory on 23 December 2009, 16 February 2010, 23-24 June 2010, 19-20 August 2010, 10 December 2010, 29 March 2011, 28 June 2011, 26 September 2011, 21 December 2011, 13 March 2012, 26-27 June 2012, 7 September 2012 and 12-14 December 2012 / 16/.
Type of monitoring equipment:	Methane content of burner stack gas is analysed by a third party laboratory, Life and Environment Co., Ltd., which is accredited by Thailand's Department of Industrial Work on ISO/IEC 17025 : 2005 / 16/ For this monitoring period, the laboratory uses U.S. EPA Method 18 (H/C Analyzer (HORIBA))
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	The accuracy of methane content of burner stack gas monitoring equipment was not stated in the approved revised monitoring plan. Methane content of burner stack gas is analysed by third party laboratory according to U.S. EPA Method 18 (H/C Analyzer (HORIBA)) / 16/.
Is the accuracy valid for the	Methane content of burner stack gas is analysed by third party laboratory



## MANAGING RISK

entire measuring range or do different accuracy levels apply to different measuring ranges?	according to U.S. EPA Method 18 (H/C Analyzer (HORIBA)) / 16/.
Calibration frequency /interval:	The calibration interval of methane content of burner stack gas monitoring equipment was not stated in the approved revised monitoring plan. Methane content of burner stack gas is analysed by third party laboratory according to U.S. EPA Method 18 (H/C Analyzer (HORIBA)) / 16/.
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications (if local/national standards or the manufacturer's specifications are not available, international standards may be used)?	The calibration interval of methane content of burner stack gas monitoring equipment was not stated in the approved revised monitoring plan. Methane content of burner stack gas is analysed by third party laboratory according to U.S. EPA Method 18 (H/C Analyzer (HORIBA)) / 16/.
Is the calibration of measuring equipment carried out by an accredited person or institution?	Methane content of burner stack gas is analysed by a third party laboratory, Life and Environment Co., Ltd., which is accredited by Thailand's Department of Industrial Work on ISO/IEC 17025 : 2005 / 16/.
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	The PDD does not specify the calibration interval for methane content of burner stack gas. Methane content of burner stack gas is analysed by third party laboratory according to U.S. EPA Method 18 (H/C Analyzer (HORIBA)) / 16/.
Is(are) calibration(s) valid for the whole reporting period?	Methane content of burner stack gas is analysed by third party laboratory according to U.S. EPA Method 18 (H/C Analyzer (HORIBA)) / 16/.
If applicable, has the reported data been cross-checked with other available data?	The reported methane content of burner stack gas results was cross-checked with certificates of analysis during site visit / 16/.
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Methane content of burner stack gas is analysed by a third party laboratory, Life and Environment Co., Ltd., which is accredited by Thailand's Department of Industrial Work on ISO/IEC 17025 : 2005 / 16/.
How were the values in the monitoring report verified?	All the report methane content of burner stack gas test results were cross-checked / 16/ and found to be in order. DNV can determine all data applied in the emission reduction calculation spread sheet were correct and from the original records.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, as SQS is accredited with ISO 9001 / 10/, the same data management practise were applied in ensuring correct transfer of data and reporting of emission reductions and QA/QC processes in place.
In case project participants	Not applicable.



## MANAGING RISK

have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	
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	Assessment/ Observation	Assessment/ Observation																												
Data / Parameter: (as in monitoring plan of PDD):	<b>T<sub>flare</sub></b> Temperature of the exhaust gas of the flare	<b>Flare operation parameter</b> Minutes that flare is detected during the hour h																												
Measuring frequency:	Continuous	Continuous																												
Reporting frequency:	Every shift (8 hours), 3 shifts a day	Every shift (8 hours), 3 shifts a day																												
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, the approved revised monitoring plan and AM0013 methodology / 75/ require continuous measurement but did not define the recording frequency.	Yes, the approved revised monitoring plan and AM0013 methodology / 75/ require continuous measurement and continuous recording.																												
Type of monitoring equipment:	<table><tr><td>Equipment name</td><td>Type-N Thermocouple</td></tr><tr><td>Tag NO</td><td>TIC-003</td></tr><tr><td>Manufacturer</td><td>SIEMENS/SI TRANS</td></tr><tr><td>Model</td><td>TH300</td></tr><tr><td>Serial Number</td><td>AZB/U90069 71</td></tr><tr><td>Calibration frequency</td><td>Yearly</td></tr><tr><td>Range</td><td>Not applicable</td></tr></table>	Equipment name	Type-N Thermocouple	Tag NO	TIC-003	Manufacturer	SIEMENS/SI TRANS	Model	TH300	Serial Number	AZB/U90069 71	Calibration frequency	Yearly	Range	Not applicable	<table><tr><td>Equipment name</td><td>Flare detector &amp; hour counter</td></tr><tr><td>Tag NO</td><td>Not applicable</td></tr><tr><td>Manufacturer</td><td>(Nais) Matsushita Electric Works, Ltd</td></tr><tr><td>Model</td><td>TH2385</td></tr><tr><td>Serial Number</td><td>00912</td></tr><tr><td>Calibration frequency</td><td>Not applicable</td></tr><tr><td>Range</td><td>Not applicable</td></tr></table>	Equipment name	Flare detector & hour counter	Tag NO	Not applicable	Manufacturer	(Nais) Matsushita Electric Works, Ltd	Model	TH2385	Serial Number	00912	Calibration frequency	Not applicable	Range	Not applicable
	Equipment name	Type-N Thermocouple																												
Tag NO	TIC-003																													
Manufacturer	SIEMENS/SI TRANS																													
Model	TH300																													
Serial Number	AZB/U90069 71																													
Calibration frequency	Yearly																													
Range	Not applicable																													
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Tag NO	Not applicable																													
Manufacturer	(Nais) Matsushita Electric Works, Ltd																													
Model	TH2385																													
Serial Number	00912																													
Calibration frequency	Not applicable																													
Range	Not applicable																													
	<table><tr><td>Equipment name</td><td>Type-N Thermocouple</td></tr><tr><td>Tag NO</td><td>TIC-003</td></tr><tr><td>Manufacturer</td><td>SIEMENS/SIT RANS</td></tr><tr><td>Model</td><td>TH300</td></tr><tr><td>Serial Number</td><td>AZB/U900686 9</td></tr><tr><td>Calibration frequency</td><td>Yearly</td></tr><tr><td>Range</td><td>Not applicable</td></tr></table> <p>Replacement of the thermocouple (S/N: AZB/U9006971) took place on 2 January 2010 with (S/N: AZB/U9006869).</p>	Equipment name	Type-N Thermocouple	Tag NO	TIC-003	Manufacturer	SIEMENS/SIT RANS	Model	TH300	Serial Number	AZB/U900686 9	Calibration frequency	Yearly	Range	Not applicable															
Equipment name	Type-N Thermocouple																													
Tag NO	TIC-003																													
Manufacturer	SIEMENS/SIT RANS																													
Model	TH300																													
Serial Number	AZB/U900686 9																													
Calibration frequency	Yearly																													
Range	Not applicable																													
Is accuracy of the monitoring	There is no accuracy indicated in the	There is no accuracy indicated in the																												



## MANAGING RISK

equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	approved revised monitoring plan. The accuracy of the SIEMENS/SITRANS thermocouple used is $\pm 3.0^{\circ}\text{C}$ , which were checked via the manufacturer's specification / 62/.	approved revised monitoring plan or in the manufacturer's specification.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes, the accuracy is valid for the whole range.	Not applicable
Calibration frequency /interval:	12 months	Not applicable
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications (if local/national standards or the manufacturer's specifications are not available, international standards may be used)?	The calibration interval of the approved revised monitoring plan refers to appropriate industry/international standards. Since there is no industry or international standards, SQS has adopted the calibration interval of 12 months recommended by the Flaring Tool.	No calibration is required for the run time counter.
Is the calibration of measuring equipment carried out by an accredited person or institution?	Calibration Management Co., Ltd.	No calibration is required for the run time counter.
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes, the calibration confirms proper functioning of the thermocouple.	No calibration is required for the run time counter.
Is(are) calibration(s) valid for the whole reporting period?	Siemens/Sitrans TH300 Type-N Thermocouple (S/N: AZB/U9006971) was calibrated on 3 January 2009 (calibration valid until 2 January 2010) / 56/. Siemens/Sitrans TH300 Type-N Thermocouple (S/N: AZB/U9006869) was calibrated on 3 January 2010 (calibration valid until 2 January 2011), 18 September 2010 (calibration valid until 17 September 2011), subsequent calibration occurred on 13 December 2011 (calibration valid until 12 December 2012) and 8 December 2012 (calibration valid until 7 December 2013) / 57/.	No calibration is required for the run time counter.
If applicable, has the reported data been cross-checked with other available data?	The values in the monitoring report were cross verified via the operator log sheet available in the biogas plant	The values in the monitoring report were cross verified via the operator log sheet available in the biogas plant





## MANAGING RISK

	control room / 4/.	control room / 4/.
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes, the calibration has covered the range for all measurements made.	Not applicable.
How were the values in the monitoring report verified?	The values in the monitoring report were cross verified via the operator log sheet available in the biogas plant control room / 4/.	The values in the monitoring report were cross verified via the operator log sheet available in the biogas plant control room / 4/.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, as SQS is accredited with ISO 9001 / 10/, the same data management practise were applied in ensuring correct transfer of data and reporting of emission reductions and QA/QC processes in place.	Yes, as SQS is accredited with ISO 9001 / 10/, the same data management practise were applied in ensuring correct transfer of data and reporting of emission reductions and QA/QC processes in place.
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Not applicable.	Not applicable.

	Assessment/ Observation	Assessment/ Observation																												
Data / Parameter: (as in monitoring plan of PDD):	<b>T</b> Temperature of the biogas	<b>P</b> Pressure of the biogas																												
Measuring frequency:	Continuous	Continuous																												
Reporting frequency:	Every shift (8 hours), 3 shifts a day	Every shift (8 hours), 3 shifts a day																												
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, the approved revised monitoring plan and AM0013 methodology / 75/ require continuous measurement and recording.	Yes, the approved revised monitoring plan and AM0013 methodology / 75/ require quarterly measurement and recording.																												
Type of monitoring equipment:	<table><tr><td>Equipment name</td><td>RTD sensor</td></tr><tr><td>Tag NO</td><td>TIC-002</td></tr><tr><td>Manufacturer</td><td>Rosemount</td></tr><tr><td>Model</td><td>N11 A30C060T26</td></tr><tr><td>Serial Number</td><td>0541593</td></tr><tr><td>Calibration frequency</td><td>Yearly</td></tr><tr><td>Range</td><td>Not applicable</td></tr></table>	Equipment name	RTD sensor	Tag NO	TIC-002	Manufacturer	Rosemount	Model	N11 A30C060T26	Serial Number	0541593	Calibration frequency	Yearly	Range	Not applicable	<table><tr><td>Equipment name</td><td>Pressure transmitter</td></tr><tr><td>Tag NO</td><td>PIC-002</td></tr><tr><td>Manufacturer</td><td>SIEMENS/TR ANS P Series</td></tr><tr><td>Model</td><td>7MF1563- 3BA01</td></tr><tr><td>Serial Number</td><td>AZB/R010052 2</td></tr><tr><td>Calibration frequency</td><td>Yearly</td></tr><tr><td>Range</td><td>Not applicable</td></tr></table> Siemens Pressure Gauge (S/N: AZB/R0100522)	Equipment name	Pressure transmitter	Tag NO	PIC-002	Manufacturer	SIEMENS/TR ANS P Series	Model	7MF1563- 3BA01	Serial Number	AZB/R010052 2	Calibration frequency	Yearly	Range	Not applicable
Equipment name	RTD sensor																													
Tag NO	TIC-002																													
Manufacturer	Rosemount																													
Model	N11 A30C060T26																													
Serial Number	0541593																													
Calibration frequency	Yearly																													
Range	Not applicable																													
Equipment name	Pressure transmitter																													
Tag NO	PIC-002																													
Manufacturer	SIEMENS/TR ANS P Series																													
Model	7MF1563- 3BA01																													
Serial Number	AZB/R010052 2																													
Calibration frequency	Yearly																													
Range	Not applicable																													
Is accuracy of the monitoring equipment as stated in the monitoring	There is no accuracy indicated in the approved revised monitoring plan.	There is no accuracy indicated in the approved revised monitoring plan.																												





## MANAGING RISK



plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	The accuracy defined by the manufacturer is $\pm 3^{\circ}\text{C}$ / 65%, which is reasonable for the monitoring of this parameter.	The accuracy defined by the manufacturer is $\pm 0.5\%$ / 64/ of full scale maximum, which is reasonable for the monitoring of this parameter and represent good monitoring practise.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes, accuracy is valid for the entire measuring range.	At 25°C, 0.25 % of full scale-typical (0.5% of full scale max) / 64/
Calibration frequency /interval:	12 months	12 months
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications (if local/national standards or the manufacturer's specifications are not available, international standards may be used)?	The calibration interval of the approved revised monitoring plan refers to appropriate national/international standards. Since there is no national or international standard, SQS has adopted the calibration interval of 12 months recommended by the Flaring Tool.	The calibration interval of the approved revised monitoring plan refers to appropriate national/international standards. Since there is no national or international standard, SQS has adopted the calibration interval of 12 months which is reasonable for the equipment.
Is the calibration of measuring equipment carried out by an accredited person or institution?	Calibration Management Co., Ltd. / 58/. The requirement for measuring equipment being calibrated by accredited person/institution is only applicable for Small Scale Methodologies / 73/.	Calibration Management Co., Ltd. / 63/. The requirement for measuring equipment being calibrated by accredited person/institution is only applicable for Small Scale Methodologies / 73/.
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes, the calibration confirms proper functioning of the thermocouple.	Yes, the calibration confirms proper functioning of the pressure gauge.
Is(are) calibration(s) valid for the whole reporting period?	Rosemount/68 N11 (S/N: 0541593) was calibrated on 3 January 2009 (calibration valid until 2 January 2010) and 2 January 2010 (calibration valid until 1 January 2011). Subsequent calibrations were carried out on 1 January 2011 (calibration valid until 31 December 2011) and 2 January 2012 (calibration valid until 1 January 2013) / 58/. There was a calibration gap on 1 January 2012 and the delayed calibration on 2 January 2012 shows an error of 0.041%, well within its accuracy range at $\pm 3\%$ . A maximum permissible error of 3% was included to the measured values	Siemens Pressure Gauge (S/N: AZB/R0100522) was calibrated on 30 April 2009 (calibration valid until 29 April 2010). Subsequent calibrations were performed on 3 January 2010 (calibration valid until 2 January 2011), 2 January 2011 (calibration valid until 1 January 2012) and 2 January 2012 (calibration valid until 1 January 2013) / 63/.



## MANAGING RISK

	resulting in a lower emission reduction. This is justified as the delayed calibration revealed that the accuracy of the thermocouple is still within the permissible error for the thermocouple. This is conservative and in accordance with paragraph 238 of Clean Development Mechanism Validation and Verification Standard version 05.0 / 72/.	
If applicable, has the reported data been cross-checked with other available data?	The values in the monitoring report were cross verified via the operator log sheet available in the biogas plant control room / 4/.	The values in the monitoring report were cross verified via the operator log sheet available in the biogas plant control room / 4/.
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes, the calibration has covered the range for all measurements made.	Yes, the calibration has covered the range for all measurements made.
How were the values in the monitoring report verified?	The values in the monitoring report were cross verified via the operator log sheet available in the biogas plant control room / 4/.	The values in the monitoring report were cross verified via the operator log sheet available in the biogas plant control room / 4/.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, as SQS is accredited with ISO 9001 / 10/, the same data management practise were applied in ensuring correct transfer of data and reporting of emission reductions and QA/QC processes in place.	Yes, as SQS is accredited with ISO 9001 / 10/, the same data management practise were applied in ensuring correct transfer of data and reporting of emission reductions and QA/QC processes in place.
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Not applicable.	Not applicable.

### ***Quantity of fuel oil displaced in year y ( $Q_{fuel, oil, y}$ )***

This parameter is not a measured parameter but calculated based on the mass flow rate of the total biogas combusted in the burners and the heating value of methane at normal condition (c.f. Section 3.6)

### ***Grid carbon emission factor (CEF)***

This parameter is not a measured parameter but calculated based on combined margin of the emissions of the current generation mix. For *ex-post* this value is re-estimated every year, based on the information of electricity generation in Thailand. The emission factor of electricity generation has been calculated by “Tool to calculate the emission factor for an electricity system” (Version 02.2.0) / 79/.

**Consideration about  $EF_{grid}$ ,  $OM_{y}$ :** The simple OM emission factor calculation method is selected based on the total net electricity generation of all power plants serving the system and



## MANAGING RISK

the fuel types and total fuel consumption of the project electricity system and  $EF_{OM}$  for 2009, 2010, 2011 and 2012 are calculated. Since data required to calculate the 2012 grid emission factor has not been released yet, the project participant has applied the y-1 approach to take into account for the data generation in 2012. The NCV for the different fuel types were sourced from national available data. The emission factors for the different fuel types (coal, natural gas, lignite residual fuel oil) are following the IPCC default values / 71/ at the lower limit of the uncertainty at a 95% confidence interval as provided in 2006 IPCC Guidelines on National GHG Inventories / 71/. Consequently the Operating Margin Emission Factor is determined to be 0.6147 tCO<sub>2</sub>/MWh (2009), 0.5994 tCO<sub>2</sub>/MWh (2010), 0.5545 tCO<sub>2</sub>/MWh (2011) and 0.5545 tCO<sub>2</sub>/MWh (2012).

**Consideration about  $EF_{grid}$ ,  $BM_y$ :** The Build Margin (BM) for 2009, 2010, 2011 and 2012 were calculated as the data vintage for year (y) in which the project generation occurs in this monitoring period. BM emission factor was calculated for the set of power plants that comprises the larger annual generation among i) 5 most recent power units, ii) the units that comprise at least 20% of the system generation excluding CDM. Project proponent has chosen the latter approach as it yields the larger generation. The BM is calculated as the generation-weighted average emission factor of the sample group m and arrived to be 0.5477 tCO<sub>2</sub>/MWh (2009), 0.4231 tCO<sub>2</sub>/MWh (2010), 0.4291 tCO<sub>2</sub>/MWh (2011) and 0.4291 tCO<sub>2</sub>/MWh (2012).

**Calculation of  $EF_{grid}$ ,  $CM_y$ :** The weights  $W_{OM}$  and  $W_{BM}$  were selected as 0.5 and 0.5. All the data used in calculation of grid emission factor is sourced from the website of Thailand Greenhouse Gas Management Organization (TGO). The combined margin used in the emission reduction calculation are calculated as 0.5821 tCO<sub>2</sub>/MWh (2009), 0.5113 tCO<sub>2</sub>/MWh (2010), 0.4918 tCO<sub>2</sub>/MWh (2011) and 0.4918 tCO<sub>2</sub>/MWh (2012).

### *Amount of burner stack gas in year y ( $Q_{burner\_stack,y}$ )*

As described in the validation opinion of the revision of monitoring plan approved on 3 June 2011, the project participants would monitor this parameter by performing measurement campaign quarterly (23 December 2009, 16 February 2010, 23-24 June 2010, 19-20 August 2010, 10 December 2010, 29 March 2011, 28 June 2011, 26 September 2011, 21 December 2011, 13 March 2012, 26-27 June 2012, 7 September 2012 and 12-14 December 2012) by commissioning an independent laboratory using the U.S.EPA Method 18 (H/C Analyzer (HORIBA)) to measure stack gas flow, temperature and pressure for each of the four (4) burners / 16/. The calculation method used to derive this ratio, including the application of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" / 77/, was cross checked and found appropriate by DNV.

Furthermore, an additional conservativeness measure have been taken into account by applying the Subsidiary Body for Scientific and Technological Advice (SBSTA) conservativeness factory for uncertainty in the calculations / 80/, which is a measure adopted in some CDM methodologies such as AMS-III.H. Several uncertainty factors were adopted in the study, the most conservative factor available in the study of 1.37 is applied / 80/. As this is a conservativeness factor, this value will be fixed throughout the crediting period.

The resultant stack gas: biogas ratio will therefore be the product of the maximum measured stack gas: biogas ratio obtained in the periodical measurement campaign and the conservativeness factor, which yields a ratio of 40 Nm<sup>3</sup> stack gas / Nm<sup>3</sup> feed biogas (2009), 46 Nm<sup>3</sup> stack gas / Nm<sup>3</sup> feed biogas (2010), 53 Nm<sup>3</sup> stack gas / Nm<sup>3</sup> feed biogas (2011) and 80 Nm<sup>3</sup> stack gas / Nm<sup>3</sup> feed biogas (2012).

### 3.7 Assessment of data and calculation of emission reductions

GHG emissions reductions were correctly calculated using applicable formulae and considerations of the baseline and monitoring methodologies AM0013 version 04 / 75/ and AMS-I.C (version 12) / 76/.

The total emission reduction,  $ER_{y,expost}$  takes into consideration the sum of emission reduction due to methane recovered,  $ER_y$  and emission reduction due to electricity displacement,  $ER_{y,power}$ .

The emission reductions due to methane recovered by the project activity,  $ER_y$  during the monitoring period is the difference between the methane fuelled and flared by the sum of project emission *ex-post* and leakage *ex-post*.

The emission reduction  $ER_{y,power}$  by the project activity during the monitoring period is the multiplication of emission reduction of electricity displaced from the grid and the grid emission factor.

$$ER_y = MD_y - (PE_{y,ex-post} + L_{y,ex-post})$$

#### 3.7.1 Baseline emission

As per AM0013 (version 4) / 75/, the baseline emission (BE) from the lagoon will be based on the lower figure of the following two  $BE_{lagoon,y}$  results computed in the following manner: (i) baseline methane emission less the physical leakage, hereafter referred as ' $BE_{lagoon,theoretical,y}$ ' and (ii) actual methane captured and flared/used for energy generation, hereafter referred as ' $BE_{lagoon,monitored,y}$ '.

As the flows are monitored in volumetric flow rate, a conversion is needed to mass flow rate. The conversion for this monitoring period was done in accordance to the approved revised monitoring plan using the 'Tool to determine the mass flow of a greenhouse gas in a gaseous stream' / 77/. The total  $BE_{lagoon,monitored,y}$  was calculated as 195 811 tCO<sub>2</sub>e.

$BE_{lagoon,theoretical,y}$  is calculated via the monitored COD and amount of wastewater entering the anaerobic digester, the monitored temperature which is used to calculate the anaerobic degradation factor due to temperature ( $f_t$ ), the COD in the baseline calculated via the monitored COD entering the anaerobic digester and the adjustment factor (0.992) calculated determined during validation, and the subsequent methane correction factor (MCF) for each month and the COD available for conversion. As per the requirement of the methodology, the  $BE_{lagoon,theoretical,y}$  has to take into account the Project Emissions from digester physical leakage ' $PE_{Phy\_Leakage,m}$ ' which was calculated via the monitored amount of biogas combusted, with the physical leakage default value defined in AM0013 version 4 / 75/ as 0.15. The total  $BE_{lagoon,theoretical,y}$  was calculated as 380 037 tCO<sub>2</sub>e.

Thus, the lower of two values has been selected for  $BE_{lagoon,y}$  which is 195 811 tCO<sub>2</sub>e.

$BE_{fuel\_oil,y}$  was calculated using the mass flow rate of the total biogas combusted in the burners and the heating value of methane at normal condition, which is the IPCC default value / 71/ of 50.4 Tj/Gg or 0.03609 MJ/Nm<sup>3</sup>CH<sub>4</sub>. The baseline emission from the combustion of fuel oil ' $BE_{fuel\_oil,y}$ ' that is displaced have been capped according to the average of historical 3 years consumption which was validated as 140.6 TJ/year, which is equivalent to 10 615 tCO<sub>2</sub>/year. For this monitoring period, the energy displaced by the biogas captured and combusted was higher than the capped limit in December 2009 and the cumulative sum incurred in 2010.



## MANAGING RISK

Nevertheless, the capped limit 140.6 TJ/year was applied for year 2010 and the pro-rated 11.71 TJ/month was applied for the month of December 2009. For the years of 138.6 TJ/year (2011) and 114.4 TJ/year (2012), the total energy displaced at the burners were below the capped limit.

### 3.7.2 Project emission

Project emissions (PE) are due to stack emissions in the burners and flare ' $PE_{stack,m}$ ', physical leakages from anaerobic digester ' $PE_{phys\_leakage,m}$ ', emissions in the secondary treatment open lagoon system ' $PE_{lagoon,m}$ ', land application of sludge ' $PE_{sludge,m}$ ' and consumption of energy due to the project activity ' $PE_{energy\_cons,m}$ '.

' $PE_{stack,m}$ ' – The stack emission were appropriately determined as a function between the methane fed to the burners and the combustion efficiencies of the burners measured during the measuring campaign. In addition, the emission for incomplete combustion of methane at the flare was taken into account at 50% as per the flaring tool. The ' $PE_{stack,m}$ ' was calculated to be 5 400 tCO<sub>2</sub>e.

' $PE_{phys\_leakage,m}$ ' – was appropriately determined to be zero as per AM0013 (version 4) / 75/ which states “when actual methane capture and flared/used for energy generation is selected as the baseline emission, physical leakage from anaerobic digester for estimating emission reductions shall be taken as zero”.

' $PE_{lagoon,m}$ ' - was appropriately determined via the monitored COD and amount of wastewater leaving the anaerobic digester, the monitored temperature which is used to calculate the anaerobic degradation factor due to temperature ( $f_t$ ), the COD in the baseline calculated via the monitored COD entering the anaerobic digester and the adjustment factor (0.992) calculated determined during validation, and the subsequent methane correction factor (MCF) for each month. The default value for the GWP<sub>CH<sub>4</sub></sub> (21 tCO<sub>2</sub>e/tCH<sub>4</sub>) and maximum methane producing capacity ( $B_o$ , 0.21) were similarly applied. The ' $PE_{lagoon,m}$ ' was calculated to be 33 111 tCO<sub>2</sub>e.

' $PE_{sludge,m}$ '- was appropriately determined via the monitored COD and Nitrogen Content of the sludge removed and the amount of sludge removed and sent to the farmers, monitored via truck scales. The ' $PE_{sludge,m}$ ' was calculated to be 1 918 tCO<sub>2</sub>e.

' $PE_{energy\_cons,m}$ '- was appropriately determined via the electricity meters monitoring the electricity consumption for the biogas facility and decanter facility for the sludge. In addition, there were no fuel oil consumption for the operation of the project activity, thus this is equal to zero. The ' $PE_{energy\_cons,m}$ ' was calculated to be 1 780 tCO<sub>2</sub>e.

### 3.7.3 Leakage

DNV was able to verify the analysis and calculation of the emission reductions in the monitoring report, and confirm that the calculations are complete and transparent. According to the methodologies AM0013 version 04 / 75/ and AMS-I.C (version 12) / 76/, no leakage is taken into account if the equipment is not transferred from another activity. Thus, there is no leakage for the project activity.

### 3.7.4 Emission reduction

According to the applied methodology, the emission reductions (ER) should be calculated as:

$$ER_y = BE_y - PE_y - LE_y$$



## MANAGING RISK

The biogas flared and combusted in burners, electricity consumption and emission reductions claimed for the proposed period were as shown in the following table and also could be found in the ER calculation spread sheet.

CDM monitoring period		Emission reductions by project activity (tCO <sub>2</sub> e)			
Start date	End date	BE	PE	Leakage	ER
1 December 2009	31 December 2012	226 442	42 209	0	184 213

The claimed total emission reductions ER<sub>y</sub> is 184 213 tCO<sub>2</sub>e reported for the period 1 December 2009 to 31 December 2012. This is lower to the estimated value in the PDD of 283 490 tCO<sub>2</sub>e (c.f. Section 3.3).

### 3.8 Quality of evidence to determine emission reductions

DNV confirms that a complete set of data for this monitoring period was available to be verified and was in accordance with the revised PDD / 68/. The data presented in the monitoring report were assessed by reviewing in detail project documentation, interviews with representatives of Carbon Partners Asiatica and Siam Quality Starch Co., Ltd. (SQS) collection of monitoring data, observation of established monitoring and reporting practices and assessment of the reliability of monitoring equipment. This has enabled the verification team to assess the accuracy and completeness of the reported monitoring results and verify the correct application of the approved monitoring methodology. All necessary documentation is collected, referenced and aggregated and is easily accessible in excel format.

### 3.9 Management system and quality assurance

The project is operated and managed by Siam Quality Starch Co., Ltd. (SQS) who is the project proponent. The site has establish a data measurement and recording protocol for all relevant data needed, based on the monitoring plan outlined, and taking into account the QA/QC comments in section B.7.1 of the revised PDD / 68/.

SQS has a well-defined management system in order to ensure a successful operation of the project and the credibility and verifiability of the ERs achieve. The organisational structure, responsibilities, competencies, non-conformance handling, internal audits and management review for the project was found to be adequate. The quality of monitoring equipment was checked via it's specification and is assured through calibration / 19/-/ 63/, and the quality of the monthly emission reduction calculation spread sheets / 2// 3/ assured through cross checking of readings between the raw data recorded on-site and the results submitted for verification / 4/-/ 9/.

The management and operational system: the responsibilities and authorities for monitoring and reporting are in accordance with the responsibilities and authorities stated in the monitoring plan.





MANAGING RISK

## 4 CERTIFICATION STATEMENT

DNV Climate Change Services AS (DNV) has performed the verification of the emission reductions that have been reported for the CDM project activity 1993 “Siam Quality Starch Wastewater Treatment and Energy Generation Project in Chaiphum, Thailand” for the period 1 December 2009 to 31 December 2012.

The project participants are responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project activity.

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

DNV conducted the verification on the basis of the baseline and monitoring methodology AM0013 (version 04), the monitoring plan contained in the revised PDD (version 1.4 of 7 October 2014) and the monitoring report (version 1.3) dated 19 September 2014. The verification included i) checking whether the provisions of the monitoring methodology and the monitoring plan were consistently and appropriately applied and ii) the collection of evidence supporting the reported data.

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

In our opinion the GHG emissions reductions reported for the project activity for the period 1 December 2009 to 31 December 2012 are fairly stated in the monitoring report (version 1.3) dated 19 September 2014.

The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology AM0013 (version 04) and the monitoring plan contained in the revised PDD (version 1.4 of 7 October 2014).

DNV Climate Change Services AS is able to certify that the emission reductions from the CDM project activity 1993 “Siam Quality Starch Wastewater Treatment and Energy Generation Project in Chaiphum, Thailand” during the period 1 December 2009 to 31 December 2012 amount to 184 213 tonnes of CO<sub>2</sub> equivalent.

*Kuala Lumpur and Oslo, 7 October 2014*

Simon Wong Yon-Sing  
Verifier  
DNV Kuala Lumpur, Malaysia

Michael Lehmann  
Director of Services and Technologies  
DNV Climate Change Services AS





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## MANAGING RISK

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## MANAGING RISK

October 2013)

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## MANAGING RISK

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## MANAGING RISK

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## Persons interviewed during the verification

- / 81/ Kyoko Tochikawa, Carbon Partners Asiatica
- / 82/ Parnkamol Howatson, Carbon Partners Asiatica
- / 83/ Aroonlak Jiranthappinyo, Carbon Partners Asiatica
- / 84/ Santi Amnuaiwatanawu, Siam Quality Starch Co., Ltd. (SQS)
- / 85/ Panida Duangmala, TQM Officer
- / 86/ Wirat Wosri, Siam Quality Starch Co., Ltd. (SQS)
- / 87/ Boontham Pantumas, Siam Quality Starch Co., Ltd. (SQS)
- / 88/ Tohssaporn Poorahom, Siam Quality Starch Co., Ltd. (SQS)
- / 89/ Gordon Reynolds, Siam Quality Starch Co., Ltd. (SQS)



## MANAGING RISK

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## **APPENDIX A**

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### **CORRECTIVE ACTION REQUESTS, CLARIFICATION REQUESTS AND FORWARD ACTION REQUESTS**

**Corrective action requests**

<b>CAR ID</b>	<b>Corrective action request</b>	<b>Response by Project Participants</b>	<b>DNV's assessment of response by Project Participants</b>
CAR 1	A gap in calibration scale 4 (SN 5453962-5KF) from 28 April 2010 to 10 May 2010 was identified. It is unclear to how the project proponent has met the provisions provided in paragraph 238 of Clean Development Mechanism Validation and Verification Standard version 05.0.	The gap in calibration of scale no.4 SN 5453962-5KF from 28 April 2010 to 10 May 2010 has been addressed. Please refer to the revised ER calculation 'Corrected Values – EB52 Annex 60' sheet for your reference.	<p>S/N 5453962-5KF was calibrated on 28 April 2008 (calibration is valid until 27 April 2010). Subsequent calibration was carried out on 11 May 2010 (calibration is valid until 10 May 2012). The calibration was carried out on 20 April 2011 (calibration valid until 19 April 2013) / 36/. Hence, there are calibration gap between 28 April to 10 May 2010.</p> <p>The delayed calibrations on 11 May 2010 shows no error.</p> <p>A maximum permissible error of 10kg was included to the measured values for Project Emission Calculation and increases the project emissions from this source. This is justified as the delayed calibration revealed that the accuracy of the scale is still within the permissible error for the scale. This is conservative and in accordance with paragraph 238 of Clean Development Mechanism Validation and Verification Standard version 05.0 / 72/. After the corrective action, the emission reductions for the monitoring period were revised to 283 490 tonnes of CO<sub>2</sub> equivalent.</p> <p><b>This CAR is closed.</b></p>

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
CAR 2	It was observed during the site visit on the inconsistencies for the biogas burners capacity compared to the PDD.	<p>Thermal oil heater / boiler capacity This is 3,663kW, consistent with the nameplate observed on-site.</p> <p>Burner capacity: As described in page 6 of the attached original burner specification, the original burner type is RMS11 ZMD. It can be seen that the rating capacity varies with the HFO flow rate. These burners were fitted with 300 kg/hr spray nozzles giving them a corresponding capacity of 3,300 kW (with so many years having passed, we could not find documentary evidence of the original spray nozzle). This 3,300kW figure being the limiting figure, it was always considered by the SQS factory staff to be the capacity, and was used in the original PDD instead of the actual thermal oil heater/boiler capacity of 3,663kW.</p>	<p>The purchase order and burner specification have been reviewed and found that the changes were more correction in nature rather than project design change (further elaboration is made in the post registration change assessment).</p> <p>A Post Registration Change has been requested on the changes to the project design of a registered project activity that do not adversely impact the applicability and application of the applied methodology under which the project activity has been registered, the additionality of the project activity and the scale of the project activity, thus do not require prior approval by the Board which is in accordance with Appendix 1 of CDM Project Standard.</p> <p><b>This CAR is closed.</b></p>

## Clarification requests

CL ID	Clarification request	Response by Project Participants	DNV's assessment of response by Project Participants
CL 1	<p>Clarification is needed on the following issues:</p> <ol style="list-style-type: none"> <li>1. In the monitoring report, the verification team could not locate the gas flow meter SN: 09110005;</li> <li>2. Cell B35 of the SQS CERs, worksheet 'corrected values – EB52, Annex 60'.</li> </ol>	<ol style="list-style-type: none"> <li>1. The typo for the serial no. of the gas flow meter SN:09110004 has been revised to 09119904. Furthermore, the reason SN:0911005 could not be found is because it was replaced with another flow meter SN:12169402. Please refer to ER calculation sheet, 'Equipment log' for your reference.</li> <li>2. Revision of Cell B35 is no longer valid in the log sheet due to revised equipment log.</li> </ol>	<ol style="list-style-type: none"> <li>1. OK, it has been checked that serial number is now being revised in the monitoring report and consistent with the actual serial number found on-site.</li> <li>2. OK, cell B35 is now being removed as it was not valid. Cell A265 is now being revised with a date consistent with the actual equipment installed on-site.</li> </ol> <p><b>This CL is closed.</b></p>
CL 2	<p>It was identified on-site that there is a lack of traceability of installation and change of monitoring equipment during his monitoring period for the following equipment:-</p> <ol style="list-style-type: none"> <li>1. Methane gas analysers (SN 1718, SN31176, SN LFB-072, SN LFB-020)</li> <li>2. Gas flow meters (SN 09110106, SN 0911005, SN 091909904, 09110207, 09137001, SN 12169402)</li> <li>3. Electricity meter (Decanter SN 8328033)</li> <li>4. Standard Weights (SN M1443, SN15839)</li> </ol> <p>Clarification is also sought on what are the procedures that will be implemented to ensure that the changing and replacing of monitoring equipment can be transparently documented.</p>	<p>Please kindly refer to the ER calculation 'Equipment log' sheet for your reference.</p> <p>In the future, when there are changes in monitoring equipment, it will be recorded in log sheets or excel file for the traceability of the installation dates.</p>	<p>OK, it has been checked that traceability of the change of equipment was not done in formal manner, nevertheless records were available to trace the equipment change trail.</p> <p>The 'equipment log' has now been included in the ER calculation spreadsheet for transparency purposes.</p> <p><b>This CL is closed.</b></p>



**Forward action requests from this verification**

FAR ID	Forward action request	Response by Project Participants
	No FARs were raised	

## **APPENDIX B**

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### **POST REGISTRATION CHANGES**

Type of post registration change	Description of post registration change*	Is prior approval by CDM EB required**?	In case prior approval by CDM EB is required, when was post registration change approved?
Corrections	The registered PDD states that the baseline burners have capacities of 5 234 kW (2 units) and 3 300 kW (2 units). The actual baseline capacities were 5 280 kW (2 units) and 3 663 kW (2 units). In addition, the PDD mentions in the project scenario the total boilers capacity to be 17.068 MW. This was derived from 3 300 kW (2 units) and 5 234 kW (2 units). The actual installed capacities are 3 663 kW (2 units) and 5 280 kW (2 units) which yields a total of 17.886 MW. This has been corrected in the revised PDD. The parameter $Q_{ele\_cons,y}/Q_{ele\_cons,y}$ has been revised to $Q_{ele\_cons,y}/Q_{fuel\_cons,y}$ .	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Not applicable	<i>Not applicable</i>
Temporary deviations from the registered monitoring plan and/or monitoring methodology		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not applicable	<i>Not applicable</i>
Permanent changes from the registered monitoring plan or applied methodology		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not applicable	<i>Not applicable</i>
Changes to the project design of a registered project activity	Discrepancies between the PDD and the actual number of ponds were found. In the original PDD, it was misunderstood that the entire series of open lagoons were to be used after project implementation. In the project scenario, a new open anaerobic lagoon was built as part of the project activity, and this lagoon receives the effluent from the treated wastewater in the Covered In-Ground Anaerobic Reactor (CIGAR) system. The effluent from the new anaerobic lagoon will be routed to the existing open lagoons, bypassing only the first two baseline open anaerobic lagoons.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Not applicable	<i>Not applicable</i>

\* For further details refer to the "Post-registration changes request form" (F-CDM-PRC) and DNV's assessment opinion on the changes

\*\* Refer to Appendix 1 to the CDM Project Standard / 73/

## **APPENDIX C**

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### **CURRICULA VITAE OF THE VERIFICATION TEAM MEMBERS**

***Simon Wong Yon Sing***

**SIMON WONG YON SING** holds a Bachelor's Degree in Chemical Engineering with Environmental Engineering, with a year experience in the field of design and operation/maintenance of wastewater treatment as part of working in wastewater design & equipment supply services. His experience in designing and maintaining the wastewater treatment systems covers the fields of various manufacturing and chemical industries in Malaysia. He has experience of more than 7 years in validation and verification of numerous CDM projects in DNV, both in Malaysia and abroad. His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in Energy Generation from Renewable Energy Sources, Waste Handling and Disposal and Animal Waste Management System.

***Denise Lai Siew Sit***

**DENISE LAI SIEW SIT** holds a Business Degree in Business Management and specialised in Company Secretarial matters. Having an overall experience of around 15 years. Prior to joining DNV having 1 year experience in printing industry covering costing and operation matters. In the past 14 years with DNV, she has gained numerous experiences including those of quality management system auditing and training for a period of 2 years. She has been exposed to CDM validation since 2007 and has ample experience in validation and verification of numerous CDM projects. Her qualification, industrial experience and experience in CDM demonstrate her sufficient sectoral competence in renewable projects.

***Andrea Leiroz***

**ANDREA LEIROZ** holds a Bachelor's Degree in Chemical Engineering, Master Degree in Material Science and Doctor Degree in Mechanical Engineering. She has an overall experience of around thirteen years.

She has experience of around 7 years in validation and verification of numerous CDM projects in DNV, both in Brazil & abroad.

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