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Technical reviewer team	Mr. A. Prabu Das and Mr. V.S. Narayanan

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Abbreviations:

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reductions
CO2	Carbon Dioxide
CO2e	Carbon Dioxide Equivalent
CR	Clarification Request
DOE	Designated Operational Entity
EF	Emission Factor
ESSPL	EPIC Sustainability Services Private Limited
FAR	Forward Action Request
GHG	Greenhouse gases
IPCC	Intergovernmental Panel on Climate Change
kW	Kilo Watt
kWthermal	Kilo Watt thermal output
MoV	Means of Verification
NCV	Net Calorific Value
PDD	Project Design Document
PLF	Plant Load Factor
PP	Project Participant
QA/QC	Quality Assurance/Quality Control
UNFCCC	United Nations Framework Convention on Climate Change

1.0 INTRODUCTION

EPIC Sustainability Services Private Limited (EPIC) has been contracted by Swiss Carbon Assets Limited to undertake the first periodic independent verification of the registered CDM project activity titled "Maesod Wastewater Treatment and Biogas Utilisation Project" (UNFCCC reference number: 8712) (hereinafter project activity). The objectives of this verification are to verify and certify emission reductions reported for project activity for the monitoring period of 22/03/2013 to 19/12/2014 (first and last day included); and to verify that the data reported are complete and transparent.

This report summarizes the findings of the verification of the project, performed on the basis of UNFCCC criteria for CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to the Kyoto Protocol, the CDM rules and modalities as agreed in the Bonn Agreement, the Marrakech Accords and the CDM Executive Board's decisions.

The verification team has, based on the recommendations in the Validation and Verification Standard[/1/], and employed a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generations of CERs. The verification is not meant to provide any consulting towards the client. However, stated request for clarifications and/or corrective actions may provide input for improvement of the project design.

The scope of the verification is the independent and objective review and ex-post determination of the monitored reductions in GHG emission by the project activity. The verification is based on the validated project design document[/2/] version 3 dated 20th March 2013 (hereinafter validated PDD), corresponding validation report[/2/]. These documents were reviewed against the requirements of the Kyoto Protocol, the CDM Modalities and Procedures and related rules and guidance.

EPIC has employed a risk-based approach in the verification based on the recommendations in the Validation and Verification Standard version 7.0 (VVS[/1/]), focusing on the identification of significant risks for project implementation and the generation of CERs. The verification is not meant to provide any consulting towards the client. However, the stated requests for clarifications and/or corrective actions may provide input for improvement of the monitoring report and CER sheet.

2.0 AUDITING AND QA/QC PROCEDURE

Verification team

The following validation team has been assigned to carry out the verification of the project.

Name	**Mr. R. Vijayaraghavan**	**Dr. Komsilp Wangyao**	**Mr. A. Prabu Das and Mr. V.S. Narayanan**
Role	Lead Auditor	Technical Expert	Technical Reviewer team
Competence in relevant sectors	Sector 1	Sector 13	Sector 1 and 13
Responsibility	Doc review, onsite, DVR resolution, FVR preparation	Monitoring methodology, DVR preparation	Technical review

A brief summary of the personnel involved in the verification is indicated below.

Mr. R. Vijayaraghavan holds BE in Mechanical Engineering, M.Tech in Energy Conservation and Management and MBA in Technology Management. He is certified as Energy Auditor by Bureau of Energy Efficiency (BEE), Government of India. He has 10 years of working experience in energy sector including validation / verification of twenty five CDM and VCS projects and has undergone extensive training on CDM validation and verification and has been qualified as Lead Auditor for Sectoral Scope 1. He is also an ISO 26000 lead auditor certified by Professional Evaluation and Certification Board (PECB).

Dr. Komsilp Wangyao holds Bachelor Degree in Civil Engineering and Master's Degree in Survey Engineering. He has also done his doctoral degree in Environmental technology. Currently, he is working as Assistant Director in The Joint Graduate School of Energy and Environment, King Mongkut's University of Technology from December 2010 onwards. Previously, he was a project manager in The Joint Graduate School of Energy and Environment, King Mongkut's University of Technology and an Assistant fellow to Post-doctoral fellow: Research member of Asian municipal solid waste at Recycling and Disposal Engineering Section, Research Centre for Material Cycles and Waste Management, National Institute for Environmental Studies, Japan. He has worked as a sectoral expert and technical reviewer for many CDM projects in similar technologies areas.

Mr. A Prabu Das, holds a M.Tech Degree in Energy Conservation and Management and B. Tech Degree in Petro-chemical Technology. He is a certified Energy Auditor by Bureau of Energy Efficiency (BEE), Government of India. He has around 8 years of work experience in Design of biomass Power plants, preparing Techno Economic Feasibility Reports (TEFR), carrying out energy audits, of which last six years have been in CDM consultancy and validation services. He has undergone extensive training on CDM validation and verification and is a qualified lead auditor for Sectoral Scope 1 under Technical Area "TA 1.2 Renewables" in accordance with procedures of EPIC Sustainability Services Pvt. Ltd. He is also an ISO 26000 lead auditor certified by Professional Evaluation and Certification Board (PECB).

Mr. V.S. Narayanan holds a Bachelor Degree in Chemical Engineering from Anna University. He has around 40 years of work experience in various levels including waste water treatment system. Currently he is working as Deputy General Manager heading a 60 MLD Sewage Treatment Plant project and handling the environmental projects such as water, waste water treatment and solid waste management. He has undergone extensive training on CDM validation and verification and is a qualified technical reviewer in Sectoral Scope 13 in accordance with procedures of EPIC procedures.

Process

The verification process consists of the following phases:

i) a document review of the monitoring report and preparation of verification protocol;
ii) on-site visit to the project activity and interviews with project developer and project consultant; and
iii) resolution of outstanding issues and the issuance of final verification report and certification

In order to ensure transparency, a verification protocol was prepared for the project according to the VVS[/1/] validation requirements. The verification protocol serves the following purposes:

- it organizes, details and clarifies the requirements that a CDM project is expected to meet;
- it ensures a transparent verification process where the verifier will document how a particular requirement has been verified and the result of the verification.

The completed verification protocol is enclosed in Appendix A of this report.

During the verification, non-fulfillment of the verification protocol criteria or identified risks to the fulfillment of project objectives were raised as either CAR or CR. Corrective Action Requests (CAR) were issued, where:

i) mistakes had been made that directly impacted on the project implementation and estimated CERs; or
ii) CDM requirements had not been met; or
iii) there was a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

The Clarification Requests (CR) were issued where additional information was needed to clarify issues, and Forward Action Requests (FAR) for issues relating to project implementation that required review during the subsequent verification of the project activity.

Resolution of Clarification and Corrective Action Requests

The objective of this phase of the verification was to resolve the corrective action requests and clarifications and any other outstanding issues which needed to be clarified prior to EPIC positive conclusion on the monitoring report. During the verification process eleven CARs, seven CRs were raised.

All the CARs and CRs were resolved during this phase. In order to ensure the transparency of the verification process, the concerns raised and responses that were given are documented in more detail in Appendix A. All the corrective actions have been incorporated into the MR version 2.0 and CER calculation spreadsheet.

Internal quality control

After the completion of assessment by the verification team all the relevant documentation is submitted to a qualified, Independent Technical Reviewer team as part of EPIC's internal quality Control system. A Technical Reviewer team is appointed to review the draft final verification report (Draft FVR). The comments made by the Technical Reviewer team are taken into consideration and incorporated in the final FVR. The technical reviewer team assesses whether all the reporting requirements have been fulfilled and whether all the issues raised were closed satisfactorily by the verification team with appropriate justification. The technical review process can also raise issues in this regard which is resolved further by the verification team to the satisfaction of the Technical Reviewer. The Technical Reviewer team either accepts or rejects the report made by the verification team. The final report (after resolutions of all findings) is then submitted to the Head – Operations for review and approval.

Document review and other documents

The verification was performed primarily based on the review of the monitoring report and the supporting documentation. This process included review of data and information presented to verify their completeness and review of the Monitoring Plan and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the QA/QC procedures, and an evaluation of data management and the QA/QC system in the context of their influence on the generation and reporting of ERs.

The first MR[/3/] version 1.0 submitted by the project participant and additional background documents related to the emission reductions are reviewed as an initial step of the verification process. The subsequent step involved the identification of corrective action requests and clarification requests (CAR and CR) which are presented in Appendix A of this report. As a result of these findings, the MR is revised to MR version 2.0[/3/]. A complete list of all documents and records reviewed is as attached in reference section of this report.

Follow-up interviews

The verification team conducted visits to the project site from 22nd-23rd December 2014 to confirm the information and to resolve issues identified in the document review. An on-site assessment was conducted as a part of verification activity and involved:

1) an assessment of the implementation and operation of the CDM project activity as per the validated PDD

2) a review of information flows for generating, aggregating and reporting of the monitoring parameters

3) interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the Monitoring Plan

4) a cross-check between information provided in the MR and data from other sources

5) a check of the monitoring equipment including calibration performance, and observations of monitoring practices against the requirements of the PDD and the applied methodology

6) A review of calculations and assumptions made in determining the GHG data and ERs, and

7) An identification of QA/QC procedures in place to prevent, or identify and correct, any errors or omissions in the reported monitoring parameters.

The table below provides a list of all persons interviewed and the main topics covered.

NAME AND DESIGNATION	ORGANIZATION	TOPICS COVERED
Mr. Jiravat Udom Kityuenyonu- Factory Manager	Maesod Biogas Company Limited	• Performance of project activity – Waste water treatment, Sludge generation and disposal, Gas engine, thermic oil heater, Fossil fuel measurement, its consumption, starch that has a direct impact on the project activity • Biogas recovery, Power generation, and auxiliary consumption if any • Data management and reporting, QA/QC systems of PP • Record keeping – daily production report, breakdown / maintenance log • Project Site layout • Project implementation, operation, boundary issues • Confirmation of technical specifications of UASB system, biogas recovery, flaring, thermic oil heaters and gas engines if any and flaring • Record keeping – daily electricity generation report, breakdown / maintenance log • Metering guidelines, Meter specifications – Accuracy, make • Calibration requirements – procedure, frequency/schedule, records
Mr. Pakawat Chaopreecha- Biogas plant Manager	Maesod Biogas Company Limited	
Mr. Santosh Kumar Singh- Regional Director for South East Asia	Southpole Group	
Ms. Suwipa Rukwongtrakool- Project Manager	Southpole Group	

3.0 Description of the Project Activity

This project implements a wastewater treatment system with methane recovery at a large starch processing facility. The project activity involves the installation of an anaerobic wastewater treatment facility, based on Upflow Anaerobic Sludge Blanket (UASB) technology, at a starch manufacturing plant. The capacity of the UASB system[/4/] is in the tune of 11000 cubic metre. In the absence of project activity (baseline scenario), the wastewater would have been treated in the existing wastewater treatment system which did not have methane recovery facility. Anaerobic bacteria in the ponds break down organic compounds in the wastewater, resulting in the release of biogas. The resulting biogas is characterized by the chemical oxygen demand of the wastewater. The implementation of system enables the recovery of biogas that would have been released to the atmosphere in the baseline scenario and the utilization of the recovered biogas for thermal use in the thermic oil heater[/4/] (capacity being 1 no x 4,070 kW_{th}). The biogas captured is combusted in a gas generator[/4/] (capacity being 1 no x 952 kW_e) for satisfying its electricity demand and the excess of which is supplied to the national grid.

4.0 Project implementation

The verification team determines the conformity of the actual project activity and its operation with the validated project design document. EPIC has, by means of a desk review and an on-site visit, assessed that all physical features of the proposed CDM project activity proposed in the validated PDD[/2/] are in place, and that the project participants have operated the CDM project activity as per the validated PDD[/2/]. Thus the verification team has concluded that the project activity was implemented and operated as per validated PDD, and that all physical features of the project are in place and comply with para 270 to 273 of VVS[/1/].

The verification team, based on the site visit and document review, was able to conclude that the project activity has been commissioned and implemented as per the validated PDD[/2/]. The start date of this first monitoring period is 22/03/2013 which is in line with the UNFCCC project webpage[/5/] considering the start date of the crediting period of the project activity.

The monitoring report for this monitoring period is in compliance with the monitoring plan of the validated PDD[/2/]. The project activity was registered by applying the small scale methodologies[/6/] AMS. III. H version 16, AMS.I.C Version 19 and AMS.I.D version 17 and the verification was carried out in accordance with the applied methodology. It was confirmed during the site visit that the project activity during the current periodic verification is in accordance with the applicability criteria of the methodology.

5.0 Monitoring report

PP has used the version 4.0 of the MR template[/7/] which is current and active one. The monitoring report has been prepared as per the instructions provided in the template. EPIC has made the version 1.0 of the monitoring report[/3/] covering the monitoring period from 22nd March 2013 to 31st October 2014 publicly available on 2nd December 2014 through its dedicated interface on the UNFCCC CDM website[/3/] before undertaking the site visit for the verification on 22nd and 23rd December 2014. At the project site, PP requested the verification team if it is possible to extend the end date of the monitoring period to 19th December 2014. As per the provisions of EB 41[/8/] para 78, DOEs are allowed to request a change in the dates of a monitoring period undergoing verification, provided the change is the result of the corrective action request raised by the DOE during the verification process. Accordingly, the verification team has raised CAR (CAR 5) to enable PP to make necessary corrective action to reflect the new end date of the monitoring period. Since the verification team has verified the data till 19th December 2014 at the site itself, additional site visit is not deemed necessary by the verification team. After the corrective actions have been incorporated into the MR[/3/] version 2.0 and CER calculation spreadsheet is submitted for verification.

6.0 Remaining Issues, CARs, CLs and FARs from previous validation/verification

The verification has reviewed the previous validation report and observed that there is no open issue i.e. FARs was found from the validation. EPIC has not raised a Forward Action Request (FAR) during this verification process.

7.0 Calculation of Emission Reductions

The verification assessed whether the monitoring plan of the project activity is in accordance with the applied methodology including applicable tools. The verification team determined whether the monitoring of parameters related to the GHG emissions reductions in the project activity has been implemented in accordance with the monitoring plan contained in the validated PDD[/2/]. The verification team determined whether the calibration of those measuring equipments that have an impact on the claimed emission reductions is conducted by the project participants at a frequency specified in the applied monitoring methodology and/or the monitoring plan. The verification team assessed the data and calculations of GHG emission reductions achieved in accordance with the selected validated methodology. The verification details are described below.

Parameters	Justification by the verification team
Emission reductions of the project ($ER_{y,project}$)	As per the validated PDD[/2/], the emission reductions from the methane avoidance component of the project activity are calculated as per the guidance given in the methodology[/6/] (version 16 of AMS III.H). The emission reductions from thermal and electrical components are calculated as per the guidance given in the methodologies[/6/] (version 19 of AMS I.C) and (version 17 of AMS I.D) respectively. Emission reduction of the project is calculated as below $ER_{y,project} = ER_{y,AMS.III.H} + ER_{y,AMS.I.C} + ER_{y,AMS.I.D}$
Emission reductions ($ER_{y,AMS.III.H}$)	As per the applied methodology, Emission reductions due to the meth AMS.III.H are calculated as follows. $ER_{y,AMS.III.H} = BE_{y,AMS.III.H} – PE_{y,AMS.III.H}-LE_{y,AMS.III.H}$ Where $BE_{y,AMS.III.H}$ – Baseline emissions due to the meth AMS.III.H (version 16.0) $PE_{y,AMS.III.H}$- Project emissions due to the meth AMS.III.H (version 16.0) $LE_{y,AMS.III.H}$- Leakage emissions due to the meth AMS.III.H (version 16.0) The calculation of each parameter is detailed below
Baseline emissions ($BE_{y,AMS.III.H}$)	As per AMS.III.H (version 16), baseline emissions consist of 1) emissions on account of electricity or fossil fuel used ($BE_{power,y}$) 2) emissions from baseline wastewater treatment systems ($BE_{ww,treatment,y}$) 3) emissions from baseline sludge treatment systems ($BE_{s,treatment,y}$) 4) emissions due to inefficiencies in the baseline wastewater treatment systems and presence of degradable organic carbon in the treated wastewater discharged into river/lake/sea ($BE_{ww,discharge,y}$) 5) emissions from the decay of the final sludge generated by the baseline treatment systems ($BE_{s,final,y}$) $BE_{y\ AMS.III.H} = BE_{power,y} + BE_{ww,treatment,y} + BE_{s,\ treatment,}y + BE_{ww,discharge,y} + BE_{s,final,y}$
Baseline emissions from electricity or fuel consumption ($BE_{power,y}$) = 0 tCO2e	As per para 19 of AMS.III.H (version 16), Baseline emissions from electricity and fossil fuel consumption ($BE_{power,y}$) are determined as per the procedures described in the "Tool to calculate baseline, project and/or leakage emissions from

	electricity consumption"[9] and "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion"[9], respectively. The energy consumption includes all equipment/devices in the baseline wastewater and sludge treatment facility. If recovered biogas in the baseline is used to power auxiliary equipment it should be taken into account accordingly, using zero as its emission factor. In the validated PDD[2], it is demonstrated by the PP that the baseline emissions from electricity consumption are not considered as the electricity consumption of the open anaerobic lagoons in the baseline scenario would be negligible. Furthermore, it is conservative to neglect this emission source. The baseline emissions from fuel consumption would be zero as no fossil fuels would have been consumed in the operation of the open anaerobic lagoons in the baseline scenario. Therefore, $BE_{power,y}$ is assumed zero which is accepted by the verification team.
Baseline emissions of the wastewater treatment systems affected by the project activity ($BE_{ww,treatment,y}$)	As per para 20 of AMS.III.H (version 16) and validated PDD[2], Methane emissions from the baseline wastewater treatment systems affected by the project ($BE_{ww,treatment,y}$) are determined using COD removal efficiency of the baseline plant. The baseline emissions are calculated as below. $BE_{ww,treatment,y} = \Sigma(Q_{ww,i,y} \times COD_{inflow,i,y} \times \eta_{COD,BL,i} \times MCF_{ww,treatment,BL,i}) \times B_{o,ww} \times UF_{BL} \times GWP_{CH4}$ Where $Q_{ww,i,y}$ - Volume of wastewater treated in baseline wastewater treatment system 'i' in year y. $COD_{inflow,i,y}$ - Chemical oxygen demand of the wastewater inflow to the baseline treatment system i in year y $\eta_{COD,BL,i}$ – COD removal efficiency of the baseline treatment system $MCF_{ww,treatment,i}$ - Methane correction factor for the baseline wastewater system 'i' $B_{o,ww}$- Methane producing capacity of the wastewater UF_{BL} – Model correction factor to account for model uncertainties GWP_{CH4}- Global Warming Potential of methane

<table>
<tr>
<td>Volume of wastewater treated in baseline wastewater treatment system ‘i’ in year y. ($Q_{ww,i,y}$)

(monitored parameter)

<table>
<tr><td>Period</td><td>$Q_{y,ww}$ (count)</td></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>160,478 m^3 (129 days)</td></tr>
<tr><td>1st January 2014 to 19th December 2014</td><td>273,658 m^3 (195 days)</td></tr>
</table>

QA/QC procedure:

<table>
<tr><td>Meter name</td><td>FM1</td></tr>
<tr><td>Serial no of the meter</td><td>D6016C20000</td></tr>
<tr><td>Installed on</td><td>11th May 2010 (From commissioning of the starch plant)</td></tr>
<tr><td>Max permissible error</td><td>+/-0.5%</td></tr>
<tr><td>Calibration frequency as per validated PDD</td><td>3 years</td></tr>
<tr><td>Date of calibration no 1</td><td>26th September 2012</td></tr>
<tr><td>Validity upto</td><td>25th September 2015</td></tr>
<tr><td>Actual error (max error identified for the range of water flow in the calibration certificate)</td><td>-0.0279%</td></tr>
<tr><td>Date of calibration no 2</td><td>25th October 2014</td></tr>
<tr><td>Validity upto</td><td>24th October 2017</td></tr>
<tr><td>Actual error</td><td>-0.026%</td></tr>
<tr><td>Calibration delay period</td><td>Nil</td></tr>
<tr><td>Applied error</td><td>Not applicable</td></tr>
</table>
</td>
<td>As per the para 20 of AMS.III.H version 16.0, the volume of wastewater would have been treated in baseline wastewater treatment system is the actual monitored volume of treated wastewater in the monitored period. The total volume of wastewater is the cumulative of waste water flows through flow meter FM1 (installed at inlet of UASB system).
As per the validated PDD, $Q_{ww,i,y}$ is to be measured continuously using volumetric flow meter and atleast hourly measurement will be undertaken. At the site, it is observed that it is measured continuously and recorded every day. The verification team has reviewed the daily log sheets/10/. Daily readings of the meter are calculated from the final reading of the day and initial reading for the meter. Cumulative of such data gives reading for one day. Yearly reading is cumulative of daily data. The verification team has checked the measurement methods and found that data is being logged in every day and plant operators first manually archive the monitored data onto the log sheets then transfer to the computer for electronic storage. Hence the verification team was able to conclude that this parameter is being monitored & recorded as per the validated monitoring plan/2/.

As per the validated PDD/2/, the flowmeters would be calibrated periodically based on manufacturer’s specification/11/ from a certified testing agency but atleast once in every three years. The verification team has checked the calibration certificates/12/ against meter number, serial number, date of calibration, validity and actual error and found that meters are calibrated by the certified agency and are having sufficient accuracy and the validity covering the monitoring period. The verification team was able to conclude that QA/QC of the meter is ensured.

The verification team has observed that when there is no raw material for starch production/45/, the plant has been non-operational. During this period, there found to be no data for volume of wastewater. The verification team has reviewed the starch production data confirmed the above. The verification team has found that the data is being measured when the plant is operating or waste water available.

The starch plant was operational for 129 days out of possible 285 days in 2013 and 195 days out of possible 353 days in 2014. The estimated volume of wastewater estimated as the validated PDD was 541,800 m^3 converted for 129 days in 2013 and 819,000 m^3 converted for 195 days in 2014 (derived from estimated daily volume of 4500 m^3 per day and actual no of days operational in a year). Due to cassava root (raw material for starch) shortage, volume of wastewater is less than the expected value. As the volume of wastewater is the main contributor for the emission reductions, actual emission reduction is less.</td>
</tr>
<tr>
<td>Chemical oxygen demand of the wastewater inflow to the baseline treatment system i in year y ($COD_{inflow,i,y}$)
(monitored parameter)</td>
<td>COD of the wastewater inflow to the baseline treatment system is the COD of the untreated waste water entering the UASB system. Since the baseline treatment system (open lagoon system) is different from the treatment system in the</td>
</tr>
</table>

Period	$COD_{inflow,i,y}$ (error adjusted and 90% CL lower bound)
From 22nd March 2013 to 31st December 2013	12,722 mg/litre (114 days)
1st January 2014 to 19th December 2014	13,063 mg/litre (159 days)

QA/QC procedure:

Portable COD analyser tag name	DR 890
Serial no of the Portable COD analyser	091290C75916
Used from	11th May 2010 (From commissioning of the starch plant)
Max permissible error	0.238%
Calibration frequency as per validated PDD	3 years
Date of calibration no 1	31st October 2014
Validity upto	30th October 2017
Actual error	-3.644%
Calibration delay period	From 22nd March 2013 to 31st October 2014
Applied error	3.644%

project scenario (UASB system), the monitored values of the COD inflow to the UASB during the monitoring period will be used to calculate the baseline emissions The sampling point for the $COD_{y,ww,untreated}$ is located at the inlet of the UASB system.

As per the validated PDD/2/, $COD_{y,\ untreated}$ has to be analysed using a colorimetric method in the onsite lab. At the site, it is measured three times every day and the results are recorded in the logsheets/13/. The daily average is then calculated. The measurement is undertaken according to APHA Standard Method 5220 D standards. The verification team has observed that samples of untreated wastewater are taken every day to the factory laboratory for analysis. The verification team has reviewed the results of the analysis/13/. Hence the verification team was able to conclude that this parameter is being monitored and recorded as per the validated monitoring plan.

As per the validated PDD/2/, the colorimetric measurement would be in line with the manufacturer's specification/14/ and the colorimeter would be undertaken by an external agency atleast once in every three year. The verification team has checked the calibration certificates/15/ against portable COD colorimeter, serial number, date of calibration, validity and actual error and found that colorimeter is calibrated by the certified agency but is having calibration delay. As the actual error is more than the maximum permissible error, observed from the results of delayed calibration records, actual error is applied to the measured value for the calibration delayed period as follows.

Adjusted value = Measured value x (100%- applied error)

The adjustment is done on a daily basis. The formula is accepted by the verification team as the adjustment leads to conservative baseline emissions. Hence the verification team was able to conclude that error is applied for the delayed calibration period in a conservative approach so as to arrive at a conservative baseline emission value. Thus it is in line with para 283 and 284 of VVS/1/ version 7.0.

The adjusted COD value is based on representative sampling as some days as it is not measured as evident from the logsheets/13/. As per the validated PDD/2/, final measurements would ensure 90/10 confidence level. The verification team has checked the rationale and factors used in the calculation of the final adjusted value at 90% confidence level and accepted. Hence it is inline with "Sampling and surveys for CDM project activities and programmes of activities"/16/ ver. 4.1. The verification team was able to conclude that this parameter is being monitored and recorded as per the validated monitoring plan.

Since this value is used for baseline calculation, lower bound value is used for the calculation which is considered conservative and hence accepted. The lower bound at 90%

	confidence level value is used for the further calculation.
COD removal efficiency of the baseline treatment system ($\eta_{COD, BL,i}$) = 88.17%	It is fixed at the time of validation and it remains the same during this monitoring period also. PP has used COD removal efficiency of the baseline treatment system (open lagoon system). The verification team interpreted that the superior technology (UASB system) used in the project activity leads to more methane emissions by removing more COD which would not have occurred in the baseline scenario. Hence COD removal efficiency is thus limited to baseline scenario only.
Methane correction factor for the baseline wastewater system 'i' ($MCF_{ww,treatment,i}$) = 0.8	It is fixed at the time of validation and it remains the same during this monitoring period also.
Methane producing capacity of COD in wastewater.($B_{o,ww}$) =0.25 kg CH4/ kg COD	It is fixed at the time of validation and it remains the same during this monitoring period also.
Model correction factor to account for model uncertainties (UF_{BL}) =0.89	It is fixed at the time of validation and it remains the same during this monitoring period also.
Global warming potential of methane gas. ($GWP_{CH4,y}$) = 25 kg CO_2/kg CH_4	PP has considered GWP of methane as 25 which is accepted for the second commitment period which is in accordance with decision 4/CMP 7 as prescribed by the "Standard for application of the global warming potentials to CDM PA and PoA for the second commitment period of the Kyoto protocol"/17/ Version 1.0 (EB 69 Annex 3).
Emissions from baseline wastewater treatment systems ($BE_{ww,treatment,y}$) Period / $BE_{ww,treatment,y}$ From 22nd March 2013 to 31st December 2013 / 8,010 tCO2e 1st January 2014 to 19th December 2014 / 14,025 tCO2e (Rounded down)	$BE_{ww,treatment,y} = \Sigma(Q_{ww,i,y} \times COD_{inflow,i,y} \times \eta_{COD, BL,i} \times MCF_{ww,treatment,BL,i}) \times B_{o,ww} \times UF_{BL} \times GWP_{CH4}$ Emissions from baseline wastewater treatment systems is calculated as per the given formula and found to be correct.
Emissions from baseline sludge treatment systems ($BE_{s, treatment,y}$)	As per para 22 of AMS.III.H v16, Methane emissions from the baseline sludge treatment systems affected by the project activity are determined using the methane generation potential of the sludge treatment systems. The formula used is as follows $BE_{s, treatment,y} = \Sigma S_{j,BL,y} \times MCFs_{, treatment,BL,j} \times DOC_s \times UF_{BL} \times DOC_F \times F \times 16/12 \times GWP_{CH4}$
Amount of dry matter in the sludge that would have been treated by the sludge treatment system j in the baseline scenario ($S_{j,BL,y}$) =0 kg	As demonstrated in the validated PDD, there was no treatment plant available for sludge in the baseline scenario. It is demonstrated in the validated PDD that there is no sludge that would have been treated by the sludge treatment system in the baseline scenario. Hence amount of sludge is assumed to be zero.
Emissions from baseline sludge treatment systems ($BE_{s, treatment,y}$) =0 tCO2e	Since there is no sludge, the emissions from baseline sludge treatment systems are also zero.
Methane emissions from degradable organic carbon in treated wastewater discharged in e.g. a river, sea or lake in the baseline situation ($BE_{ww,discharge,y}$)	As per the para 24 of AMS.III.H version 16.0, the formula used is as follows. $BE_{ww,discharge,y} = Q_{ww,y} \times GWP_{CH4} \times B_{o,WW} \times UF_{BL} \times COD_{ww,discharge,BL,y} \times MCF_{ww, BL, discharge}$ Where $Q_{ww,y}$ = Volume of treated water discharged into the river.

<table>
<tr><td>Volume of treated water discharged into the river, lake or sea =0 litre</td><td>It is demonstrated in the validated PDD[72] that no treated water would be discharged into the river and all untreated wastewater would therefore be sent to the existing baseline lagoons only, hence $Q_{ww,y}$ =0.</td></tr>
<tr><td>Emissions from degradable organic carbon in treated wastewater discharged in e.g., a river, sea or lake in the baseline scenario ($BE_{ww,discharge,y}$) =0 tCO2e</td><td>Since there is no treated water discharged into the river/lake or sea, the emissions from degradable organic carbon in treated wastewater discharged in a river, sea or lake in the baseline scenario are also zero.</td></tr>
<tr><td>Emissions from anaerobic decay of the final sludge produced ($BE_{s,final,y}$)</td><td>As per the para 25 of AMS.III.H v16.0, the formula used is as follows.
$BE_{s,final,y} = S_{final,BL,y} \times DOC_s \times UF_{BL} \times MCF_{s,BL,final} \times DOC_F \times F \times 16/12 \times GWP_{CH4}$
Where $S_{final,BL,y}$ = Amount of dry matter in final sludge generated by the baseline wastewater treatment systems in the year y</td></tr>
<tr><td>Amount of dry matter in final sludge generated by the baseline wastewater treatment systems ($S_{final,BL,y}$) =0 tonnes</td><td>There was no treatment plant available for sludge in the baseline scenario. Hence amount of sludge is assumed to be zero as per the validated PDD.</td></tr>
<tr><td>Emissions from anaerobic decay of the final sludge produced ($BE_{s,final,y}$) = 0 tCO2e</td><td>Since no sludge is generated by the baseline wastewater treatment systems, emissions from anaerobic decay of the final sludge produced is zero.</td></tr>
<tr><td>Baseline emissions ($BE_{y,AMS.III.H}$)
<table><tr><th>Period</th><th>$BE_{y,AMS.III.H}$</th></tr><tr><td>From 22nd March 2013 to 31st December 2013</td><td>8,010 tCO2e</td></tr><tr><td>1st January 2014 to 19th December 2014</td><td>14,025 tCO2e</td></tr></table></td><td>$BE_{y\ AMS.III.H} = BE_{power,y} + BE_{ww,treatment,y} + BE_{s,treatment,y} + BE_{ww,discharge,y} + BE_{s,final,y}$</td></tr>
</table>

<table>
<tr>
<td>Project emissions as per AMS.III.H ($PE_{y\ AMS.IIII.H}$)</td>
<td>As per the validated PDD, project emissions consist of the following
(i) emissions from electricity and fuel used by the project facilities ($PE_{power,y}$)
(ii) emissions from wastewater treatment systems affected by the project activity, and not equipped with biogas recovery in the project scenario ($PE_{ww,treatment,y}$)
(iii) emissions from sludge treatment systems affected by the project activity, and not equipped with biogas recovery in the project situation ($PE_{s,treatment,y}$)
(iv) emissions on account of inefficiency of the project activity wastewater treatment systems and presence of degradable organic carbon in treated wastewater($PE_{ww,discharge,y}$)
(v) emissions from the decay of the final sludge generated by the project activity treatment systems ($PE_{s,final,y}$)
(vi) fugitive emissions due to inefficiencies in capture systems ($PE_{fugitive,y}$)
(vii) emissions due to incomplete flaring ($PE_{flaring,y}$)
(viii) emissions from biomass stored under anaerobic conditions which would not have occurred in the baseline situation ($PE_{biomass,y}$)

$PE_{y\ AMS.IIII.H} = PE_{power,y} + PE_{ww,treatment,y} + PEs_{,treatment,y} + PE_{ww,discharge,y} + PE_{s,final,y} + PE_{fugitive,y} + PE_{flaring,y} + PE_{biomass,y}$

The verification details of each of the parameter are indicated below.</td>
</tr>
<tr>
<td>Emissions from electricity and fuel used by the project facilities ($PE_{power,y}$)</td>
<td>As per para 29 of AMS.III.H version 16.0 and validated PDD, Emissions from electricity and fuel used by the project facilities is calculated as per “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”
$PE_{power,y} = \Sigma EC_{PJ,j,y} \times EF_{EL,j,y} \times (1+TDL_{j,y})$

Where $EC_{PJ,j,y}$ – Quantity of electricity consumed by the project electricity consumption source j in year y
$EF_{EL,j,y}$ – Emission factor for electricity generation source j in year y
$TDL_{j,y}$ –Average transmission and distribution losses for providing electricity to source j in year y

The emissions from usage of fuel (fuel oil) are calculated under the methodology AMS.I.C. The verification of the same is detailed in same section below.</td>
</tr>
<tr>
<td>Amount of electricity imported from the grid ($EC_{PJ,j,y}$)

(monitored parameter)

<table>
<tr><th>Period</th><th>$EC_{PJ,j,y}$</th></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>288.86 MWh</td></tr>
<tr><td>1st January 2014 to 19th December 2014</td><td>296.1 MWh</td></tr>
</table>

QA/QC procedure:</td>
<td>As per the validated PDD, Quantity of electricity consumed by the project electricity consumption source j in year y is the amount of electricity imported from the grid system j.
As per the validated PDD, $EC_{PJ,i,v}$ is to be measured continuously monitored using an energy meter and readings would be based on monthly invoices/18/. During this monitoring period, it is measured continuously and monthly invoices/18/ are prepared on the cumulative value for the month. The verification team has observed that the energy meter is in control of Provincial Electrical Authority (PEA). The verification team has reviewed the electricity invoices/18/. Hence the verification team was able to conclude that this parameter is being monitored and recorded as per the validated monitoring</td>
</tr>
</table>

<table>
<tr><td>Energy meter is not in control of service recipient or PPs; hence QA/QC is not possible.</td><td>plan.

Since the meters are in the control of PEA, the calibration is beyond the control of the project owner and based on the fact the values are used invoicing, QA/QC is thus accepted by the verification team.</td></tr>
<tr><td>Emission factor for electricity generation source j in year y ($EF_{EL,j,y}$) =0.5113 tCO2/MWh</td><td>It is fixed at the time of validation and it remains same during this monitoring period also.</td></tr>
<tr><td>Average transmission and distribution losses for providing electricity to source j ($TDL_{j,y}$) = 6.3%

(monitored parameter)

QA/QC procedure:

QA/QC is not applicable as per validated PDD</td><td>As per the validated PDD[2], most recent data available within the host country will be used during the monitoring and verification. The source is based on Annual report[19] on Electric power in Thailand 2011 published by Department of Alternative Energy Department and Efficiency under the Ministry of Energy, Thailand. The verification team has checked the source and accepted the value as it is the most recent data available and hence accepted.</td></tr>
<tr><td>Emissions from electricity and fuel used by the project facilities ($PE_{power,y}$)

<table><tr><th>Period</th><th>$PE_{power,y}$</th></tr><tr><td>From 22nd March 2013 to 31st December 2013</td><td>157 tCO2e</td></tr><tr><td>1st January 2014 to 19th December 2014</td><td>161 tCO2e</td></tr></table>
(Rounded up)</td><td>$PE_{power,y} = \Sigma EC_{PJ,j,y} \times EF_{EL,j,y} \times (1+TDL_{j,y})$
Emissions from Emissions from electricity and fuel used by the project facilities is calculated as per the given formula and found to be correct.</td></tr>
</table>

<table>
<tr>
<td>Emissions from wastewater treatment systems affected by the project activity, and not equipped with biogas recovery in the project scenario ($PE_{ww,treatment,y}$)</td>
<td>As per para 29 and 20 of AMS.III.H v16, Emissions from wastewater treatment systems affected by the project activity, and not equipped with biogas recovery in the project scenario is determined as follows. These are the emissions from the open lagoon system in the project boundary. The verification team has observed that after treatment in the UASB system the treated water is entering the open lagoon system for further treatment.
$PE_{ww,treatment,y} = \Sigma(Q_{ww,k,y} \times COD_{inflow,k,y} \times \eta_{PJ,k} \times MCF_{ww,treatment,PJ,k}) \times B_{o,ww} \times UF_{PJ} \times GWP_{CH4}$

Where $Q_{ww,k,y}$ - Volume of wastewater treated in project wastewater treatment system ‘k’ in year y.
$COD_{inflow,k,y}$ - Chemical oxygen demand of the wastewater inflow to the project treatment system k in year y
$\eta_{PJ,k}$ – COD removal efficiency of the project wastewater treatment system k
$MCF_{ww,treatment,PJ,k}$ - Methane correction factor for the project wastewater system ‘k’
$B_{o,ww}$- Methane producing capacity of the wastewater
UF_{PJ} – Model correction factor to account for model uncertainties
GWP_{CH4}- Global Warming Potential of methane</td>
</tr>
<tr>
<td>Volume of wastewater treated in project wastewater treatment system ‘k’ in year y. ($Q_{ww,k,y}$)
(monitored parameter)

<table>
<tr><th>Period</th><th>$Q_{y,WW}$</th></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>160,478 m^3</td></tr>
<tr><td>1st January 2014 to 19th December 2014</td><td>273,658 m^3</td></tr>
</table>
</td>
<td>After treatment in the UASB system, all the treated water is going to open lagoon system k for further treatment. The verification team has visited all the three open lagoons available with capacities of 37 Rai, 33 Rai and 13 Rai (1 Rai = 1,600 m^2). From the hydrological balance, it is assumed that volume of wastewater leaving the UASB system is equal to the untreated water entering the UASB system. Hence the volume of water treated in project wastewater treatment system ‘k’ is equal to volume of untreated water entering the UASB system. The verification of this parameter is already detailed above. The verification of QA/QC procedure is also detailed in above section.</td>
</tr>
<tr>
<td>Chemical oxygen demand of the wastewater inflow to the project treatment system k in year y ($COD_{inflow,k,y}$)

<table>
<tr><th>Period</th><th>$COD_{inflow,k,y}$ (error adjusted and 90% CL upper bound)</th></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>1,328 mg/litre (124 days)</td></tr>
<tr><td>1st January 2014 to 19th December 2014</td><td>934 mg/litre (165 days)</td></tr>
</table>

QA/QC procedure:

<table>
<tr><td>Portable COD analyser tag</td><td>DR 890</td></tr>
</table>
</td>
<td>COD of the wastewater inflow to the project treatment system (open lagoon system) is the COD of the treated waste water leaving from UASB system. The sampling point for the $COD_{y,ww,treated}$ is located at the outlet of the UASB system.

As per the validated PDD, $COD_{y,\ treated}$ has to be analysed using a colorimetric method in the onsite lab. At the site, it is measured three times every day and the results are recorded in the logsheets/13/. The daily average is then calculated. The measurement is undertaken according to international standards. The verification team has observed that samples of treated wastewater are taken every day to the factory laboratory for analysis. The verification team has reviewed the results of the analysis/13/. Hence the verification team was able to conclude that this parameter is being monitored and recorded as per the validated monitoring plan.

As per the validated PDD/2/, the colorimetric measurement</td>
</tr>
</table>

name	
Serial no of the Portable COD analyser	091290C75916
Used from	11th May 2010 (From commissioning of the starch plant)
Max permissible error	0.238%
Calibration frequency as per validated PDD	3 years
Date of calibration no 1	31st October 2014
Validity upto	30th October 2017
Actual error	-3.644%
Calibration delay period	From 22nd March 2013 to 31st October 2014
Applied error	3.644%

would be in line with the manufacturer's specification/14/ and the colorimeter would be undertaken by an external agency atleast once in every three year. The verification team has checked the calibration certificates/15/ against colorimeter, serial number, date of calibration, validity and actual error and found that colorimeter is calibrated by the certified agency but is having calibration delay. As the actual error is more than the maximum permissible error, observed from the results of delayed calibration records, actual error is applied to the measured value for the calibration delayed period as follows.

Adjusted value = Measured value x (100%+ applied error)

The adjustment is done on a daily basis. The formula is accepted by the verification team as the adjustment leads to conservative project emissions. Hence the verification team was able to conclude that error is applied for the delayed calibration period in a conservative approach so as to arrive at a conservative project emission value. Thus it is in line with para 283 and 284 of VVS/1/ version 7.0.

The adjusted COD value is based on representative sampling as some days as it is not measured as evident from the logsheets. As per the validated PDD/2/, final measurements would ensure 90/10 confidence level. The verification team has checked the rationale and factors used in the calculation of the final adjusted value at 90% confidence level and accepted. Hence it is inline with "Sampling and surveys for CDM project activities and programmes of activities"/16/ ver. 4.1. The verification team was able to conclude that this parameter is being monitored and recorded as per the validated monitoring plan.

Since this value is used for project emission calculation, upper bound value is used for the calculation which is considered conservative and hence accepted. The upper bound at 90% confidence level value is used for the further calculation.

COD removal efficiency of the project wastewater treatment system k ($\eta_{PJ,k}$) = 88.17%	It is fixed at the time of validation and it remains the same during this monitoring period also. COD removal efficiency of the open lagoon system is used, hence accepted.
Methane correction factor for the project wastewater system 'k' ($MCF_{ww,treatment,k}$) = 0.8	It is fixed at the time of validation and it remains the same during this monitoring period also.
Methane producing capacity of the wastewater ($B_{o,ww}$) =0.25 kg CH4/ kg COD	It is fixed at the time of validation and it remains the same during this monitoring period also.
Model correction factor to account for model uncertainties (UF_{PJ}) =1.12	It is fixed at the time of validation and it remains the same during this monitoring period also.

<table>
<tr><td>Global warming potential of methane gas. ($GWP_{CH4,y}$) = 25 kg CO_2/kg CH_4</td><td>The verification of this parameter is already detailed above.</td></tr>
<tr><td>Emissions from wastewater treatment systems affected by the project activity, and not equipped with biogas recovery in the project scenario ($PE_{ww,treatment,y}$)

<table><tr><td>Period</td><td>$PE_{ww,treatment,y}$</td></tr><tr><td>From 22nd March 2013 to 31st December 2013</td><td>1,053 tCO2e</td></tr><tr><td>1st January 2014 to 19th December 2014</td><td>1,263 tCO2e</td></tr></table>
(Rounded up)</td><td>$PE_{ww,treatment,y}$ is calculated as follows.
$PE_{ww,treatment,y} = \Sigma(Q_{ww,k,y} \times COD_{inflow,k,y} \times \eta_{PJ,k} \times MCF_{ww,treatment,PJ,k}) \times B_{o,ww} \times UF_{PJ} \times GWP_{CH4}$</td></tr>
<tr><td>Emissions from sludge treatment systems affected by the project activity, and not equipped with biogas recovery in the project situation ($PE_{s,treatment,y}$)</td><td>As per para 22 and para 29 of AMS.III.H v16, emissions from sludge treatment systems affected by the project activity, and not equipped with biogas recovery is determined by following formula.
$PE_{s,treatment,y} = \Sigma S_{l,PJ,y} \times MCFs_{,treatment,PJ,l} \times DOC_s \times UF_{PJ} \times DOC_F \times F \times 16/12 \times GWP_{CH4}$</td></tr>
<tr><td>Amount of dry matter in the sludge treated by the sludge treatment system ‘l’ in the project scenario ($S_{l,PJ,y}$)

(monitored parameter)

<table><tr><td>Period</td><td>$S_{l,PJ,y}$</td></tr><tr><td>From 22nd March 2013 to 31st December 2013</td><td>0 kg</td></tr><tr><td>1st January 2014 to 19th December 2014</td><td>0 kg</td></tr></table>
QA/QC procedure:

<table><tr><td>Serial no of the Weigh bridge</td><td>E23308-0017</td></tr><tr><td>Used from</td><td>11th May 2010 (From commissioning of the starch plant)</td></tr><tr><td>Calibration frequency as per validated PDD</td><td>3 years</td></tr><tr><td>Date of calibration no 1</td><td>13th February 2013</td></tr><tr><td>Validity upto</td><td>12th February 2016</td></tr><tr><td>Actual error</td><td>No error</td></tr></table></td><td>As per the validated PDD[/2/], if sludge is generated and removed from the UASB system; records will be kept on its quantity and disposal method and end use of final sludge. It will be monitored through continuous or batch measurements using weigh bridge. It was checked on-site that no sludge were removed during this verification period. It is also confirmed from the factory personnel that there was no sludge was removed during this monitoring period. Moreover, the verification team observed that there is no sludge treatment system available at the site.

As per the validated PDD, measurement equipment would be calibrated based on manufacturer’s specification but atleast once in every three years. The verification team has checked the calibration certificates[/20/] against weigh bridge serial number, date of calibration, validity and actual error and found that meters are calibrated by the certified agency and are having sufficient accuracy and the validity covering the monitoring period. The verification team was able to conclude that QA/QC is ensured.</td></tr>
</table>

Date of calibration no 2	4th June 2014
Validity upto	3rd June 2016
Actual error	No error
Calibration delay period	Nil
Applied error	Not applicable

Emissions from sludge treatment systems affected by the project activity, and not equipped with biogas recovery in the project situation ($PE_{s,treatment,y}$) =0 tCO2e	Since the amount of dry matter in final sludge generated by the project wastewater treatment systems is zero, $PE_{s,treatment,y}$ = 0 tCO2e
Emissions on account of inefficiency of the project activity wastewater treatment systems and presence of degradable organic carbon in treated wastewater ($PE_{ww,discharge,y}$)	As per the para 24 and para 29 of AMS.III.H version 16.0, the formula used is as follows. $PE_{ww,discharge,y} = Q_{ww,y} \times GWP_{CH4} \times B_{o,WW} \times UF_{PJ} \times COD_{ww,discharge,PJ,y} \times MCF_{ww,PJ,discharge}$
Volume of treated water discharged into the river, lake or sea ($Q_{ww,y}$) =0 m^3	The verification team has observed that treated water is let out to open lagoon system only at the site. Since all the treated water is discharged into the open lagoon, volume of treated water discharged into the river, lake or sea is zero. PP has also provided an undertaking letter/21/ stating that all treated water was sent to open lagoon system only.
Emissions on account of inefficiency of the project activity wastewater treatment systems and presence of degradable organic carbon in treated wastewater ($PE_{ww,discharge,y}$) = 0 tCO2e	Since volume of treated water discharged into the river, lake or sea is zero, $PE_{ww,discharge,y}$ is zero.
Emissions from the decay of the final sludge generated by the project activity treatment systems ($PE_{s,final,y}$)	As per the para 25 and para 29 of AMS.III.H v16.0, the formula used is as follows. $PE_{s,final,y} = S_{final,PJ,y} \times DOC_s \times UF_{PJ} \times MCF_{s,PJ,final} \times DOC_F \times F \times 16/12 \times GWP_{CH4}$ Where $S_{final,PJ,y}$ = Amount of dry matter in final sludge generated by the project wastewater treatment systems in the year y
Amount of dry matter in final sludge generated by the project wastewater treatment systems in the year y ($S_{final,PJ,y}$)	As per the validated PDD, if sludge is generated and removed from the UASB system; records will be kept on its quantity and disposal method and end use of final sludge. It will be monitored through continuous or batch measurements using weigh bridge. It was checked on-site that no sludge were removed during this verification period. It is also confirmed from the factory personnel that there was no sludge was removed during this monitoring period. The verification details of QA/QC procedure is already explained in above section.

Period	$S_{final,PJ,y}$
From 22nd March 2013 to 31st December 2013	0 kg
1st January 2014 to 19th December 2014	0 kg

<table>
<tr><td>Emissions from the decay of the final sludge generated by the project activity treatment systems ($PE_{s,final,y}$) = 0 tCO2e</td><td>Since the amount of dry matter in final sludge generated by the project wastewater treatment systems is zero, $PE_{s,final,y}$ =0 tCO2e</td></tr>
<tr><td>Fugitive emissions on account of inefficiencies in capture systems ($PE_{fugitive,y}$);</td><td>As per the para 30a of AMS.III.H version 16.0, $PE_{fugitive,y}$ is calculated as below.
$PE_{fugitive,y} = PE_{fugitive,ww,y} + PE_{fugitive,s,y}$
Where $PE_{y,fugitive,ww}$ is fugitive emissions through capture inefficiencies in the anaerobic wastewater treatment systems in the year y
$PE_{fugitive,s,y}$ is fugitive emissions through capture inefficiencies in the anaerobic sludge treatment systems in the year y</td></tr>
<tr><td>Fugitive emissions through capture inefficiencies in the anaerobic wastewater treatment systems in the year y ($PE_{fugitive,ww,y}$)</td><td>As per the para 30a of AMS.III.H version 16.0, $PE_{fugitive,ww,y}$ is calculated as below
$PE_{fugitive,ww,y} = (1-CFE_{ww}) \times MEP_{ww,treatment,y} \times GWP_{CH4}$
Where CFE_{ww} is Capture efficiency of the biogas recovery equipment in the wastewater treatment systems
$MEP_{ww,treatment,y}$ is Methane emission potential of wastewater treatment systems equipped with biogas recovery system
GWP_{CH4}-Global warming potential of methane</td></tr>
<tr><td>Capture efficiency of the biogas recovery equipment in the wastewater treatment systems (CFE_{WW})= 0.9</td><td>It is fixed at the time of validation and it remains same during this monitoring period also.</td></tr>
<tr><td>Methane emission potential of wastewater treatment systems equipped with biogas recovery system ($MEP_{ww,treatment,y}$)</td><td>As per the para 30a of AMS.III.H version 16.0, $MEP_{ww,treatment,y}$ is calculated as below.

$MEP_{y,ww,treatment} = Q_{WW,k,y} \times B_{o,ww} \times UF_{PJ} \times \sum COD_{removed,PJ,k,y} \times MCF_{ww,treatment,PJ,k}$

Where $Q_{ww,k,y}$ - Volume of wastewater treated in project wastewater treatment system ‘k’ in year y.
$B_{o,ww}$- Methane producing capacity of the wastewater
UF_{PJ} – Model correction factor to account for model uncertainties
$COD_{removed, PJ,k,y}$ - Chemical oxygen demand removed by the treatment system k of the project activity equipped with biogas recovery in year y
$MCF_{ww,treatment,PJ,k}$ - Methane correction factor for the project wastewater system ‘k’</td></tr>
<tr><td>Volume of wastewater treated in project wastewater treatment system ‘k’ in year y. ($Q_{ww,k,y}$)
(monitored parameter)

<table><tr><td>Period</td><td>$Q_{WW,k,y}$</td></tr><tr><td>From 22nd March 2013 to 31st December 2013</td><td>160,478 m^3</td></tr><tr><td>1st January 2014 to 19th December 2014</td><td>273,658 m^3</td></tr></table></td><td>The verification of this parameter is already detailed above.</td></tr>
<tr><td>Methane producing capacity of the wastewater ($B_{o,ww}$) =0.25 kg CH4/ kg COD</td><td>It is fixed at the time of validation and it remains the same during this monitoring period also.</td></tr>
<tr><td>Model correction factor to account for model uncertainties (UF_{PJ}) =1.12</td><td>It is fixed at the time of validation and it remains the same during this monitoring period also.</td></tr>
<tr><td>Chemical oxygen demand removed by the</td><td>As per the para 30a of AMS.III.H version 16.0, it is determined</td></tr>
</table>

<table>
<tr><td>treatment system k of the project activity equipped with biogas recovery in year y ($COD_{removed, PJ,k,y}$)</td><td>as difference between inflow COD and outflow COD. It is calculated as follows.
$COD_{removed, PJ,k,y} = COD_{y,ww,untreated} - COD_{y,ww,treated}$</td></tr>
<tr><td>Chemical oxygen demand of the wastewater inflow to the baseline treatment system i in year y ($COD_{inflow,i,y}$)

(monitored parameter)

<table><tr><td>Period</td><td>$COD_{inflow,i,y}$ (error adjusted and 90% CL upper bound)</td></tr><tr><td>From 22nd March 2013 to 31st December 2013</td><td>15,029 mg/litre (114 days)</td></tr><tr><td>1st January 2014 to 19th December 2014</td><td>14,998 mg/litre (159 days)</td></tr></table>
QA/QC procedure:

<table><tr><td>Calibration delay period</td><td>From 22nd March 2013 to 31st October 2014</td></tr><tr><td>Applied error</td><td>3.644%</td></tr></table></td><td>The verification of this parameter is already detailed above.

The verification of the calibration is already detailed above. But it is having calibration delay and as the actual error is more than the maximum permissible error, observed from the results of delayed calibration records[15], actual error is applied to the measured value for the calibration delayed period as follows

Adjusted value = Measured value x (100% + applied error)

The adjustment is done on a daily basis. The formula is accepted by the verification team as the adjustment leads to conservative project emissions. Hence the verification team was able to conclude that error is applied for the delayed calibration period in a conservative approach so as to arrive at a conservative project emission value. Thus it is in line with para 283 and 284 of VVS[1] version 7.0.

The adjusted COD value is based on representative sampling as some days as it is not measured as evident from the logsheets[13]. As per the validated PDD, final measurements would ensure 90/10 confidence level. Since upper bound value leads to conservative project emissions, upper bound value is used in the calculation, hence accepted by the verification team.</td></tr>
<tr><td>Chemical oxygen demand of the wastewater inflow to the project treatment system k in year y ($COD_{inflow,k,y}$)

(monitored parameter)

<table><tr><td>Period</td><td>$COD_{inflow,k,y}$ (error adjusted and 90% CL lower bound)</td></tr><tr><td>From 22nd March 2013 to 31st December 2013</td><td>878 mg/litre (124 days)</td></tr><tr><td>1st January 2014 to 19th December 2014</td><td>743 mg/litre (165 days)</td></tr></table>
QA/QC procedure:

<table><tr><td>Calibration delay period</td><td>From 22nd March 2013 to 31st October 2014</td></tr><tr><td>Applied error</td><td>3.644%</td></tr></table></td><td>The verification of this parameter is already detailed above.

The verification of the calibration is already detailed above. But it is having calibration delay and as the actual error is more than the maximum permissible error, observed from the results of delayed calibration records[15], actual error is applied to the measured value for the calibration delayed period as follows

Adjusted value = Measured value x (100%- applied error)

The adjustment is done on a daily basis. The formula is accepted by the verification team as the adjustment leads to conservative project emissions. Hence the verification team was able to conclude that error is applied for the delayed calibration period in a conservative approach so as to arrive at a conservative project emission value. Thus it is in line with para 283 and 284 of VVS[1] version 7.0.

The adjusted COD value is based on representative sampling as some days as it is not measured as evident from the logsheets[13]. As per the validated PDD, final measurements would ensure 90/10 confidence level. Since lower bound value leads to conservative project emissions, lower bound value is used in the calculation, hence accepted by the verification team.</td></tr>
<tr><td>Chemical oxygen demand removed by the</td><td>$COD_{removed, PJ,k,y}$ is calculated as follows.</td></tr>
</table>

<table>
<tr>
<td>treatment system k of the project activity equipped with biogas recovery in year y ($COD_{removed, PJ,k,y}$)

<table>
<tr><th>Period</th><th>$COD_{removed, PJ,k,y}$)</th></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>14,151 mg/litre</td></tr>
<tr><td>1st January 2014 to 19th December 2014</td><td>14,255 mg/litre</td></tr>
</table>
</td>
<td>$COD_{removed, PJ,k,y} = COD_{y,ww,untreated} - COD_{y,ww,treated}$</td>
</tr>
<tr>
<td>Methane correction factor for the project wastewater system ‘k’ ($MCF_{ww,treatment,k}$) = 0.8</td>
<td>It is fixed at the time of validation and it remains the same during this monitoring period also.</td>
</tr>
<tr>
<td>Methane emission potential of wastewater treatment systems equipped with biogas recovery system ($MEP_{ww,treatment,y}$)
<table>
<tr><th>Period</th><th>$MEP_{ww,treatment,y}$</th></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>508.69 tonnes of CH_4</td></tr>
<tr><td>1st January 2014 to 19th December 2014</td><td>873.80 tonnes of CH_4</td></tr>
</table>
</td>
<td>$MEP_{ww,treatment,y}$ is calculated as below.

$MEP_{y,ww,treatment} = Q_{WW,k,y} \times B_{o,ww} \times UF_{PJ} \times \sum COD_{removed,PJ,k,y} \times MCF_{ww,treatment,PJ,k}$</td>
</tr>
<tr>
<td>Global warming potential of methane gas. ($GWP_{CH4,y}$) = 25 kg CO_2/kg CH_4</td>
<td>The verification of this parameter is already detailed above.</td>
</tr>
<tr>
<td>Fugitive emissions through capture inefficiencies in the anaerobic wastewater treatment systems in the year y ($PE_{fugitive,ww,y}$)
<table>
<tr><th>Period</th><th>$PE_{fugitive,ww,y}$</th></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>1,272 tCO2e</td></tr>
<tr><td>1st January 2014 to 19th December 2014</td><td>2,185 tCO2e</td></tr>
</table>
(Rounded up)
</td>
<td>$PE_{fugitive,ww,y}$ is calculated as below
$PE_{fugitive,ww,y} = (1-CFE_{ww}) \times MEP_{ww,treatment,y} \times GWP_{CH4}$</td>
</tr>
<tr>
<td>Fugitive emissions through capture inefficiencies in the anaerobic sludge treatment systems in the year y ($PE_{fugitive,s,y}$)</td>
<td>As per para 30 of AMS.III.H version 16.0, $PE_{fugitive,s,y}$ is calculated as follows.
$PE_{fugitive,s,y} = (1-CFE_s) \times MEP_{s,treatment,y} \times GWP_{CH4}$
Where $MEP_{s,treatment,y} = \sum (S_{l,PJ,y} \times MCF_{s,treatment} \times DOC_{y,s,untreated} \times DOC_F \times F \times 16/12$
Where $S_{l,PJ,y}$ is amount of sludge treated in the project sludge treatment system ‘l’ equipped with a biogas recovery system</td>
</tr>
<tr>
<td>Amount of sludge treated in the project sludge treatment system equipped with biogas recovery system ($S_{l,PJ,y}$)

(monitored parameter)
<table>
<tr><th>Period</th><th>$S_{l,PJ,y}$</th></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>0 kg</td></tr>
</table>
</td>
<td>The verification of this parameter is already detailed above. The verification details of QA/QC procedure is also explained in above section.</td>
</tr>
</table>

1st January 2014 to 19th December 2014	0 kg

Fugitive emissions through capture and utilization/combustion/flare inefficiencies in the anaerobic sludge treatment system ($PE_{fugitive,s,y}$)	Since the amount of dry matter in final sludge generated by the project wastewater treatment systems is zero, $PE_{s,treatment,y}$ =0 tCO2e
Fugitive emissions on account of inefficiencies in capture systems ($PE_{fugitive,y}$)	$PE_{fugitive,y}$ is calculated as below. $PE_{fugitive,y} = PE_{fugitive,ww,y} + PE_{fugitive,s,y}$
Methane emissions due to incomplete flaring ($PE_{flaring,y}$)	As per para 29 of AMS.III.H version 16.0, Methane emissions due to incomplete flaring is calculated as per "Tool to determine project emissions from flaring gases containing methane"[22] Methane emissions due to incomplete flaring ($PE_{flaring,y}$) is determined as follows. $PE_{flaring,y} = GWP_{CH4} \times \sum F_{CH4,RG,m} \times (1-\eta_{flare,m})$ Where GWP_{CH4}- Global Warming potential of methane $F_{CH4,RG,m}$ - Mass flow of greenhouse gas CH_4 in the residual gaseous stream in the minute m $\eta_{flare,m}$ – Flare efficiency
Global warming potential of methane gas. ($GWP_{CH4,y}$) =25 kg CO_2/kg CH_4	The verification of this parameter is already detailed in the same section above.
Mass flow of greenhouse gas CH_4 in the residual gaseous stream in the minute m ($F_{CH4,RG,m}$)	As per validated PDD, $F_{CH4,RG,m}$ is determined as follows. $F_{CH4,RG,m} = V_{m,db} \times V_{CH4,m,db} \times \rho_{CH4,m}$ Where $V_{m,db}$ - Volumetric flow of the residual gaseous stream on dry basis $V_{CH4,m,db}$ - Volumetric fraction of the greenhouse gas CH_4 in the gaseous stream on dry basis $\rho_{CH4,m}$ - Density of greenhouse gas CH4 in the gaseous stream at reference conditions
Volumetric flow of the residual gaseous stream in minute m on dry basis ($V_{m,db}$)	Volumetric flow of the residual gaseous stream in minute m on dry basis is the amount of biogas flared in the flaring system[23]. As per the validated PDD[2], it is to be monitored continuously and the values will be averaged every minute. At the site, it is measured continuously on dry basis and recorded every day by the flow meter (GM2) located at the inlet of flaring system. The verification team has reviewed the raw data sheet[24].

Period	$V_{m,db}$ (error adjusted)
From 22nd March 2013 to 31st December 2013	24,051 Nm^3
1st January 2014 to	1,153 Nm^3

Period	$PE_{fugitive,s,y}$
From 22nd March 2013 to 31st December 2013	0 tCO2e
1st January 2014 to 19th December 2014	0 tCO2e

Period	$PE_{fugitive,y}$
From 22nd March 2013 to 31st December 2013	1,272 tCO2e
1st January 2014 to 19th December 2014	2,185 tCO2e

19th December 2014	

QA/QC procedure:

Meter name	GM2
Serial no of the meter	A90A5702000
Used from	24th February 2011 (From commissioning of the biogas system)
Max permissible error	+/-1%
Calibration frequency as per validated PDD	3 years
Date of calibration no 1	20th October 2014
Validity upto	19th October 2017
Actual error	-1.979%
Calibration delay period	From 22nd March 2013 to 20th October 2014
Applied error	1.979%

As per the validated PDD[/2/], gas flowmeter would be calibrated as per manufacturer's specifications[/25/] but atleast once in every three years. The verification team has checked the calibration certificates[/26/] against meter number, serial number, date of calibration, validity and actual error and found that meter is calibrated by the certified agency but is having calibration delay. As the actual error is more than the maximum permissible error, observed from the results of delayed calibration records, actual error is applied to the measured value for the calibration delayed period as follows

Adjusted value = Measured value x (100%+ applied error)

The adjustment is done on a daily basis. The formula is accepted by the verification team as the adjustment leads to conservative project emissions. Hence the verification team was able to conclude that error is applied for the delayed calibration period in a conservative approach so as to arrive at a conservative project emission value. Thus it is in line with para 283 and 284 of VVS[/1/] version 7.0. Yearly data is cumulative of daily adjusted readings. Yearly data is used for the calculation of project emissions. The verification team has accepted the measurement methods, aggregation approach and data used for project emission calculations.

<table>
<tr>
<td>Volumetric fraction of the greenhouse gas CH_4 in the gaseous stream on dry basis ($V_{CH4,m,db}$)

<table>
<tr><td>Period</td><td>$V_{CH4,m,db}$ (error adjusted and 90% CL upper bound)</td></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>56.4 % Count =125 days</td></tr>
<tr><td>1st January 2014 to 19th December 2014</td><td>59.4% Count =119 days</td></tr>
</table>

QA/QC procedure:

<table>
<tr><td>Serial no of portable gas analyser</td><td>11701</td></tr>
<tr><td>Used from</td><td>24th February 2011 (From commissioning of the biogas system)</td></tr>
<tr><td>Max permissible error</td><td>3%</td></tr>
<tr><td>Calibration frequency as per validated PDD or manufacturer's specification</td><td>1 year (as per manufacturer's specification)</td></tr>
<tr><td>Date of calibration no 1</td><td>8th November 2012</td></tr>
<tr><td>Validity upto</td><td>7th November 2013</td></tr>
<tr><td>Actual error</td><td>No error</td></tr>
<tr><td>Date of calibration no 2</td><td>21st November 2014</td></tr>
<tr><td>Validity upto</td><td>20th November 2015</td></tr>
<tr><td>Actual error</td><td>-1.067%</td></tr>
<tr><td>Calibration delay period</td><td>8th November 2013 to 21st November 2014</td></tr>
<tr><td>Applied error</td><td>3%</td></tr>
</table>
</td>
<td>As per the validated PDD/2/, methane content is to be measured using continuous gas analyser and the value would be averaged on a minute basis. In case continuous analyser is not available, periodical measurements at 90/10 confidence level would be made. At the site, it is measured two times every day till 30th November 2013 and four times from December 2013 onwards using portable analyser on dry basis. The daily average is then calculated. The verification team has reviewed the analysis results/27/. Thus the number of samples collected for the measurement is sufficient and appropriate.

As per the validated PDD, gas analyser would be periodically calibrated according to manufacturer's specifications/28/ or atleast once in every three years. The verification team has checked the calibration certificates/29/ against portable gas analyser, serial number, date of calibration, validity and actual error and found that meter is calibrated by the certified agency but is having calibration delay. As the actual error is less than the maximum permissible error, observed from the results of delayed calibration records/29/, maximum permissible error is applied to the measured value for the calibration delayed period as follows

Adjusted value = Measured value x (100%+ applied error)

The adjustment is done on a daily basis. The formula is accepted by the verification team as the adjustment leads to conservative project emissions. Yearly data is cumulative of daily adjusted readings. Yearly data is used for the calculation of project emissions. The verification team has accepted the measurement methods, aggregation approach and data used for project emission calculations.

The adjusted value is based on representative sampling as some days as it is not measured as evident from the logsheets/27/. As per the validated PDD, final measurements would ensure 90/10 confidence level. The verification team has checked the rationale and factors used in the calculation of the final adjusted value at 90% confidence level and accepted. Hence it is inline with "Sampling and surveys for CDM project activities and programmes of activities"/16/ ver. 4.1. The verification team was able to conclude that this parameter is being monitored and recorded as per the validated monitoring plan.

Since this value is used for project emission calculation, upper bound value is used for the calculation which is considered conservative and hence accepted. The upper bound at 90% confidence level value is used for the further calculation.</td>
</tr>
<tr>
<td>Density of greenhouse gas CH4 in the gaseous stream at reference conditions ($\rho_{CH4,m}$) = 0.716 kg/m^3</td>
<td>It is fixed at the time of validation and it remains same during this monitoring period also.</td>
</tr>
<tr>
<td>Mass flow of greenhouse gas CH_4 in the residual gaseous stream in the minute m ($F_{CH4,RG,m}$)</td>
<td>$F_{CH4,RG,m}$ is determined as follows.
$F_{CH4,RG,m} = V_{m,db} \times V_{CH4,m,db} \times \rho_{CH4,m}$</td>
</tr>
</table>

<table><tr><td>Period</td><td>$F_{CH4,RG,m}$</td></tr><tr><td>From 22nd March 2013 to 31st December 2013</td><td>9720 kg of CH_4</td></tr><tr><td>1st January 2014 to 19th December 2014</td><td>490 kg of CH_4</td></tr></table>	
Flare efficiency ($\eta_{flare,m}$)	As per the validated PDD[12], flare efficiency for the minute *m* ($\eta_{flare,m}$) is 90% when the following two conditions are met to demonstrate that the flare is operating: (1) The temperature of the flare ($T_{EG,m}$) and the flow rate of the residual gas to the flare ($F_{CH4,RG,m}$) is within the manufacturer's specification[23] for the flare ($SPEC_{flare}$) in minute *m*: and (2) The flame is detected in minute *m* ($Flame_m$) Otherwise, $\eta_{flare,m}$ is 0%
Temperature of the flare ($T_{EG,m}$) (monitored parameter) <table><tr><td>Period</td><td>$T_{EG,m}$</td></tr><tr><td>From 22nd March 2013 to 31st December 2013</td><td>Not monitored</td></tr><tr><td>1st January 2014 to 19th December 2014</td><td>Not monitored</td></tr></table> QA/QC procedure: Measuring equipment is not installed, so QA/QC is not followed.	As per the validated PDD[12], flame temperature is to be measured once per minute using a thermocouple and if this data is not available during the monitoring period, flare efficiency will be taken as zero. During this monitoring period, thermocouple is not installed which was to be used for measuring the flame temperature. As per the validated PDD[12], thermocouple would be subjected to calibration as per manufacturer's specification; Since no thermocouple is installed, no QA/QC is followed for this parameter.
Mass flow of greenhouse gas CH_4 in the residual gaseous stream in the minute m ($F_{CH4,RG,m}$) <table><tr><td>Period</td><td>$F_{CH4,RG,m}$</td></tr><tr><td>From 22nd March 2013 to 31st December 2013</td><td>9720 kg of CH_4</td></tr><tr><td>1st January 2014 to 19th December 2014</td><td>490 kg of CH_4</td></tr></table>	The verification of this parameter is already detailed in the same section above.
Flame detection of flare in the minute m ($Flame_m$) (monitored parameter) <table><tr><td>Period</td><td>$Flame_m$</td></tr><tr><td>From 22nd March 2013 to 31st December 2013</td><td>Not monitored</td></tr><tr><td>1st January 2014 to 19th December 2014</td><td>Not monitored</td></tr></table>	As per the validated PDD[12], flame is detected once per minute using fixed installation optical flame detector temperature. During this monitoring period, flame is not monitored. As per the validated PDD[12], measuring equipment would be maintained and calibrated as per manufacturer's specification; Since no equipment is installed, no QA/QC is followed for this parameter.

<table>
<tr><td>QA/QC procedure:

Measuring equipment is not installed, so QA/QC is not followed.</td><td></td></tr>
<tr><td>Flare efficiency ($\eta_{flare,m}$) =0%</td><td>As per the validated PDD, flare efficiency for the minute m ($\eta_{flare,m}$) is 90% when the following two conditions are met to demonstrate that the flare is operating:
(1) The temperature of the flare ($T_{EG,m}$) and the flow rate of the residual gas to the flare ($F_{CH4,RG,m}$) is within the manufacturer's specification for the flare ($SPEC_{flare}$) in minute m: and
(2) The flame is detected in minute m ($Flame_m$)
Otherwise, $\eta_{flare,m}$ is 0%
Since the two conditions are not met, flare efficiency is taken as zero. The verification team has accepted the approach as it leads to conservative project emissions.</td></tr>
<tr><td>Methane emissions due to incomplete flaring ($PE_{flaring,y}$)

<table><tr><td>Period</td><td>$PE_{flaring,y}$</td></tr><tr><td>From 22nd March 2013 to 31st December 2013</td><td>244 tCO2e</td></tr><tr><td>1st January 2014 to 19th December 2014</td><td>13 tCO2e</td></tr></table>
(Rounded up)</td><td>$PE_{flaring,y}$ is determined as follows.
$PE_{flaring,y} = GWP_{CH4} \times \sum F_{CH4,RG,m} \times (1-\eta_{flare,m})$</td></tr>
<tr><td>Emissions from biomass stored under anaerobic conditions ($PE_{biomass,y}$)</td><td>Emissions due to anaerobic decay of this biomass shall be considered and be determined as per the procedure in the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site"[30]. Since there is no biomass stored in the project activity as evident from the onsite observation, $PE_{biomass,y}$ is taken as zero.</td></tr>
</table>

<table>
<tr>
<td>Project emissions as per AMS.III.H ($PE_{y, AMS.III. H}$)

<table>
<tr><th>Period</th><th>$PE_{y, AMS.III. H}$</th></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>2,726 tCO2e</td></tr>
<tr><td>1st January 2014 to 19th December 2014</td><td>3,622 tCO2e</td></tr>
</table>
</td>
<td>$PE_{y\ AMS.IIII.H} = PE_{power,y} + PE_{ww,treatment,y} + PEs_{,treatment,y} + PE_{ww,discharge,y} + PE_{s,final,y} + PE_{fugitive,y} + PE_{flaring,y} + PE_{biomass,y}$</td>
</tr>
<tr>
<td>Leakage ($LE_{y, AMS.III.H}$)

<table>
<tr><th>Period</th><th>$LE_{y, AMS.III.H}$</th></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>0 tCO2e</td></tr>
<tr><td>1st January 2014 to 19th December 2014</td><td>0 tCO2e</td></tr>
<tr><td>Total</td><td>0 tCO2e</td></tr>
</table>
</td>
<td>As per para 31 of AMS.III.H version 16.0, if equipment is transferred from another activity where the technology is used, leakage effects at the site of other activity are to be considered. Since this is not the case here, leakage is zero.</td>
</tr>
<tr>
<td>Emission reductions as per AMS.III.H ($ER_{y,AMS.III.H}$)</td>
<td>As per para 33 and 34 of AMS.III.H version 16.0 and since the project activity falls under introduction of a sequential stage of wastewater treatment with biogas recovery and combustion, without sludge treatment, to an anaerobic wastewater treatment system without biogas recovery, the calculation of emission reductions shall be based on the lowest value of the following
(i) The amount of biogas recovered and fuelled or flared (MD_y) during the crediting period, that is monitored ex post;
(ii) Ex post calculated baseline, project and leakage emissions based on actual monitored data for the project activity.
Because it is possible that the project activity involves wastewater and sludge treatment systems with higher methane conversion factors (MCF) or with higher efficiency than the treatment systems used in the baseline situation. Therefore the emission reductions achieved by the project activity is limited to the ex post calculated baseline emissions minus project emissions using the actual monitored data for the project activity
or
$ER_{y,AMS.III.H} = \min((BE_{y,AMS.III.H} - PE_{y,AMS.III.H} - LE_{y,AMS.III.H}), (MD_y - PE_{power,y} - PE_{biomass,y} - LE_{y,AMS.III.H}))$

Where $BE_{y,AMS.III.H}$ – Baseline emissions due to the meth AMS.III.H (version 16.0)
$PE_{y,AMS.III.H}$- Project emissions due to the meth AMS.III.H (version 16.0)
$LE_{y,AMS.III.H}$- Leakage emissions due to the meth AMS.III.H (version 16.0)
MD_y- Amount of biogas recovered and fuelled or flared during the crediting period, that is monitored ex post
$PE_{power,y}$ - Emissions from electricity and fuel used by the project facilities
$PE_{biomass,y}$ - Emissions from biomass stored under anaerobic</td>
</tr>
</table>

<table>
<tr><td></td><td>conditions which would not have occurred in the baseline situation

The verification details of each of the parameter are indicated below.</td></tr>
<tr><td>Amount of biogas recovered and fuelled or flared during the crediting period, that is monitored ex post (MD_y)</td><td>As per para 35 of AMS.III.H version 16.0, MD_y is calculated as below.
$MD_y = BG_{burnt,y} \times \omega_{CH4,y} \times D_{CH4} \times FE \times GWP_{CH4}$
or $MDy = (Q_{biogas,flare,y} \times FE + (Q_{biogas,boiler,y} + Q_{biogas,gas\ engine,y}) \times DE) \times \omega_{CH4,y} \times D_{CH4} \times GWP_{CH4}$
Where
$BG_{burnt,y}$ –Biogas flared /combusted
$\omega_{CH4,y}$ - Methane content of biogas recovered
D_{CH4}- Density of methane
FE-Flaring efficiency
GWP_{CH4}- Global Warming potential
$Q_{biogas,flare,y}$ – Amount of biogas flared for combustion
$Q_{biogas,boiler,y}$ – Amount of biogas combusted in the thermic oil heater
$Q_{biogas,gas\ engine,y}$ - Amount of biogas combusted in the gas engine
DE- Destruction efficiency of thermic oil heater and gas engine</td></tr>
<tr><td>Amount of biogas flared ($Q_{biogas,flare,y}$) (monitored parameter)

<table><tr><td>Period</td><td>$Q_{biogas,flare,y}$ (error adjusted)</td></tr><tr><td>From 22nd March 2013 to 31st December 2013</td><td>23,117 Nm^3</td></tr><tr><td>1st January 2014 to 19th December 2014</td><td>1,109 Nm^3</td></tr></table>
QA/QC procedure:

<table><tr><td>Calibration delay period</td><td>From 22nd March 2013 to 20th October 2014</td></tr><tr><td>Applied error</td><td>1.979%</td></tr></table></td><td>The verification of this parameter is already detailed in the same section above.

The verification of QA/QC procedure is already detailed in the same section above. But it is having a calibration delay. As the actual error is more than the maximum permissible error, observed from the results of delayed calibration records/26/, actual error is applied to the measured value for the calibration delayed period as follows.

Adjusted value = Measured value x (100%- applied error)

The adjustment is done on a daily basis. The formula is accepted by the verification team as the adjustment leads to conservative baseline emissions. Hence the verification team was able to conclude that error is applied for the delayed calibration period in a conservative approach so as to arrive at a conservative baseline emission value. Thus it is in line with para 283 and 284 of VVS/1/ version 7.0. Yearly data is cumulative of daily adjusted readings. Yearly data is used for the calculation of baseline emissions. The verification team has accepted the measurement methods, aggregation approach and data used for project emission calculations.</td></tr>
<tr><td>Flaring efficiency (FE) =0%</td><td>The verification of this parameter is already detailed in the same section above.</td></tr>
</table>

Amount of biogas combusted in thermic oil heater ($Q_{biogas,boiler,y}$)

(monitored parameter)

Period	$Q_{biogas,boiler,y}$ (error adjusted)
From 22nd March 2013 to 31st December 2013	735,817 Nm^3 Count = 129 days
1st January 2014 to 19th December 2014	1,190,136 Nm^3 Count = 84 days

QA/QC procedure:

Meter name	GM1
Serial no of the meter	D6090202000
Installed on	11th May 2010 (From commissioning of the starch plant)
Max permissible error	1%
Calibration frequency as per validated PDD	3 years
Date of calibration no 1	12th July 2010
Validity upto	11th July 2013
Actual error	+0.64%
Date of calibration no 2	20th October 2014
Validity upto	19th October 2017
Actual error	+1.279%
Calibration delay period	12th July 2013 to 20th October 2014
Applied error	1.279%

The amount of biogas combusted in the thermic oil heater is measured by flow meter GM1 installed at the entry to the thermic oil heater. As per the validated PDD/2/, it is to be monitored continuously on hourly basis. At the site, it is measured continuously on hourly basis. The verification team has reviewed the raw data sheet/31/.

As per the validated PDD/2/, the gas flowmeter would be calibrated at regular intervals based on manufacturer specification/32/ from a certified testing agency and calibration would be done atleast once in every three years. The verification team has checked the calibration certificates/33/ against meter name, serial number, date of calibration, validity and actual error and found that meter is calibrated by the certified agency but is having calibration delay. As the actual error is less than the maximum permissible error, observed from the results of delayed calibration records, maximum permissible error is applied to the measured value for the calibration delayed period as follows

Adjusted value = Measured value x (100%-applied error)

The adjustment is done on a daily basis. The formula is accepted by the verification team as the adjustment leads to conservative baseline emissions. Hence the verification team was able to conclude that error is applied for the delayed calibration period in a conservative approach so as to arrive at a conservative baseline emission value. Thus it is in line with para 283 and 284 of VVS/1/ version 7.0. Yearly data is cumulative of daily adjusted readings. Yearly data is used for the calculation of baseline emissions. The verification team has accepted the measurement methods, aggregation approach and data used for project emission calculations.

The thermic oil heater was operational for 129 days out of possible 285 days in 2013 and 84 days out of possible 353 days in 2014. As the volume of biogas consumed in thermic oil heater is the main contributor for the emission reductions, actual emission reduction is less.

Amount of biogas combusted in gas engine ($Q_{biogas,gasengine,y}$)

(monitored parameter)

Period	$Q_{biogas,gasengine,y}$ (error adjusted)
From 22nd March 2013 to 31st	37,904 Nm^3 Count = 137

The amount of biogas combusted in the gas engine is measured by flow meter GM3 installed at the entry to the gas engine. As per the validated PDD, it is to be monitored continuously and recorded hourly. At the site, it is measured continuously and recorded hourly basis. The verification team has reviewed the raw data sheet/34/. Daily reading is cumulative of all the hourly readings.

As per the validated PDD/2/, the gas flowmeter would be calibrated at regular intervals based on manufacturer

December 2013	days
1st January 2014 to 19th December 2014	419,931 Nm^3 Count = 198 days

QA/QC procedure:

Meter name	GM3
Serial no of the meter	5591
Installed on	11th May 2010 (From commissioning of the starch plant)
Max permissible error	+/-1.5%
Calibration frequency as per validated PDD	3 years
Date of calibration no 1	7th November 2013
Validity upto	6th November 2016
Actual error	-1.168%
Calibration delay period	22nd March 2013 to 7th November 2013
Applied error	1.5%

specification[/35/] from a certified testing agency and calibration would be done atleast once in every three years. The verification team has checked the calibration certificates[/36/] against meter name, serial number, date of calibration, validity and actual error and found that meter is calibrated by the certified agency but is having calibration delay. As the actual error is less than the maximum permissible error, observed from the results of delayed calibration records[/36/], maximum permissible error is applied to the measured value for the calibration delayed period as follows

Adjusted value = Measured value x (100%-applied error)

The adjustment is done on a daily basis. The formula is accepted by the verification team as the adjustment leads to conservative baseline emissions. Hence the verification team was able to conclude that error is applied for the delayed calibration period in a conservative approach so as to arrive at a conservative baseline emission value. Thus it is in line with para 283 and 284 of VVS[/1/] version 7.0. Yearly data is cumulative of daily adjusted readings. Yearly data is used for the calculation of baseline emissions. The verification team has accepted the measurement methods, aggregation approach and data used for project emission calculations.

The gas engine was operational for 137 days out of possible 285 days in 2013 and 198 days out of possible 353 days in 2014. As the volume of biogas consumed in gas engine is the main contributor for the emission reductions, actual emission reduction is less.

Destruction efficiency =100%

As per para 35 of AMS.III.H version 16.0, if the biogas is combusted for gainful purposes, e.g. fed to an engine, an efficiency of 100% may be used. Hence accepted by the verification team.

Methane content of biogas recovered ($\omega_{CH4,y}$)

Period	$\omega_{CH4,y}$ (error adjusted and 90% CL lower bound)
From 22nd March 2013 to 31st December 2013	54.6 %
1st January 2014 to 19th December 2014	54.7 %

QA/QC procedure:

Calibration delay period	8th November 2013 to 21st November 2014
Applied error	3%

The verification of this parameter is already detailed in the same section above.

The verification of calibration is already detailed in the same section above. But it is having a calibration delay. As the actual error is less than the maximum permissible error, observed from the results of delayed calibration records[/29/], maximum permissible error is applied to the measured value for the calibration delayed period as follows

Adjusted value = Measured value x (100%-applied error)

The adjustment is done on a daily basis. The formula is accepted by the verification team as the adjustment leads to conservative baseline emissions. Hence the verification team was able to conclude that error is applied for the delayed calibration period in a conservative approach so as to arrive at a conservative baseline emission value. Thus it is in line with para 283 and 284 of VVS[/1/] version 7.0. Yearly data is cumulative of daily adjusted readings. Yearly data is used for the calculation of baseline emissions. The verification team

<table>
<tr><td></td><td>has accepted the measurement methods, aggregation approach and data used for project emission calculations.

It is not measured every day as evident from the logsheets[/27/] as the adjusted value is based on representative sampling as some days. Since this value is used for baseline emission calculation, 90% CL lower bound value is used for the calculation which is considered conservative and hence accepted.</td></tr>
<tr><td>Density of methane (D_{CH4}) = 0.716 kg/m^3</td><td>It is fixed at the time of validation and it remains same during this monitoring period also.</td></tr>
<tr><td>Global warming potential of methane gas. ($GWP_{CH4,y}$) =25 kg CO2/kg CH_4</td><td>The verification of this parameter is already detailed in the same section above.</td></tr>
<tr><td>Amount of biogas recovered and fuelled or flared during the crediting period, that is monitored ex post (MD_y)

<table><tr><th>Period</th><th>MD_y</th></tr><tr><td>From 22nd March 2013 to 31st December 2013</td><td>7,556 tCO2e</td></tr><tr><td>1st January 2014 to 19th December 2014</td><td>15,758 tCO2e</td></tr></table>
(Rounded up)</td><td>MD_y is calculated as below.
MDy =(BG_{flare} x FE +(BG_{boiler} +$BG_{gas\ engine}$) x DE) x $\omega_{CH4,y}$ x D_{CH4} x GWP_{CH4}</td></tr>
<tr><td>Emission reductions as per AMS.III.H ($ER_{y,AMS.III.H}$)

<table><tr><th>Period</th><th>$ER_{y,AMS.III.H}$</th></tr><tr><td>From 22nd March 2013 to 31st December 2013</td><td>5,284 tCO2e</td></tr><tr><td>1st January 2014 to 19th December 2014</td><td>10,403 tCO2e</td></tr></table></td><td>$ER_{y,AMS.III.H}$ = min (($BE_{y,AMS.III.H}$- $PE_{y,AMS.III.H}$-$LE_{y,AMS.III.H}$), (MD_y-$PE_{power,y}$-$PE_{biomass,y}$-$LE_{y,AMS.III.H}$))</td></tr>
<tr><td>Emission reductions ($ER_{y,AMS.I.C}$)</td><td>As per para 49 of AMS.I.C version 19.0, Emission reductions due to the meth AMS.I.C are calculated as follows.
$ER_{y,AMS.I.C}$ = $BE_{y,AMS.I.C}$ – $PE_{y,AMS.I.C}$ -$LE_{y,AMS.I.C}$
Where $BE_{y,AMS.I.C}$ – Baseline emissions due to the meth AMS.I.C (version 19.0)
$PE_{y,AMS.I.C}$ - Project emissions due to the meth AMS.I.C (version 19.0)
$LE_{y,AMS.I.C}$ - Leakage emissions due to the meth AMS.I.C (version 19.0)
The calculation of each parameter is detailed below.</td></tr>
</table>

<table>
<tr>
<td>Baseline emissions due to the meth AMS.I.C ($BE_{y,AMS.I.C}$)</td>
<td>As per para 22 of AMS.I.C version 19.0, $BE_{y,AMS.I.C}$ = $BE_{thermal,CO2,y} = (EG_{thermal,y} / \eta_{BL,thermal}) \times EF_{FF,CO2}$
Where $BE_{thermal,CO2,y}$ – Baseline emissions from steam/heat displaced by the project activity in year y
$EG_{thermal,y}$ – Net quantity of steam/heat supplied by the project activity in year y
$\eta_{BL,thermal}$- Efficiency of the plant using fossil fuel that would have been used in the absence of project activity
$EF_{FF,CO2}$ – CO2 emission factor of the fossil fuel that would have been used</td>
</tr>
<tr>
<td>Net quantity of steam/heat supplied by the project activity in year y ($EG_{thermal,y}$)</td>
<td>As per the validated PDD[/2/], $EG_{thermal,y}$ is calculated as follows.
$EG_{thermal,y} = Q_{oil,y} \times \rho_{oil,avg} \times (T_{out}-T_{in}) \times LHC_{oil,avg}$

Where $Q_{oil,y}$ – Quantity of the thermic oil from thermic oil heater to the process plant
$\rho_{oil,avg}$ – Density of thermic oil
T_{out}- Temperature of thermic oil leaving the thermic oil heater
T_{in}- Temperature of thermic oil entering the thermic oil heater
$LHC_{oil,avg}$- Specific heat capacity of thermic oil</td>
</tr>
<tr>
<td>Quantity of the thermic oil from thermic oil heater to the process plant ($Q_{oil,y}$)

(monitored parameter)

<table>
<tr><th>Period</th><th>$Q_{oil,y}$</th></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>0 litre (not monitored)</td></tr>
<tr><td>1st January 2014 to 19th December 2014</td><td>0 litre (not monitored)</td></tr>
</table>
(Temporary deviation)
QA/QC procedure:

Measuring equipment is not installed, so no QA/QC followed.</td>
<td>As per the validated PDD[/2/], this parameter is to be measured continuously using flow meter and recorded hourly and aggregated daily. But during the monitoring period, this parameter is not monitored which is also confirmed by the PP at the site. The verification tem has observed that there is no meter installed at the inlet of the thermic oil heater to measure thermic oil entering. PP has provided undertaking letter[/37/] stating that this is a temporary deviation. Since this temporary change falls under the type of changes indicated in Appendix 1 of Project Standard[/38/] version 7.0 and this parameter is used calculating the baseline emissions, PP has considered this parameter as zero for the monitoring period, which the verification team has accepted as conservative. Thus the verification team did not seek prior approval from the EB with respect to the acceptability of this temporary deviation.

As per the validated PDD[/2/], the flowmeter would be subjected to regular calibration as per manufacturer specification or atleast once in every three years. Since no meter is installed, no QA/QC is followed for this parameter.</td>
</tr>
<tr>
<td>Density of thermic oil ($\rho_{oil,avg}$)
(monitored parameter)

<table>
<tr><th>Period</th><th>$\rho_{oil,avg}$</th></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>Not monitored</td></tr>
<tr><td>1st January 2014 to 19th December 2014</td><td>Not monitored</td></tr>
</table>
(Temporary deviation)

QA/QC procedure:
QA/QC procedure is not applicable as per the validated PDD</td>
<td>As per the validated PDD[/2/], this parameter is to be measured annually or per verification period by taking values from the thermic oil data sheet corresponding to T_{in} and T_{out}. But the monitoring period, this parameter is not monitored which is confirmed by the PP at the site.</td>
</tr>
</table>

<table>
<tr>
<td>Temperature of thermic oil leaving the thermic oil heater (T_{out})
(monitored parameter)

<table><tr><td>Period</td><td>T_{out}</td></tr><tr><td>From 22nd March 2013 to 31st December 2013</td><td>Not monitored</td></tr><tr><td>1st January 2014 to 19th December 2014</td><td>Not monitored</td></tr></table>(Temporary deviation)

QA/QC procedure:

Measuring equipment is not installed, so QA/QC is not followed.</td>
<td>As per the validated PDD[2], this parameter is to be measured continuously by a temperature gauge and recorded on an hourly basis. But the monitoring period, this parameter is not monitored which is confirmed by the verification team at the site.

As per the validated PDD[2], the temperature gauge would be calibrated as per manufacturer's speciation but atleast once in every three years. Since no temperature gauge is installed, no QA/QC is followed for this parameter.</td>
</tr>
<tr>
<td>Temperature of thermic oil leaving the thermic oil heater (T_{in})

(monitored parameter)
<table><tr><td>Period</td><td>T_{in}</td></tr><tr><td>From 22nd March 2013 to 31st December 2013</td><td>Not monitored</td></tr><tr><td>1st January 2014 to 19th December 2014</td><td>Not monitored</td></tr></table>(Temporary deviation)

QA/QC procedure:

Measuring equipment is not installed, so QA/QC is not followed.</td>
<td>As per the validated PDD[2], this parameter is to be measured continuously and recorded on an hourly basis. But the monitoring period, this parameter is not monitored which is confirmed by the verification team at the site.

As per the validated PDD[2], the temperature gauge would be calibrated as per manufacturer's speciation but atleast once in every three years. Since no temperature gauge is installed, no QA/QC is followed for this parameter.</td>
</tr>
<tr>
<td>Specific heat capacity of thermic oil ($LHC_{oil,avg}$)
(monitored parameter)

<table><tr><td>Period</td><td>$LHC_{oil,avg}$</td></tr><tr><td>From 22nd March 2013 to 31st December 2013</td><td>Not monitored</td></tr><tr><td>1st January 2014 to 19th December 2014</td><td>Not monitored</td></tr></table>(Temporary deviation)

QA/QC procedure:
QA/QC procedure is not applicable as per the validated PDD</td>
<td>As per the validated PDD[2], this parameter is to be measured annually or per verification period by taking values from the thermic oil data sheet corresponding to T_{in} and T_{out}. But the monitoring period, this parameter is not monitored which is confirmed by the verification team at the site.</td>
</tr>
<tr>
<td>Net quantity of steam/heat supplied by the project activity in year y ($EG_{thermal,y}$)</td>
<td>As per the validated PDD, $EG_{thermal,y}$ is calculated as follows.
$EG_{thermal,y} = Q_{oil,y} \times \rho_{oil,avg} \times (T_{out}-T_{in}) \times LHC_{oil,avg}$</td>
</tr>
</table>

<table><tr><th>Period</th><th>$EG_{thermal,y}$</th></tr><tr><td>From 22nd March 2013 to 31st December 2013</td><td>0 Joule</td></tr><tr><td>1st January 2014 to 19th December 2014</td><td>0 Joule</td></tr></table>	
Efficiency of the plant using fossil fuel that would have been used in the absence of project activity ($\eta_{BL,thermal}$) = 100%	It is fixed at the time of validation and it remains same during this monitoring period also.
CO2 emission factor of the fossil fuel that would have been used ($EF_{FF,CO2}$)= 77.40 tCO2/TJ	The source being 2006 IPCC value[/39/] as per the validated PDD and 2006 IPCC source is still valid. Hence $EF_{FF,CO2}$ value remains the same during this monitoring period also.
Baseline emissions due to the meth AMS.I.C ($BE_{y,AMS.I.C}$) <table><tr><th>Period</th><th>$BE_{thermal,CO2,y}$</th></tr><tr><td>From 22nd March 2013 to 31st December 2013</td><td>0 tCO2e</td></tr><tr><td>1st January 2014 to 19th December 2014</td><td>0 tCO2e</td></tr></table>	As per para 22 of AMS.I.C version 19.0, $BE_{y,AMS.I.C}$ = $BE_{thermal,CO2,y}$ = ($EG_{thermal,y}$ /$\eta_{BL,thermal}$) x $EF_{FF,CO2}$ Since the temporary change of non-monitoring of parameters used to calculate $BE_{thermal,CO2,y}$ falls under the type of changes indicated in Appendix 1 of Project Standard[/38/] version 7.0 and this parameter is used calculating the baseline emissions, PP has considered $BE_{thermal,CO2,y}$ as zero for the monitoring period, which the verification team has accepted as conservative. Thus the verification team did not seek prior approval from the EB with respect to the acceptability of this temporary deviation. Since baseline emissions claimed under AMS.I.C is zero, overall emission reductions from the project activity is less than that estimated at the time of validation.
Project emissions due to the meth AMS.I.C ($PE_{y,AMS.I.C}$)	Project emissions consist of emissions due to the combustion of fossil fuels in the thermic oil heaters. As per para 45 of AMS.I.C version 19.0, CO_2 emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the latest version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"[/9/]. (version 2.0) As per the tool and validated PDD, $PE_{y,AMS.I.C}$ is calculated as follows. $PE_{y,AMS.I.C} = FC_{k,y} \times NCV_{k,y} \times EF_{CO2,k,y}$ Where $FC_{k,y}$ - Quantity of fossil fuel type k combusted in the thermal oil boiler during the year y $NCV_{k,y}$ - Net calorific value of fossil fuel type k $EF_{CO2,k,y}$- CO2 emission factor of fuel type k in the year y
Quantity of fossil fuel type k combusted in the thermal oil boiler during the year y ($FC_{k,y}$) (monitored parameter) <table><tr><th>Period</th><th>$FC_{k=fuel\ oil,y}$</th></tr><tr><td>From 22nd March 2013 to 31st December 2013</td><td>80,489 litre</td></tr><tr><td>1st January 2014 to 19th December</td><td>301,435 litre</td></tr></table>	As per the validated PDD[/2/], $FC_{k,y}$ is to be measured continuously and records would be kept when fossil fuel is used in the project activity. During the monitoring period, it is monitored and recorded monthly in the log sheets[/40/]. Yearly data is cumulative of monthly data. The verification team has crosschecked the same with purchase records[/41/] and accepted. Hence the verification team was able to conclude that this parameter is being monitored and recorded as per the validated monitoring plan. As per the validated PDD[/2/], the measured value would be cross-checked with the purchase records[/41/]. The verification team has crosschecked the fuel oil consumption with the

<table>
<tr>
<td>
<table>
<tr><td>2014</td><td></td></tr>
</table>

QA/QC procedure:

Fuel oil consumption is crosschecked with the Fuel oil purchase invoices,
</td>
<td>purchase invoices and accepted the same.</td>
</tr>
<tr>
<td>Density of fossil fuel type k combusted in the thermal oil boiler ($\rho_{k=fuel\ oil}$) =0.95 kg/litre</td>
<td>It is fixed at the time of validation and it remains same during this monitoring period also.</td>
</tr>
<tr>
<td>Net calorific value of fossil fuel type k ($NCV_{k=fuel\ oil,y}$)

(monitored parameter)

<table>
<tr><th>Period</th><th>$NCV_{k=fuel\ oil,y}$</th></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>41.71 GJ/tonne</td></tr>
<tr><td>1st January 2014 to 19th December 2014</td><td>41.71 GJ/tonne</td></tr>
</table>
QA/QC procedure:
QA/QC procedure is not applicable as per the validated PDD</td>
<td>As per the validated PDD, the following order will be followed for the NCV:
(i) Values provided by fuel supplier in invoices/41/
(ii) Regional or national default values
(iii) IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of vol 2 of the 2006 IPCC./39/

The verification team has reviewed the fuel oil purchase invoices/41/. Since there is no value provided in the purchase invoices and there is no regional/national default values, IPCC default value/39/ is considered.</td>
</tr>
<tr>
<td>CO2 emission factor of fuel type k in the year y ($EF_{CO2,\ k,y}$)

(monitored parameter)

<table>
<tr><th>Period</th><th>$EF_{CO2,\ k=fuel\ oil,y}$</th></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>78.8 tCO2/TJ</td></tr>
<tr><td>1st January 2014 to 19th December 2014</td><td>78.8 tCO2/TJ</td></tr>
</table>
QA/QC procedure:
QA/QC procedure is not applicable as per the validated PDD</td>
<td>As per the validated PDD, the following order will be followed for the NCV:
(i) Values provided by fuel supplier in invoices/41/
(ii) Regional or national default values
(iii) IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of vol 2 of the 2006 IPCC./39/

The verification team has reviewed the fuel oil purchase invoices/41/. Since there is no value provided in the purchase invoices and there is no regional/national default values, IPCC default value/39/ is considered.</td>
</tr>
<tr>
<td>Project emissions due to the meth AMS.I.C ($PE_{y,AMS.I.C}$)

<table>
<tr><th>Period</th><th>$PE_{y,AMS.I.C}$</th></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>252 tCO2e</td></tr>
<tr><td>1st January 2014 to 19th December 2014</td><td>942 tCO2e</td></tr>
</table>
(Rounded up)</td>
<td>$PE_{y,AMS.I.C}$ is calculated as follows.
$PE_{y,AMS.I.C} = FC_{k,y} \times NCV_{k,y} \times EF_{CO2,\ k,y}$</td>
</tr>
</table>

<table>
<tr>
<td>Leakage ($LE_{y,AMS.I.C}$)

<table>
<tr><td>Period</td><td>$LE_{y,AMS.I.C}$</td></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>0 tCO2e</td></tr>
<tr><td>1st January 2014 to 19th December 2014</td><td>0 tCO2e</td></tr>
</table>
</td>
<td>As per para 47 and para 48 of AMS.I.C version 19.0, if the energy generating equipment currently being utilised is transferred from outside the boundary to the project activity, and in cases where the collection/processing/transportation of biomass residues is outside the project boundary CO2 emissions from the collection/processing/transportation of biomass residues to the project site shall be taken into account as leakage.
Since thermic oil heater is not transferred from another project and there is no biomass residue generated in the project activity, leakage is nil. The verification team has accepted as it is in line with the applied methodology.</td>
</tr>
<tr>
<td>Emission reductions ($ER_{y,AMS.I.C}$)

<table>
<tr><td>Period</td><td>$ER_{y,AMS.I.C}$</td></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>-252 tCO2e</td></tr>
<tr><td>1st January 2014 to 19th December 2014</td><td>-942 tCO2e</td></tr>
</table>
</td>
<td>As per para 49 of AMS.I.C version 19.0, $ER_{y,AMS.I.C}$ is calculated as below.

$ER_{y,AMS.I.C} = BE_{y,AMS.I.C} - PE_{y,AMS.I.C} - LE_{y,AMS.I.C}$</td>
</tr>
<tr>
<td>Emission reductions ($ER_{y,AMS.I.D}$)</td>
<td>As per para 23 of AMS.I.D version 17.0, Emission reductions due to the meth AMS.I.D are calculated as follows.
$ER_{y,AMS.I.D} = BE_{y,AMS.I.D} – PE_{y,AMS.I.D} - LE_{y,AMS.I.D}$
Where $BE_{y,AMS.I.D}$ – Baseline emissions due to the meth AMS.I.D (version 17.0)
$PE_{y,AMS.I.D}$ - Project emissions due to the meth AMS.I.D (version 17.0)
$LE_{y,AMS.I.D}$ - Leakage emissions due to the meth AMS.I.D (version 17.0)
The calculation of each parameter is detailed below.</td>
</tr>
<tr>
<td>Baseline emissions due to the meth AMS.I.D ($BE_{y,AMS.I.D}$)</td>
<td>As per para 11 of AMS.I.D version 17.0,
$BE_{y,AMS.I.D} = EG_{BL,y} \times EF_{CO2,\ grid,y}$
Where $EG_{BL,y}$ – Quantity of net electricity supplied to the grid as a result of implementation of CDM project activity in year y
$EF_{CO2,\ grid,y}$ – CO2 emission factor of the grid in year y</td>
</tr>
<tr>
<td>Quantity of net electricity supplied to the grid as a result of implementation of CDM project activity in year y ($EG_{BL,y}$)

(monitored parameter)

<table>
<tr><td>Period</td><td>$EG_{BL,y}$</td></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>62.7646 MWh</td></tr>
<tr><td>1st January 2014 to 19th December 2014</td><td>454.78855 MWh</td></tr>
</table>

QA/QC procedure:

<table>
<tr><td>Meter name</td><td>PEA meter</td></tr>
<tr><td>Serial no of the meter</td><td>206501524</td></tr>
</table>
</td>
<td>As per the validated PDD[/2/], Quantity of electricity exported to the grid is to be measured continuously using energy meter[/42/]. The readings will be based on monthly joint meter readings and invoices[/43/].
At the site, it is measured continuously and monthly invoices are prepared on the cumulative value for the month. The verification team has reviewed the electricity bills[/43/]. Hence the verification team was able to conclude that this parameter is being monitored and recorded as per the validated monitoring plan.
The electricity imported from the grid is already accounted as proejct emisison under AMS.III.H.

As per the validated PDD, the calibration of the meter is under the control of PEA, to which electricity is sold to. But PP has calibrated periodically. The verification team has checked the calibration certificates[/44/] against meter no, serial number, date of calibration, validity and actual error. But it is having a calibration delay. As the actual error is less than the maximum permissible error, observed from the results of delayed</td>
</tr>
</table>

Installed on	
Max permissible error	+/-0.5%
Calibration frequency as per validated PDD	1 year as per PEA requirements
Date of calibration no 1	14th January 2014
Validity upto	13th January 2015
Actual error	-0.04%
Calibration delay period	22nd March 2013 to 14th January 2014
Calibration delay period applied	22nd March 2013 to 31st January 2014
Applied error	0.5%

calibration records, maximum permissible error is applied to the measured value for the calibration delayed period as follows.

Adjusted value = Measured value x (100%-applied error)

Hence the verification team was able to conclude that error is applied for the delayed calibration period in a conservative approach so as to arrive at a conservative baseline emission value. Thus it is in line with para 283 and 284 of VVS[1] version 7.0. Yearly data is cumulative of monthly adjusted readings. Yearly data is used for the calculation of baseline emissions. The verification team has accepted the measurement methods, aggregation approach and data used for project emission calculations.

CO2 emission factor of the grid in year y ($EF_{CO2, grid,y}$) =0.5113 tCO2/MWh

It is fixed at the time of validation and it remains same during this monitoring period also.

Baseline emissions due to the meth AMS.I.D ($BE_{y,AMS.I.D}$)

Period	$BE_{y,AMS.I.D}$
From 22nd March 2013 to 31st December 2013	32 tCO2e
1st January 2014 to 19th December 2014	232 tCO2e

(Rounded down)

$BE_{y,AMS.I.D} = EG_{BL,y} \times EF_{CO2, grid,y}$

Project emissions due to the meth AMS.I.D ($PE_{y,AMS.I.D}$)

Period	$PE_{y,AMS.I.D}$
From 22nd March 2013 to 31st December 2013	0 tCO2e
1st January 2014 to 19th December 2014	0 tCO2e

As per para 20 and para 21 of AMS.I.D version 17.0, For most renewable energy project activities, PEy = 0. However, for the following categories of project activities, project emissions have to be considered following the procedure described in the most recent version of ACM0002.
i)Emissions related to the operation of geothermal power plants (e.g. non condensable gases, electricity/fossil fuel consumption);
ii) Emissions from water reservoirs of hydro power plants.
iii)CO2 emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the latest version of the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" [9]
Since the project activity does not fall under geothermal or hydro power plant, project emission is zero. The consumption of fossil fuel in the project activity is already as project emissions under AMS.I.C
So project emission under AMS.I.D is zero.

<table>
<tr>
<td>Leakage ($LE_{y,AMS.I.D}$)

<table>
<tr><th>Period</th><th>$LE_{y,AMS.I.C}$</th></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>0 tCO2e</td></tr>
<tr><td>1st January 2014 to 19th December 2014</td><td>0 tCO2e</td></tr>
</table>
</td>
<td>As per para 22 of AMS.I.D version 17.0, if the energy generating equipment currently is transferred from outside the boundary to the project activity, leakage is to be considered. Since thermic oil heater or gas engine is not transferred from another project, leakage is nil. The verification team has accepted as it is in line with the applied methodology.</td>
</tr>
<tr>
<td>Emission reductions ($ER_{y,AMS.I.D}$)

<table>
<tr><th>Period</th><th>$ER_{y,AMS.I.D}$</th></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>32 tCO2e</td></tr>
<tr><td>1st January 2014 to 19th December 2014</td><td>232 tCO2e</td></tr>
</table>
</td>
<td>Emission reductions due to the meth AMS.I.D are calculated as follows.
$ER_{y,AMS.I.D} = BE_{y,AMS.I.D} – PE_{y,AMS.I.D} - LE_{y,AMS.I.D}$</td>
</tr>
<tr>
<td>Emission reductions of the project ($ER_{y,project}$)

<table>
<tr><th>Period</th><th>$ER_{y,project}$</th></tr>
<tr><td>From 22nd March 2013 to 31st December 2013</td><td>5,064 tCO2e</td></tr>
<tr><td>1st January 2014 to 19th December 2014</td><td>9,693 tCO2e</td></tr>
<tr><td>Total</td><td>14,757 tCO2e</td></tr>
</table>
</td>
<td>Emission reduction of the project is calculated as below
$ER_{y,project} = ER_{y,AMS.III.H} + ER_{y,AMS.I.C} + ER_{y,AMS.I.D}$</td>
</tr>
</table>

Thus the verification concluded the monitoring plan of the project activity is in accordance with the applied methodology including applicable tools and comply with para 274 to 277 of VVS[/1/]. The verification team concluded that the monitoring of parameters related to the GHG emissions reductions in the project activity has been implemented in accordance with the monitoring plan contained in the validated PDD[/1/] and comply with par 278 to 281 of VVS. The verification team concluded the calibration of all measuring equipments that have an impact on the claimed emission reductions is conducted by the project participants at a frequency specified in the applied monitoring methodology and/or the monitoring plan and comply with para 282 to 288 of VVS. The verification team was able to assess the data and calculations of GHG emission reductions achieved resulting from the project activity by the application of the selected approved methodology and thus comply with para 289 to 291 of VVS.

8.0 VERIFICATION OPINION

EPIC Sustainability Services Private Limited (EPIC) has been contracted by Swiss Carbon Assets Limited to undertake the first periodic independent verification of the registered CDM project activity titled “Maesod Wastewater Treatment and Biogas Utilisation Project” (UNFCCC reference number: 8712). The objectives of this verification are to verify and certify emission reductions reported for project activity for the monitoring period of 22/03/2013 to 19/12/2014 (first and last day included); and to verify that the data reported are complete and transparent.

The verification team determines the conformity of the actual project activity and its operation with the validated project design document. EPIC has, by means of a desk review and an on-site visit, assessed that all physical features of the proposed CDM project activity proposed in the validated PDD are in place, and that the project participants have operated the CDM project activity as per the validated PDD[/2/]. Thus the verification team has concluded that the project activity was implemented and operated as per validated PDD, and that all physical features of the project are in place.

The verification team, based on the site visit and document review, was able to conclude that the project activity has been commissioned and implemented as per the validated PDD. The start date of this first monitoring period is 22/03/2013 which is in line with the UNFCCC project webpage[/5/] considering the start date of the crediting period of the project activity.

The monitoring report for this monitoring period is in compliance with the monitoring plan of the validated PDD[/2/]. The project activity was registered by applying the small scale methodologies AMS. III. H version 16, AMS.I.C Version 19 and AMS.I.D version 17 and the verification was carried out in accordance with the applied methodology. It was confirmed during the site visit that the project activity during the current periodic verification is in accordance with the applicability criteria of the methodology.

The management of project participants is responsible for the preparation and reporting of GHG emissions data, and the reported GHG emission reduction on the basis set out within the project monitoring plan. The development and maintenance of records and reporting procedures in accordance with the monitoring plan, including the calculation and determination of GHG emission reduction from the project is the responsibility of the management of the project.

It is the responsibility of EPIC to express an independent GHG verification opinion on the GHG emissions reductions and on the calculation of GHG emission reductions from the project for this monitoring period based on the reported emission reduction in the monitoring Report.

EPIC’s verification approach was based on the requirements as defined under the Kyoto Protocol, Marrakech accord, as well as those defined by the CDM Executive board. EPIC’s approach was risk-based, drawing on an understanding of the risks associated with reported GHG emissions data and the controls in place to mitigate these. The examination includes assessment of evidence relevant to the amounts and disclosures in relation to the project’s GHG emission reductions for this monitoring period.

The verification team has planned and performed the work to obtain the information and explanations that is considered necessary to provide sufficient evidence for it to give reasonable assurance that the amount of calculated GHG emission reductions for this monitoring period were fairly stated.

The verification team has verified that the information included in the revised monitoring report[/3/] is correct and that the emission reduction achieved has been determined correctly. Based on the information seen and evaluated, the verification team confirms the following:

Project title:	Maesod Wastewater Treatment and Biogas Utilisation Project
UNFCCC ref no:	8712
Crediting period:	22nd March 2013 to 21st March 2020
PDD Monitoring report	Version 03, dated 20th March 2013 Version 2.0 dated 14th January 2015 ; first verification
Methodology used for verification:	AMS. III. H version 16.0, AMS. I. C version 19.0 and AMS.I.D version 17.0
Applicable monitoring period:	22nd March 2013 to 19th December 2014 (first and last day included)
Emissions reductions verified:	14,757 tCO2e

Prepared by	Approved by :
R. Vijayaraghavan	
R. Vijayaraghavan	K. Sudheendra
(Lead Auditor)	(Head Operations)

References

1	Validation and Verification Standard Version 7.0 https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20140624190900246/accr_stan02.pdf
2	Validated PDD, Corresponding validation report https://cdm.unfccc.int/Projects/DB/RINA1355318111.91/view
3	Monitoring report version 1.0 (uploaded version) dated 2nd December 2014 and its CER sheet https://cdm.unfccc.int/UserManagement/FileStorage/Z2B8WOXJVYCDFHT14K3GIP57LURMAE only MR Monitoring report version 2.0 (final version for RFI) dated 14th January 2015 and its CER sheet
4	Manufacturer's specification for UASB system, Thermic oil heater, Gas engine
5	UNFCCC webpage indicating the start date of the crediting period of the project activity https://cdm.unfccc.int/Projects/DB/RINA1355318111.91/view
6	Methane recovery in wastewater treatment AMS.III.H version 16.0 https://cdm.unfccc.int/methodologies/view?ref=AMS-III.H. Thermal energy for the user with or without electricity AMS.I.C version 19.0 https://cdm.unfccc.int/methodologies/view?ref=AMS-I.C. Grid connected renewable electricity generation AMS.I.D version 17.0 https://cdm.unfccc.int/methodologies/view?ref=AMS-I.D.
7	Monitoring report form template version 4.0 (CDM-MR-FORM) https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20140625145808027/Iss_form07.doc
8	EB 41 report –provision to change the monitoring period https://cdm.unfccc.int/EB/041/eb41rep.pdf
9	Tool to calculate baseline, project and/or leakage emissions from electricity consumption version 1.0 EB 39 annex 7 https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf Tool to calculate project or leakage CO2 emissions from fossil fuel combustion version 2.0 EB 41 annex 11 https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf
10	Daily raw data sheet for wastewater flow
11	Manufacturer's specification - Volume of waste water flow specification FM1 meter
12	Calibration certificates for Volume of waste water flow specification FM1 meter dated 26th September 2012 and 25th October 2014
13	Logsheets for COD measurement
14	Manufacturer's specification – Colorimeter
15	Calibration certificates for Colorimeter dated 31st October 2014
16	Sampling and surveys for CDM project activities and programmes of activities version 4.1 https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20131128104214283/meth_stan05.pdf
17	Standard for application of the global warming potentials to CDM PA and PoA for the second commitment period of the Kyoto protocol" Version 1.0 (EB 69 Annex 3) https://cdm.unfccc.int/Reference/Standards/meth/reg_stan02.pdf
18	Monthly invoices for electricity import ($EC_{PJ,i,y}$) from PEA covering the monitoring period
19	Annual report on Electric power in Thailand 2011 published by Department of Alternative Energy Department and Efficiency under the Ministry of Energy, Thailand
20	Calibration certificates for weigh bridge dated 13th February 2013 and 4th June 2014
21	Undertaking letter from PP stating that all treated water was sent to open lagoon system only.
22	Tool to determine project emissions from flaring gases containing methane version 2.0 EB 68 Annex 15 https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-06-v2.0.pdf
23	Manufacturer's specification for flaring system
24	Logsheets for biogas flared
25	Manufacturer's specification for GM2 meter (Volume of biogas flared)
26	Calibration certificates for GM2 meter dated 20th October 2014
27	Logsheets for methane content
28	Manufacturer's specification for portable gas analyser

29	Calibration certificates for portable gas analyser dated 8th November 2012 and 21st November 2014
30	Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-04-v6.0.1.pdf EB 66 Annex 46
31	Logsheets for biogas combusted in the thermic oil heater
32	Manufacturer's specification for GM1- Meter for Biogas combusted in thermic oil heater
33	Calibration certificates for GM1 dated 12th July 2010 and 20th October 2014
34	Logsheets for biogas combusted in the gas engine
35	Manufacturer's specification for GM3- Meter for Biogas combusted in gas engine
36	Calibration certificates for GM1 dated 7th November 2013
37	Meter for measuring quantity of the thermic oil from thermic oil heater to the process plant - Undertaking letter from PP stating that this is a meter temporary deviation
38	Project Standard Version 7.0 https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20140624190848314/reg_stan01.pdf Project Cycle procedure version 7.0 https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20140624190732727/pc_proc01.pdf
39	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Table 1.2 http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf
40	Logsheets for fuel oil consumption in thermic oil heaters
41	Purchase invoices for fuel oil
42	Manufacturer's specification for electricity sale meter $EG_{BL,y}$
43	Electricity sale invoices
44	Calibration certificates for electricity sale meter
45	Logsheets for starch production

Verification checklist

Project name: Maesod Wastewater Treatment and Biogas Utilisation Project (UNFCCC no: 8712)

TABLE 1: VERIFICATION REQUIREMENTS BASED ON CDM VALIDATION AND VERIFCATION STANDARD VERSION 7.0

	Checklist Questions	Comments by verifier	Conclusion
	Compliance of the project implementation with the registered project design document		
1	Was an on-site visit conducted for this verification? If no, please justify the rationale of the decision. (Refer VVS 272)	The verification team visited physically to the site on 22nd and 23rd December 2014 and found that the project is commissioned and is fully operational.	**OK**
2	Are all physical features of the CDM project activity proposed in the registered PDD in place? (Refer 272)	The physical features, as required by the validated PDD, including UASB system, thermic oil heater, flaring system and lagoons are in place. The verification team was able to confirm that all physical features of the proposed project activity matches with that mentioned in the validated PDD.	**OK**
3	Have the project participants operated the proposed CDM project activity as per the registered PDD or any approved revised PDD? (Refer VVS 272)	It has implemented and operated the project as per the validated PDD.	**OK**
4	For this monitoring period, what is the status of the implementation of the project? For project activities that consist of more than one site, the DOE shall describe the status of implementation and starting date of operation	The verification team visited physically to the site and found that the project is fully commissioned and is operational.	**OK**

	Checklist Questions	Comments by verifier	Conclusion
	for each site. (Refer VVS 273 (a)		
5	For project activities with phased implementation, what is the progress of the proposed project activity achieved in each phase under verification. If the phased implementation is delayed, describe the reasons and present the expected implementation dates; (Refer VVS 273 (a)	The verification team visited physically to the site and found that the project is fully commissioned and is operational.	**OK**
6	Describe the actual operation of the project activity. (Refer VVS 273 (b)	This project implements a wastewater treatment system with methane recovery at a large starch processing facility. The project activity involves the installation of an anaerobic wastewater treatment facility, based on Upflow Anaerobic Sludge Blanket (UASB) technology, at a starch manufacturing plant. The capacity of the UASB system is in the tune of 11000 cubic metre. In the absence of project activity (baseline scenario), the wastewater would have been treated in the existing wastewater treatment system which did not have methane recovery facility. Anaerobic bacteria in the ponds break down organic compounds in the wastewater, resulting in the release of biogas. The resulting biogas is characterized by the chemical oxygen demand of the wastewater. The implementation of system enables the recovery of biogas that would have been released to the atmosphere in the baseline scenario and the utilization of the recovered biogas for thermal use in the thermic oil heater (capacity being 1 no x 4,070 kW_{th}). The biogas captured is combusted in a gas generator (capacity being 1 no x 952 kW_e) for satisfying its electricity demand and the excess of which is supplied to the national grid.	**OK**
7	Any information (data and variables) provided in the monitoring report that is different from that stated in the registered PDD or any approved revised PDD? (that has caused an increase in estimates of the emission reductions in the current monitoring period or is highly likely to	All the information observed matches with that mentioned in the PDD	**OK**

	Checklist Questions	Comments by verifier	Conclusion
	increase the estimates of emission reductions in the future monitoring) (Refer VVS 273 (c)		
	Compliance of the monitoring plan with the monitoring methodology including applicable tool(s)		
	The monitoring plan of the proposed CDM project activity shall comply with the applied methodology.		
8	For monitoring aspects that are not specified in the methodology and where applicable the standardized baseline, particularly in the case of small-scale methodologies (e.g. additional monitoring parameters, monitoring frequency and calibration frequency), these should be brought to the attention of the Board issues which may enhance the level of accuracy and completeness of the monitoring plan. (Refer VVS 276)	All the parameters are specified by the meth. Hence not applicable	**OK**
	Compliance of monitoring activities with the registered monitoring plan.		
	Determine whether the monitoring of parameters related to the GHG emissions reductions in the project activity has been implemented in accordance with the monitoring plan contained in the registered PDD or any accepted revised monitoring plan.		

	Checklist Questions	Comments by verifier	Conclusion
9	Is the monitoring plan of the CDM project activity complying with the methodology applied by the registered CDM project activity or an approved revised PDD? (Refer VVS 278)	As per the validated PDD, Quantity of the thermic oil from thermic oil heater to the process plant is to be measured continuously using flow meter and recorded hourly and aggregated daily. But during the monitoring period, $Q_{oil,y}$ and density of oil, temperatures is not monitored which is also confirmed by the PP at the site. Otherwise, Monitoring plan and applied methodology have been properly implemented and duly followed by PP.	**OK**
10	Has the monitoring plan been properly implemented and followed by the project participants? (Refer VVS 279 (a)	As per the validated PDD, Quantity of the thermic oil from thermic oil heater to the process plant is to be measured continuously using flow meter and recorded hourly and aggregated daily. But during the monitoring period, $Q_{oil,y}$ and density of oil, temperatures is not monitored which is also confirmed by the PP at the site. Otherwise, Monitoring plan and applied methodology have been properly implemented and duly followed by PP.	**OK**
11	Have all parameters stated in the monitoring plan, and relevant CDM Executive Board decisions been sufficiently monitored and updated as applicable, including: (Refer VVS 279 (b)	All parameters stated in the monitoring plan, and relevant guidelines been sufficiently monitored and updated.	**OK**
	i) project emission parameters	All parameters related to project emissions stated in the monitoring plan, and relevant guidelines been sufficiently monitored and updated. However, CAR 4, CAR 7, CAR 10 are raised as follows. **CAR 4** PP is requested to provide electricity purchase invoices for verification. **CAR 7** PP is required to provide evidence that there is no sludge produced during the monitoring period as $PE_{y,s,final}$ is considered to be zero as per CER sheet **CAR 10** PP is requested to provide the document/purchase invoices to support the monthly fossil fuel consumption in the thermic oil heaters.	~~**CAR 4**~~ ~~**CAR 7**~~ ~~**CAR 10**~~

	Checklist Questions	Comments by verifier	Conclusion
	ii) baseline emission parameters	All parameters related to baseline emissions stated in the monitoring plan, and relevant guidelines been sufficiently monitored and updated. However, CAR 6, CAR 11, CR 5, CR 6, CR 7 is raised as follows. **CAR 6** At the site, verification team has observed that there is some mismatch between value related to the volume of wastewater, methane content of the biogas logged in and the value used for the calculation. **CAR 11** At the site, verification team has observed that electricity exported for the month of December 2013 is not accounted for in the calculation. PP is requested to clarify the same. **CR 5** PP is requested to demonstrate that biogas volume and methane content measurements are taken on the same basis (wet or dry) by providing the technical specifications. **CR 6** PP is requested to provide meter specifications and calibration certifications for meters used measure biogas consumed in gas engine, boiler, flare systems **CR 7** PP is requested to clarify the calculation method used to calculate emissions from electricity and fuel used by the project facilities ($PE_{power,y}$).	~~**CAR 6**~~ ~~**CAR 11**~~ ~~**CR 5**~~ ~~**CR 6**~~ ~~**CR 7**~~
	iii) leakage parameters	Leakage is zero for this project. This parameter was adequately justified in the monitoring report.	**OK**
	iv) 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?	It is demonstrated that project management system procedures, including responsibility and authority of monitoring and reporting activities are comply with validated PDD.	**OK**

	Checklist Questions	Comments by verifier	Conclusion
12	Has the equipment used for monitoring is in accordance with section 4 below and is controlled and calibrated in accordance with the monitoring plan, the applied methodology, the applied standardized baseline, the Board guidance, local/national standards, or as per the manufacturer's specification? (Refer VVS 279 (c)	Yes. The monitoring equipment used for monitoring is controlled and calibrated with some delay for some parameters.	**OK**
13	Are monitoring results consistently recorded as per approved frequency? (Refer VVS 279 (d)	Yes. The monitoring results consistently recorded as per approved frequency	**OK**
14	Have quality assurance and quality control procedures been applied in accordance with the monitoring plan or revised monitoring plan? (Refer VVS 279 (e)	The quality assurance and quality control procedures been applied in accordance with the monitoring plan.	**OK**
	Compliance with the calibration frequency requirements for measuring instruments.		
	Determine whether the calibration of those measuring equipments that have an impact on the claimed emission reductions is conducted by the project participants at a frequency specified in the applied monitoring methodology, the applied standardized baseline and/or the monitoring plan.		

	Checklist Questions	Comments by verifier	Conclusion
15	Identify if there is any monitoring equipment not calibrated in accordance with the monitoring plan, the applied monitoring methodology, the Board guidance, local/national standards, or as per the manufacturer's specification? (Refer VVS 282)	The monitoring equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan. However, CAR 1, CAR 2, CAR 3 are raised as follows **CAR 1** PP is requested to submit calibration records for the parameter - Volume of wastewater treated (Qww). Further PP is requested to demonstrate that the validity of which covering the current monitoring period with sufficient accuracy. **CAR 2** PP is requested to provide calibration records related to COD and its external agency records for verification. **CAR 3** PP is requested to provide calibration records of weigh bridge to measure the volume of sludge for verification.	~~**CAR 1**~~ ~~**CAR 2**~~ ~~**CAR 3**~~

	Checklist Questions	Comments by verifier	Conclusion
16	If there is delayed and the calibration has been implemented after the monitoring period in consideration (i.e. the results of delayed calibration are available), has the following conservative approach adopted in the calculation of emission reductions: (a) Applying the maximum permissible error of the instrument to the measured values taken during the period between the scheduled date of calibration and the actual date of calibration, if the results of the delayed calibration do not show any errors in the measuring equipment, or if the error is smaller than the maximum permissible error; (Refer VVS 283)	Refer S. No 15	**OK**
17	(b) Applying the error identified in the delayed calibration test, if the error is beyond the maximum permissible error of the measuring equipment. (Refer VVS 283)	Refer S. No 15	**OK**
18	Confirm that the error has been applied: (a) In a conservative manner, such that the adjusted measured values of the delayed calibration shall result in fewer claimed emission reductions;	Refer S. No 15	**OK**

	Checklist Questions	Comments by verifier	Conclusion
	(b) For all measured values taken during the period between the scheduled date of calibration and the actual date of calibration. (Refer VVS 284)	Refer S. No 15	**OK**
19	In cases where the results of the delayed calibration are not available, or the calibration has not been conducted at the time of verification, the verification team, prior to finalizing verification, shall request the project participants to conduct the required calibration and shall determine whether the project participants have calculated the emission reductions conservatively using the approach mentioned in paragraph 4.2 above. (Refer VVS 285)	Refer S. No 15	**OK**

	Checklist Questions	Comments by verifier	Conclusion
20	In cases where the verification team determines that it is not possible for the project participants to conduct the calibration at a frequency specified by either the applied methodology, the applied standardized baseline, guidance provided by the Board, and/or the registered monitoring plan due to reasons beyond the control of project participants (For example, due to the contractual terms between the project participant and purchasing/selling entities), the verification team, shall follow the requirements for post registration changes in section of E of the VVS. (Refer VVS 286)	Refer S. No 15	**OK**

	Checklist Questions	Comments by verifier	Conclusion
21	In cases where neither the applied monitoring methodology, where applicable, the applied standardized baseline nor the monitoring plan specify any requirements for calibration frequency for measuring equipments, the verification team shall determine whether the equipments are calibrated either in accordance with the specifications of the local/national standards, or as per the manufacturer's specification. If neither local/national standards nor the manufacturer's specification are available, international standards may be used. Refer to appendix 1 of the VVS for an illustrative example to apply the above requirements. (Refer VVS 287)	Not applicable as the validated PDD mandates calibration frequency for the monitoring parameters.	**OK**
	Assessment of data and calculation of emission reductions		
	Assess the data and calculations of GHG emission reductions achieved by/resulting from the project activity by the application of the selected methodology and, where applicable, the applied standardized baseline.		
	Is a complete set of data for the specified monitoring period is available?	Yes. The complete set of data is available. But for quantity of thermic oil, it is not monitored and as such no data is available.	**OK**

	Checklist Questions	Comments by verifier	Conclusion
22	If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, the verification team shall raise a CAR for the project participants to comply with the requirements of Appendix 1 of the Project Standard or submit a request for deviation prior to submitting the request for issuance, if appropriate; (Refer VVS 290 a)	Entire data/plant records for the MR period is available, upon verifying it is evident that the plant is in operational for 129 days in 2013 and 195 days in 2014. This could be verified from the plant production data i.e production of starch. Non-operational days are resultant of non-availability of raw material. By verifying the starch production data for the monitoring period, the verification team was able to confirm that there is there is no starch production during this period.	**OK**
23	Has information provided in the monitoring report been cross-checked with other sources such as plant log books, inventories, purchase records, laboratory analysis? (Refer VVS 290 b)	Yes. The information regarding the electricity export/import provided in the monitoring report been crosschecked with other sources log books and sales invoices. All the parameters are checked with the source of data indicated in the validated PDD and found it to be satisfactory.	**OK**

	Checklist Questions	Comments by verifier	Conclusion
24	Have calculations of baseline emissions, proposed CDM project activity emissions and leakage, as appropriate, been carried out in accordance with the formulae and methods described in the monitoring plan, the applied methodology and where applicable, the applied standardized baseline? (Refer VVS 290 c)	Yes. The calculations of baseline emissions, proposed CDM project activity emissions and leakage, as appropriate are correct as per the validated PDD and the applied methodology. However, CR 1, CR 2, CR 3 and CR 4 are raised as follows. **CR 1** As per the validated PDD, monthly data of volume of wastewater treated (Qww,i,y) will be used in the calculation of emission reduction. But it seems that PP used yearly data to calculate the ER for 2013 and 2014. PP is requested to clarify how the emission reduction calculation for this monitoring period conform the same. **CR 2** PP is requested to clarify how TDL of 6.3% is more appropriate when the relevant tool prescribes 10%. **CR 3** PP is requested to clarify how there is no methane emissions in the UASB system as in the calculation of $PE_{ww,treatmtent,y}$, only methane emissions from open lagoon is considered by taking $COD_{treated}$ in the calculation. (Refer CER sheet; tab: ER calculation; Cell: N14). Refer D6 to D11) **CR 4** PP is requested to demonstrate how $PE_{ww,discharge,y}$ is considered to be nil and provide document for zero discharge of treated water into the river or lake.	~~**CR 1**~~ ~~**CR 2**~~ ~~**CR 3**~~ ~~**CR 4**~~
25	Any assumptions used in emission calculations? If yes, they been justified? (Refer VVS 290 d)	Yes. Emission factor for fuel oil and grid which is relevant for this project. The emission factor is determined ex ante and fixed for the crediting period and is correctly applied by the PP.	**OK**
26	Have appropriate emission factors, IPCC default values and other reference values been correctly applied? (Refer VVS 290 e)	Yes. IPCC values are correctly applied. Emission factor for grid is applied correctly.	**OK**

	Checklist Questions	Comments by verifier	Conclusion
27	For a registered CDM project activity using an approved standardized baseline that standardizes baseline emissions, have the standardized value(s) of the parameter(s) are applied using the correct version of the applied standardized baseline in accordance with the Project standard. (Refer VVS 290 f)	Not applicable.	**OK**
	Post registration changes **Temporary deviations from the registered monitoring plan, monitoring methodology and/or standardized baseline**		
28	Where the deviation is identified during verification, the DOE shall indicate in the verification report how the monitoring report reflects the application of the approved guidance from the Board regarding the deviation from the provisions of the registered monitoring plan, the applied methodology and /or the applied standardized baseline. (Refer VVS 300)	There is a temporary deviation as meters to measure thermic oil is not installed. CAR 8 and CAR 9 are raised as follows. **CAR 8** PP is requested to demonstrate how conservative approach is adopted in calculating the AMS.I.C baseline emissions as meters related to this parameter is not in place. PP is requested to demonstrate how 25.9 litre of FO/ton of starch is conservative compared to manufacturing specification data for thermic oil heaters. **CAR 9** In the monitoring report it is mentioned that the meters related to AMS. I.C calculations are not in place, and the deviation is claimed to be temporary in nature. The same was conveyed to the verification team during the site also. PP is requested to support the same with document in the form of undertaking.	~~**CAR 8**~~ ~~**CAR 9**~~

	Checklist Questions	Comments by verifier	Conclusion
29	Where the deviation is identified prior to verification, the DOE shall state its opinion on whether the deviation reflects the application of the approved guidance from the Board regarding the deviation from the provisions of the registered monitoring plan, the applied methodology and /or the applied standardized baseline and as per the applicable provisions of the Project Standard. (Refer VVS 301)	There is a temporary deviation as meters to measure thermic oil is not installed.	
	Corrections		
30	If the DOE identifies that the project participants have made corrections to project information or parameters determined at validation, the DOE shall determine whether: (a) The corrected information is an accurate reflection of actual project information; and/or (Refer VVS 303 a)	There is no correction found. Not applicable.	**OK**
31	The corrected parameters are in accordance with the applied methodology the monitoring plan and /or the applied standardized baseline. (Refer VVS 303 b)	Not applicable.	**OK**
	Changes to the start date of the crediting period		

	Checklist Questions	Comments by verifier	Conclusion
32	The DOE shall indicate if the requirements in the Project standard have been met and shall submit a request for post registration changes in accordance with the Project cycle procedure. (Refer VVS 306)	Not applicable.	**OK**
	Permanent changes from the registered monitoring plan or monitoring methodology		
33	The DOE shall determine whether the changes to the monitoring plan contained in the registered PDD proposed by the project participants are in compliance with the applied methodology and, where applicable, the applied standardized baseline and do not reduce the level of accuracy of the monitoring compared with the requirements contained in the registered monitoring plan. (Refer VVS 308)	There is no permanent deviation found . Not applicable.	**OK**

	Checklist Questions	Comments by verifier	Conclusion
34	In cases where the proposed changes refer to a later version of the applied methodology and /or the applied standardized baseline in the registered PDD, the DOE shall determine whether the application of any later version of the applied methodology any applicable tool(s) and/or the applied standardized baseline does not impact the conservativeness of the monitoring and verification process, including the related emission reduction calculations. (Refer VVS 309)	Not applicable.	**OK**
35	If the DOE identifies that the project participants are unable to implement the monitoring plan contained in the registered PDD and it will not be possible to monitor the registered CDM project activity in accordance with a monitoring plan that would comply with the applied methodology any applicable tools, and, where applicable, the standard-ized baseline or the relevant provisions of appendix 1 of the Project standard, the DOE shall request guidance from the Board concerning the acceptability of the permanent changes in accordance with the section on post registration changes in the Project cycle procedure. (Refer VVS 310)	Not applicable.	**OK**

	Checklist Questions	Comments by verifier	Conclusion
36	The DOE shall determine whether the permanent changes are likely to lead to a reduction in the accuracy of the calculation of emission reductions. In cases where the DOE considers that the permanent changes will lead to a reduction in the accuracy of the calculation of emission reductions, the DOE shall request the project participants to apply conservative assumptions or discount factors to the calculations to the extent required to ensure that emission reductions will not be over-estimated as a result of the permanent change. (Refer VVS 311)	Not applicable.	**OK**
	Changes to the project design of a registered project activity		
37	If the DOE identifies that the project design in the implementation or operation of the project activity does not conform with the description contained in the registered PDD or the relevant provisions of appendix 1 of the Project standard, the DOE shall request guidance from the Board concerning the acceptability of the proposed or actual changes in accordance with the section on post registration changes in the Project cycle procedure. (Refer VVS 315)	Not applicable.	**OK**

	Checklist Questions	Comments by verifier	Conclusion
38	In case of actual changes, the DOE shall, by means of an on-site visit and review of the submitted revised PDD by the project participants, which describes the nature and extent of the actual changes, determine whether this description accurately reflects the implementation, operation and monitoring of the modified project activity. (Refer VVS 316)	Not applicable.	**OK**
39	The DOE shall conduct an on-site inspection to assess the impacts of the actual changes on the compliance of the monitoring plan, the level of accuracy of the monitoring activity, the applied monitoring methodology and including applicable tool(s) and/or, where applicable, the applied standardized baseline. (Refer VVS 317)	Not applicable.	**OK**

	Checklist Questions	Comments by verifier	Conclusion
40	The DOE shall, by means of reviewing the revised PDD against applicable additionality and methodological requirements, determine whether the proposed or actual changes would adversely affect the conclusions of the validation report of the registered PDD with regard to: (a) Additionality of the project activity; (b) Scale of the project activity; (c) Applicability and application of the approved baseline methodology and, where applicable, the approved standardized baseline under which the project activity has been registered; or (d) The compliance of the monitoring plan with the applied monitoring methodology and, where applicable, the applied standardized baseline (Refer VVS 318)	Not applicable.	**OK**

	Checklist Questions	Comments by verifier	Conclusion
41	If the proposed or actual changes affect the additionality of the project activity then the DOE shall confirm that: (a) In the case of investment analysis, project participants have only modified the key parameters in the original spreadsheet calculations affected by the proposed or actual changes to the project activity; (b) In the case where only barriers have been claimed to demonstrate additionality, project participants have demonstrated that the barriers are still valid under the new circumstances. (Refer VVS 319)	Not applicable.	**OK**
42	For registered CDM project activity using an approved standardized baseline that standardizes additionality:- If the proposed or actual changes affect the additionality of the project activity then the DOE shall confirm that the project activity complies with the positive list of the applied standardized baseline in the registered PDD. (Refer VVS 320)	Not applicable.	**OK**

	Checklist Questions	Comments by verifier	Conclusion
43	The DOE shall confirm that the applied methodology including applied tools and/or the applied standardized baseline do not impact the conservativeness of the monitoring and verification process and the related emission reduction calculations in cases where: (a) The proposed or actual changes impact the implementation of the project activity; (b) The original methodology and/or the original standardized baseline would no longer be applicable; and (c) The project participant applies: (i) A later version of the methodology and/or the standardized baseline; or (ii) Another methodology and/or another standardized baseline that is(are) applicable to the project activity. (Refer VVS 321)	Not applicable.	**OK**
44	The DOE shall assess whether the revised PDD complies with: (a) The applied methodology, tools and/or standardized baseline; (b) Any later version of the methodology and/or the standardized baseline; or (c) The requirements of another methodology and/or another standardized baseline that is(are) applicable to the project activity. (Refer VVS 322)	Not applicable.	**OK**

Table 2 Resolution of CARs and CRs

Correction Action Request (CAR) or Clarification Request (CR) or Forward Action Request (FAR)	Reference to table 1	Response from project participant	Verification team conclusion
CAR 1 PP is requested to submit calibration records for the parameter - Volume of wastewater treated (Qww). Further PP is requested to demonstrate that the validity of which covering the current monitoring period with sufficient accuracy.	**15**	**1st response on 14/01/2015** The meter was calibrated on 26/09/2012 and 25/10/2014 whose validity up to 24/10/2017. As per the monitoring plan of the registered PDD, the meter shall be calibrated periodically at least once in three years. From the above mentioned calibration dates, the calibration interval covering the current monitoring period is in line with the monitoring plan and there is no gap in calibration.	As per the para 20 of AMS.III.H version 16.0, the volume of wastewater would have treated in baseline wastewater treatment system is the actual monitored volume of treated wastewater in the monitored period. The total volume of wastewater is the cumulative of waste water flows through flow meter FM1 (installed at inlet of UASB system). As per the validated PDD, $Q_{ww,i,y}$ is to be measured continuously using volumetric flow meter and atleast hourly measurement will be undertaken. At the site, it is observed that it is measured continuously and recorded every day. The verification team has reviewed the raw data sheets[7]. Daily readings of the meter are calculated from the final reading of the day and initial reading for the meter. Cumulative of such data gives reading for one day. Yearly reading is cumulative of daily data. The verification team has checked the measurement methods and found that data is being logged in every day and plant operators first manually archive the monitored data onto the log sheets then transfer to the computer for electronic storage. Hence the verification team was able to conclude that this parameter is being monitored & recorded as per the validated PDD.

Correction Action Request (CAR) or Clarification Request (CR) or Forward Action Request (FAR)	Reference to table 1	Response from project participant	Verification team conclusion
			The verification team has reviewed the calibration certificates. The verification team has checked the calibration certificates against meter number, serial number, date of calibration, validity and actual error and found that meters are calibrated by the certified agency and are having sufficient accuracy and the validity covering the monitoring period. The error found from the calibration is less than the maximum permissible limits. The verification team was able to conclude that QA/QC of the meter is ensured. The verification team has observed that when there is no raw material for starch production, the plant was not in operation. During this period, there found to be no data for volume of wastewater. The verification team has reviewed the starch production data confirmed the above. The verification team has found that the data is being measured when the plant is operating or waste water available. The starch plant was operational for 129 days out of possible 285 days in 2013 and 195 days out of possible 353 days in 2014. The estimated volume of wastewater estimated as the validated PDD was 541,800 m^3 for 129 days in 2013 and 819,000 m^3 for 195 days in 2014 (derived from estimated

Correction Action Request (CAR) or Clarification Request (CR) or Forward Action Request (FAR)	Reference to table 1	Response from project participant	Verification team conclusion
			daily volume of 4500 m^3 per day and actual no of days operational in the year). Due to cassova root (raw material for starch) shortage, volume of wastewater is less than the expected value. As the volume of wastewater is the main contributor for the emission reductions, actual emission reduction is less. Conclusion: CAR 1 is closed.
CAR 2 PP is requested to provide calibration records related to COD and its external agency records for verification.	**15**	**1st response on 14/01/2015** The calibration record of the equipment used for COD measurement is submitted to the verification team. Further, since the calibration of the equipment was not conducted before 31/10/2014, the measured values of the COD content for the period from 22/03/2013 – 30/10/2014 has been adjusted by applying the identified error in the calibration test dated 31/10/2014 (±2.564%) in a conservative manner. This approach is in line with the latest version of the VVS. The details can be found in the calculation sheet.	The verification team has checked the calibration certificates against portable COD analyser, serial number, date of calibration, validity and actual error and found that analyser is calibrated by the certified agency but is having calibration delay. As the actual error is more than the maximum permissible error, observed from the delayed calibration, actual error is adjusted to the measured value for the calibration delayed period as follows. Adjusted value = Measured value x (1- error) The adjustment is done on a daily basis for the calibration delayed period. The formula is accepted by the verification team as the adjustment leads to conservative baseline emissions.

Correction Action Request (CAR) or Clarification Request (CR) or Forward Action Request (FAR)	Reference to table 1	Response from project participant	Verification team conclusion
			Since the adjusted COD value is based on representative sampling as some days, it is not measured as evident from the logsheets. As per the validated PDD, 90/10 confidence level as calculated. The verification team has checked the rationale and factors used in the calculation of the final adjusted value at 90% confidence level and accepted. Hence it is inline with "Sampling and surveys for CDM project activities and programmes of activities" ver. 4.1. The verification team was able to conclude that this parameter is being monitored and recorded as per the validated PDD. Since this value is used for baseline calculation, lower bound value is used for the calculation which is considered conservative and hence accepted. The lower bound at 90% confidence level value is used for the further calculation. Conclusion : CAR 2 is closed.
CAR 3 PP is requested to provide calibration records of weigh bridge to measure the volume of sludge for verification.	**15**	**1st response on 14/01/2015** The calibration record of the weigh bridge is submitted to the verification team.	The verification team has checked the calibration certificates against meter number, serial number, date of calibration, validity and actual error and found that meters are calibrated by the certified agency and are having sufficient accuracy and the validity covering the monitoring period. The verification team was able to conclude that

Correction Action Request (CAR) or Clarification Request (CR) or Forward Action Request (FAR)	Reference to table 1	Response from project participant	Verification team conclusion
			QA/QC of the meter is ensured. Conclusion : CAR 3 is closed.
CAR 4 PP is requested to provide electricity purchase invoices covering the monitoring period for verification.	**11 i**	**1st response on 14/01/2015** The invoices of electricity purchase are submitted to the verification team.	As per the validated PDD, Quantity of electricity consumed by the project electricity consumption source j in year y is the amount of electricity imported from the grid system j. As per the validated PDD, $EC_{PJ,i,y}$ is to be measured continuously monitored using an energy meter and readings would be based on monthly invoices. At the site, it is measured continuously and monthly invoices are prepared on the cumulative value for the month. The verification team has observed that the energy meter is in control of Provincial Electrical Authority (PEA). The verification team has reviewed the electricity invoices. Hence the verification team was able to conclude that this parameter is being monitored and recorded as per the validated monitoring plan. Since the meters are in the control of PEA, the calibration is beyond the control of the project owner. Conclusion: CAR 4 is closed.

Correction Action Request (CAR) or Clarification Request (CR) or Forward Action Request (FAR)	Reference to table 1	Response from project participant	Verification team conclusion
CAR 5 At the site, PP requested the verification team whether the end date of the monitoring period can be extended up to 19th December 2014. The verification team wishes to state that change in monitoring period is possible as per provisions adopted in 41st EB meeting (Refer para 78 of the EB 41 report). PP is requested to take corrective action to reflect the extension and accordingly submit new monitoring report and CER sheet covering the new monitoring period.		**1st response on 14/01/2015** The revised monitoring report and CER sheet with the revised detail of the monitored data extended up to 19/12/2014 are submitted to the verification team.	PP has used the version 4.0 of the MR template which is current and active one. The monitoring report has been prepared as per the instructions provided in the template. EPIC has made the version 1.0 of the monitoring report covering the monitoring period from 22nd March 2013 to 31st October 2014 publicly available on 2nd December 2014 through its dedicated interface on the UNFCCC CDM website before undertaking the site visit for the verification on 22nd and 23rd December 2014. At the project site, PP requested the verification team if it is possible to extend the end date of the monitoring period to 19th December 2014. As it is possible as per the provisions of EB 41 para 78, the verification team has raised this CAR to enable PP to make necessary corrective action to reflect the new end date of the monitoring period. Since the verification team has verified the data till 19th December 2014 at the site itself, additional site visit is not deemed necessary by the verification team. Accordingly, the PP has provided the revised monitoring report with new monitoring period and new CER sheets. The verification team has reviewed the same and accepted. Conclusion: CAR 5 is closed.

Correction Action Request (CAR) or Clarification Request (CR) or Forward Action Request (FAR)	Reference to table 1	Response from project participant	Verification team conclusion
CAR 6 At the site, verification team has observed that there is some mismatch between value related to the volume of wastewater, methane content of the biogas logged in and the value used for the calculation.	**11 ii**	**1st response on 14/01/2015** The values of the volume of wastewater and methane content are rechecked. The values on following dates are corrected in the ER sheet. The volume of wastewater: -21/02/1014 - 28/02/2014 - 31/03/2014 The methane content: - 22/03/2013 to 31/10/2014	The verification team has reviewed the revised sheets and accepted as it is in line with the logsheets hence accepted. Conclusion: CAR 6 is closed.
CAR 7 PP is required to provide evidence that there is no sludge produced during the monitoring period as $PE_{y,s,final}$ is considred to be zero as per CER sheet	**11 ii**	**1st response on 14/01/2015** The confirmation letter provided by Maesod Biogas Company Limited as the evidence is submitted to the verification team. As per the confirmation letter, it is assured that there was no sludge removed from the digester since the start of project operation. Furthermore any sludge removal will be measured using the weighbridge as per the monitoring plan in the PDD.	As per the para 25 and para 29 of AMS.III.H v16.0, the formula used is as follows. $PE_{s,final,y} = S_{final,PJ,y} \times DOC_s \times UF_{PJ} \times MCF_{s,PJ,final} \times DOC_F \times F \times 16/12 \times GWP_{CH4}$ Where $S_{final, PJ, y}$ = Amount of dry matter in final sludge generated by the project wastewater treatment systems in the year y As per the validated PDD, if sludge is generated and removed from the UASB system; records will be kept on its quantity and disposal method and end use of final sludge. It will be monitored through continuous or batch measurements using weigh bridge. It was checked on-site that no sludge were removed during this verification period. It is also confirmed from the

Correction Action Request (CAR) or Clarification Request (CR) or Forward Action Request (FAR)	Reference to table 1	Response from project participant	Verification team conclusion
			factory personnel that there was no sludge was removed during this monitoring period. Since the amount of dry matter in final sludge generated by the project wastewater treatment systems is zero, $PE_{s,final,y}$ =0 tCO2e Conclusion: CAR 7 is closed.
CAR 8 PP is requested to demonstrate how conservative approach is adopted in calculating the AMS.I.C baseline emissions as meters related to this parameter is not in place. PP is requested to demonstrate how 25.9 litre of FO/ton of starch is conservative compared to manufacturing specification data for thermic oil heaters.	**28**	**1st response on 14/01/2015** Since the flow meter for measurement of monitoring parameter $Q_{oil,y}$ (Quantity of the thermic fluid from boiler to the process plant) was not installed during this monitoring period, the baseline emissions from thermal component have been taken as zero in line with Appendix 1 of the CDM project standard version 7.0. Therefore, the value of 25.9 litre of FO/ton of starch is removed from the CER calculation. But PP states that a part fuel oil is displaced with biogas in the project scenario, which can be converted to baseline emissions, since $Q_{oil,y}$ is not monitored, PP has taken baseline emissions as zero. The undertaking regarding the meter related to AMS I.C calculation (temporary deviation) is not in place is submitted to the verification team.	As per para 22 of AMS.I.C version 19.0, $BE_{y,AMS.I.C}$ = $BE_{thermal,CO2,y}$ = $(EG_{thermal,y} / \eta_{BL,thermal}) \times EF_{FF,CO2}$ Where $BE_{thermal,CO2,y}$ – Baseline emissions from steam/heat displaced by the project activity in year y $EG_{thermal,y}$ – Net quantity of steam/heat supplied by the project activity in year y $\eta_{BL,thermal}$- Efficiency of the plant using fossil fuel that would have been used in the absence of project activity $EF_{FF,CO2}$ – CO2 emission factor of the fossil fuel that would have been used As per the validated PDD, $EG_{thermal,y}$ is calculated as follows. $EG_{thermal,y} = Q_{oil,y} \times \rho_{oil,avg} \times (T_{out}-T_{in}) \times LHC_{oil,avg}$ Where $Q_{oil,y}$ – Quantity of the thermic oil from thermic oil heater to the process plant $\rho_{oil,avg}$ – Density of thermic oil T_{out}- Temperature of thermic oil leaving the thermic oil heater

Correction Action Request (CAR) or Clarification Request (CR) or Forward Action Request (FAR)	Reference to table 1	Response from project participant	Verification team conclusion
			T_{in}- Temperature of thermic oil entering the thermic oil heater $LHC_{oil,avg}$- Specific heat capacity of thermic oil Quantity of the thermic oil from thermic oil heater to the process plant ($Q_{oil,y}$): As per the validated PDD, this parameter is to be measured continuously using flow meter and recorded hourly and aggregated daily. But during the monitoring period, this parameter is not monitored which is also confirmed by the PP at the site. The verification tem has observed that there is no meter installed at the inlet of the thermic oil heater to measure thermic oil entering. Since this temporary change falls under Appendix 1 of Project Standard and this parameter is used calculating the baseline emissions, PP has considered this parameter as zero for the monitoring period, which the verification team has accepted. Since no meter is installed, no QA/QC is followed. Density of thermic oil ($\rho_{oil,avg}$): As per the validated PDD, this parameter is to be measured annually or per verification period by taking values from the thermic oil data sheet corresponding to T_{in} and T_{out}. But during the monitoring period, this parameter is not monitored which is confirmed by the PP at the site. Temperature of thermic oil leaving the

Correction Action Request (CAR) or Clarification Request (CR) or Forward Action Request (FAR)	Reference to table 1	Response from project participant	Verification team conclusion
			thermic oil heater (T_{out}): As per the validated PDD, this parameter is to be measured continuously and recorded on an hourly basis. But during the monitoring period, this parameter is not monitored which is confirmed by the PP at the site. Since no temperature gauge is installed, no QA/QC is followed. Temperature of thermic oil leaving the thermic oil heater (T_{in}): As per the validated PDD, this parameter is to be measured continuously and recorded on an hourly basis. But during the monitoring period, this parameter is not monitored which is confirmed by the PP at the site. Since no temperature gauge is installed, no QA/QC is followed. Specific heat capacity of thermic oil ($LHC_{oil,avg}$): As per the validated PDD, this parameter is to be measured annually or per verification period by taking values from the thermic oil data sheet corresponding to T_{in} and T_{out}. But during the monitoring period, this parameter is not monitored which is confirmed by the PP at the site. Net quantity of steam/heat supplied by the project activity in year y ($EG_{thermal,y}$), is hence 0 Joule Efficiency of the plant using fossil fuel that would have been used in the absence of

Correction Action Request (CAR) or Clarification Request (CR) or Forward Action Request (FAR)	Reference to table 1	Response from project participant	Verification team conclusion
			project activity ($\eta_{BL,thermal}$) is 100% which is fixed at the time of validation and it remains same during this monitoring period also. CO2 emission factor of the fossil fuel that would have been used ($EF_{FF,CO2}$) is 77.40 tCO2/TJ which is fixed at the time of validation. The source being 2006 IPCC value as per the validated PDD and 2006 IPCC source is still valid. $EF_{FF,CO2}$ value remains same during this monitoring period also. As per para 22 of AMS.I.C version 19.0, $BE_{y,AMS.I.C}$ = $BE_{thermal,CO2,y}$ = ($EG_{thermal,y}$ /$\eta_{BL,thermal}$) x $EF_{FF,CO2}$ is zero. Conclusion: CAR 8 is closed.
CAR 9 In the monitoring report it is mentioned that the meters related to AMS. I.C calculations are not in place, and the deviation is claimed to be temporary in nature. The same was conveyed to the verification team during the site also. PP is requested to support the same with document in the form of undertaking.	**28**	**1st response on 14/01/2015** The undertaking regarding the meter related to AMS I.C calculation is not in place is submitted to the verification team.	The verification team has reviewed the undertaking letter and accepted. Quantity of the thermic oil from thermic oil heater to the process plant ($Q_{oil,y}$): As per the validated PDD, this parameter is to be measured continuously using flow meter and recorded hourly and aggregated daily. But during the monitoring period, this parameter is not monitored which is also confirmed by the PP at the site. The verification tem has observed that there is no meter installed at the inlet of the thermic oil heater to measure thermic oil entering. Since this temporary change falls under Appendix 1 of Project Standard and this parameter is used calculating the baseline

Correction Action Request (CAR) or Clarification Request (CR) or Forward Action Request (FAR)	Reference to table 1	Response from project participant	Verification team conclusion
			emissions, PP has considered this parameter as zero for the monitoring period, which the verification team has accepted. As per para 22 of AMS.I.C version 19.0, $BE_{thermal,CO2,y} = (EG_{thermal,y} / \eta_{BL,thermal}) \times EF_{FF,CO2}$ is therefore considered to be zero. Conclusion: CAR 9 is closed.
CAR 10 PP is requested to provide the document/purchase invoices to support the monthly fossil fuel consumption in the thermic oil heaters.	**11 i**	**1st response on 14/01/2015** The electronic file of the fossil fuel consumption provided by factory manager is submitted to the verification team.	As per the validated PDD, $FC_{k,y}$ is to be measured continuously and records would be kept when fossil fuel is used in the project activity. During the monitoring period, it is monitored and recorded monthly in the log sheets. Yearly data is cumulative of monthly data. The verification team has crosschecked the same with purchase records and accepted. Hence the verification team was able to conclude that this parameter is being monitored and recorded as per the validated PDD. Conclusion: CAR 10 is closed.
CAR 11 At the site, verification team has observed that electricity exported for the month of December 2013 is not accounted for in the calculation. PP is requested to clarify the same.	**11 ii**	**1st response on 14/01/2015** The ER sheet is revised to include the value of electricity exported for the month of December 2013 which the monthly reading report and invoice to PEA are submitted to the verification team.	The verification team has reviewed the Dec 2013 data, CER sheet etc and accepted as correctly applied. As per the validated PDD, Quantity of electricity exported to the grid is to be measured continuously using energy meter. The readings will be based on monthly joint meter readings and invoices. At the site, it is measured continuously and

Correction Action Request (CAR) or Clarification Request (CR) or Forward Action Request (FAR)	Reference to table 1	Response from project participant	Verification team conclusion
			monthly invoices are prepared on the cumulative value for the month. The verification team has reviewed the electricity bills. Hence the verification team was able to conclude that this parameter is being monitored and recorded as per the validated monitoring plan. Conclusion: CAR 11 is closed.
CR 1 As per the validated PDD, monthly data of volume of wastewater treated (Qww,i,y) will be used in the calculation of emission reduction. But it seems that PP used yearly data to calculate the ER for 2013 and 2014. PP is requested to clarify how the emission reduction calculation for this monitoring period conform the same.	**24**	**1st response on 14/01/2015** The data of volume of wastewater treated is measured continuously and logged into the logbook on daily basis. As per the equation 2 and 11 of AMS.III.H version 16, it is shown that the value of $Q_{ww,y}$ is the volume of wastewater treated in baseline or project wastewater treatment system in year which PP has applied the same in ER calculation of the project by using the summation of daily/monthly data in year 2013 and 2014.	The verification has accepted the argument of PP. Conclusion: CR 1 is closed.
CR 2 PP is requested to clarify how TDL of 6.3% is more appropriate when the relevant tool prescribes 10%.	**24**	**1st response on 14/01/2015** PP has applied 6.3% which is the most recent available data of the TDL in line with the description given in the registered PDD.	As per the validated PDD, most recent data available within the host country will be used during the monitoring and verification. The verification team has checked the source and accepted the value as it is the most recent data available and hence accepted. Conclusion: CR 2 is closed.

Correction Action Request (CAR) or Clarification Request (CR) or Forward Action Request (FAR)	Reference to table 1	Response from project participant	Verification team conclusion
CR 3 PP is requested to clarify how there is no methane emissions in the UASB system as in the calculation of $PE_{ww,treatmtent,y}$, only methane emissions from open lagoon is considered by taking $COD_{treated}$ in the calculation. (Refer CER sheet; tab: ER calculation; Cell: N14). Refer D6 to D11)	**24**	**1st response on 14/01/2015** As per the paragraph 20 of AMS III.H, $PE_{ww,treatmtent,y}$ is the calculation of the methane emissions from open lagoon system (or baseline system) which is considered by using $COD_{treated}$ (outflow COD from the UASB system) as inflow COD in the baseline system multiplied by COD removal efficiency of the system. Regarding the methane emissions in the UASB systems, it is determined as per paragraph 30 of AMS III.H in terms of $PE_{fugitive,ww}$ which is calculated by using the difference of $COD_{untreated}$ and $COD_{treated}$ (equal to $COD_{removed,PJ,k,y}$).	$PE_{ww,treatmtent,y}$ is the emissions occur in project activity which is open lagoon in this case. After treatment in the UASB system, all the treated water is going to open lagoon system k for further treatment where fugitive emissions occur. As per the para 30a of AMS.III.H version 16.0, $PE_{fugitive,ww,y}$ is calculated as below $PE_{fugitive,ww,y} = (1-CFE_{ww}) \times MEP_{ww,treatment,y} \times GWP_{CH4}$ Where CFE_{ww} is Capture efficiency of the biogas recovery equipment in the wastewater treatment systems $MEP_{ww,treatment,y}$ is Methane emission potential of wastewater treatment systems equipped with biogas recovery system GWP_{CH4}-Global warming potential of methane $PE_{fugitive,ww,y}$ takes into account the fugitive emissions and that is being calculated. Conclusion: CR 3 is closed.
CR 4 PP is requested to demonstrate how $PE_{ww,discharge,y}$ is considered to be nil and provide document for zero discharge of treated water into the river or lake.	**24**	**1st response on 14/01/2015** The treated wastewater was not discharged into the river, sea or lake. Therefore, the $PE_{ww,discharge,y}$ is not included in the ER calculation.	Since all the treated water is discharged into the open lagoon, and volume of treated water discharged into the river, lake or sea is zero. The verification team has observed that treated water is let out to open lagoon system only at the site. Conclusion:

Correction Action Request (CAR) or Clarification Request (CR) or Forward Action Request (FAR)	Reference to table 1	Response from project participant	Verification team conclusion
			CR 4 is closed.
CR 5 PP is requested to demonstrate that biogas volume and methane content measurements are taken on the same basis (wet or dry) by providing the technical specifications.	**11 ii**	**1st response on 14/01/2015** Since the detail about measurement condition of both gas flow meter and portable gas analyzer are not available in the technical specifications, PP has requested clarification from the technology provider of the biogas system. With reference to the clarification, both biogas volume and methane content are measured on dry basis as confirmed by the technology provider.	The verification team has reviewed the clarification provided by the technology provider. Volumetric flow of the residual gaseous stream in minute m on dry basis is the amount of biogas flared in the flaring system. As per the validated PDD, it is to be monitored continuously and the values will be averaged every minute. But at the site, it is measured continuously on dry basis and recorded every day by the flow meter (GM2) located at the inlet of flaring system. Methane content: As per the validated PDD, methane content is to be measured using continuous gas analyser and the value would be averaged on a minute basis. In case continuous analyser is not available, periodical measurements at 90/10 confidence level would be made. At the site, it is measured two times every day till 30th November 2013 and four times from December 2013 onwards using portable analyser on dry basis. The daily average is then calculated. The verification team has reviewed the analysis results. Thus the number of samples collected for the measurement is sufficient and appropriate. In conclusion, the biogas volume and methane content measurements are taken on the dry basis is confirmed.

Correction Action Request (CAR) or Clarification Request (CR) or Forward Action Request (FAR)	Reference to table 1	Response from project participant	Verification team conclusion
			Conclusion: CR 5 is closed.
CR 6 PP is requested to provide meter specifications and calibration certifications for meters used to measure biogas consumed in gas engine, boiler, flare systems	**11 ii**	**1st response on 14/01/2015** The documents of meter specification and available calibration certificates for meters used measure biogas consumed in gas engine, boiler, and flare system are submitted to the verification team.	The verification team reviewed the manufacturer's specification and calibration certificates for meters used to measure biogas consumed in gas engine, boiler, and flare system and found that details are as per that observed at the site. Conclusion: CR 6 is closed.
CR 7 PP is requested to clarify the calculation method used to calculate emissions from electricity and fuel used by the project facilities ($PE_{power,y}$).	**11 ii**	**1st response on 14/01/2015** In line with the approach mentioned in the registered PDD under section B.6.1, 4(a), i., the project emission of $PE_{power,y}$ was calculated by using the quantity of electricity consumption which is based on the electricity imported by the project activity from the grid. Further, PP has applied the monitored data of electricity consumed mentioned in the electricity invoices as per the monitoring plan. Regarding the project emission from fuel combusted in the boiler ($PE_{boiler,y}$), since the project activity has not displaced 100% of fuel oil in the boiler during the monitoring period, the emissions from fuel combusted has been calculated as per the registered PDD.	As per the definition, project emission due to electricity usage and fossil fuel usage in the project boundary is calculated as follows. As per para 29 of AMS.III.H version 16.0 and validated PDD, Emissions from electricity and fuel used by the project facilities is calculated as per "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" $PE_{power,y} = \Sigma EC_{PJ,j,y} \times EF_{EL,j,y} \times (1+TDL_{j,y})$ Project emissions due to fossil fuel usage are calculated as per AMS.I.C. As per para 45 of AMS.I.C version 19.0, CO_2 emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the latest version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion". (version 2.0)

Correction Action Request (CAR) or Clarification Request (CR) or Forward Action Request (FAR)	Reference to table 1	Response from project participant	Verification team conclusion
			As per the tool and validated PDD, $PE_{y,AMS.I.C}$ is calculated as follows. $PE_{y,AMS.I.C} = FC_{k,y} \times NCV_{k,y} \times EF_{CO2,\ k,y}$ Since the same method is used for the calculation, the verification team has accepted. Conclusion: CR 7 is closed.