



Monitoring report form
(Version 04.0)

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.

MONITORING REPORT

Title of the project activity	Methane recovery from waste water generated from wheat straw wash at Paper manufacturing unit of Shreyans Industries Limited (SIL).
Reference number of the project activity	0935
Version number of the monitoring report	01
Completion date of the monitoring report	15/10/2014
Registration date of the project activity	02/04/2007
Monitoring period number and duration of this monitoring period	Monitoring Period Number : 3 rd Duration: 02/04/2011 to 01/04/2014
Project participant(s)	Shreyans Industries Limited (SIL)
Host Party(ies)	India
Sectoral scope and selected methodology(ies), and where applicable, applied standardized baseline(s)	Sectoral Scopes: 13 : Waste handling and disposal 15 : Agriculture Methodology Used AMS-III.H. ver. 3 - Methane recovery in wastewater treatment
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	$12578 \times 3 = 37734 \text{ tCO}_2$
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	23,700 tCO ₂
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012(if applicable)	13,310
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards (if applicable).	10,390

SECTION A. Description of project activity**A.1. Purpose and general description of project activity**

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The project proponent, Shreyans Industries Limited (SIL) has installed the CDM project activity titled "Methane recovery from waste water generated from wheat straw wash at Paper manufacturing unit of Shreyans Industries Limited (SIL)" on 1st September 2006 which has been registered under CDM mechanism on dated 02/04/2007. The reference number of the CDM project activity is 0935.

As described in the registered PDD, the project activity is the installation of a high rate Upflow anaerobic sludge blanket (UASB) digester which captures methane and burns it for generating steam in boilers at SIL's paper manufacturing unit at Ahmedgarh, Sangrur District, Punjab, India. The project activity has been generating biogas continuously from the UASB digester since commissioning on 1 st September 2006, and utilizing the same for generating steam in boilers at the above-mentioned paper manufacturing unit of SIL.

This is the third monitoring report associated with SIL project activity. The period covered in this monitoring report is from 02/04/2011 to 01/04/2014 (Both days included). This monitoring report does not cover any period of time which was part of the previous monitoring report. The CERs generated in the monitoring period are 23700 CERs.

A.2. Location of project activity

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The project activity is located within premises of paper manufacturing unit of SIL at Ahmedgarh village in Sangrur district in Punjab. The nearest airport is located at Ludhiana which is about 35 Km from the plant site. The nearest railway station at Ahmedgarh is about 3 Km from the plant. The geographical coordinates for the above mentioned project are:

Latitude: 20.59° N

Longitude: 78.96° E

A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (host)	Private entity: Shreyans Industries Limited (SIL)	No

A.4. Reference of applied methodology and standardized baseline

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Monitoring plan for the project activity has been prepared according to the guidelines given in paragraph 8, 9, 10 and 11 of Type.III.H. Simplified baseline and monitoring methodology.

A.5. Crediting period of project activity

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A fixed crediting period of 10 years i.e. from 02/04/2007 to 01/04/2017 has been chosen.

A.6. Contact information of responsible persons/ entities

>>

Name: Mr.Anil Kumar Designation: Executive Director & CEO,
 Organization: Shreyans Industries Limited
 E Mail: spm@shreyansgroup.com
 Telephone: +91 1675 240347

SECTION B. Implementation of project activity**B.1. Description of implemented registered project activity**

>>

There are no post registration changes in the project activity therefore the description provided in earlier section A.1 is still valid for the project activity.

B.2. Post registration changes**B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline**

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There are no temporary changes in the project activity therefore there are no deviations in baseline as well as in monitoring plan from the previous approved plans.

B.2.2. Corrections

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NA

B.2.3. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

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The project activity applied for the revision in the monitoring plan which got duly approved¹ on 04 March 2011.

B.2.4. Changes to project design of registered project activity

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There are no changes in the Project Design apart from monitoring plan which previously got approved on dated 04 March 2011.

B.2.5. Changes to start date of crediting period

>>

NA

B.2.6. Types of changes specific to afforestation or reforestation project activity

>>

NA

¹ <http://cdm.unfccc.int/UserManagement/FileStorage/ZWGB4RQ6KOCPTH0S3MUEYJAFN5LI29>

SECTION C. Description of monitoring system

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SIL has planned an operation and management structure for the project activity with defined roles and responsibilities of individuals. The management is responsible for monitoring and reporting of the parameters involved. All parameters are being monitored and reported in a transparent manner so that they can be easily verified by DOE. SIL constituted a CDM monitoring team which is responsible for the overall monitoring and management of the projects. CDM team comprises of monitoring supervisors having responsibility of operating and monitoring the plant. Parameters involved in the project activity at Digester, Lab and Cogeneration. Supervisor at cogeneration unit is responsible for monitoring parameters related to co-generation”, whereas supervisors at lab and digesters take care of monitoring at lab and digesters respectively.

Daily report of the parameters monitored is being reported to CDM controller for verification. Chairman CDM monitoring committee is in charge of CDM cell and report to ED & CEO who would review the reports on monthly basis and subsequently send reports to the Managing Director.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

(Copy this table for each piece of data and parameter.)

Data / Parameter:	BO_{ww}
Unit:	kg CH ₄ /kg.COD
Description:	Methane generation capacity of the treated wastewater
Source of data:	IPCC default value
Value(s) applied:	For baseline scenario: 0.21 For project scenario: 0.25
Purpose of data:	Baseline emissions Project emissions
Additional comment:	

Data / Parameter:	GWP_CH₄
Unit:	tCO ₂ e/tCH ₄
Description:	Global Warming Potential for CH ₄
Source of data:	UNFCCC GHG Data
Value(s) applied:	21
Purpose of data:	Baseline emissions Project emissions
Additional comment:	

Data / Parameter:	MCF_{ww,untreated}
Unit:	-
Description:	Methane conversion factor for the anaerobic decay of the untreated wastewater
Source of data:	IPCC default value
Value(s) applied:	1

Purpose of data:	Baseline emissions Project emissions
Additional comment:	

Data / Parameter:	MCF_{ww,treated}
Unit:	-
Description:	Methane conversion factor for the anaerobic decay of the treated wastewater
Source of data:	IPCC default value
Value(s) applied):	0.5
Purpose of data:	Baseline emissions Project emissions
Additional comment:	

Data / Parameter:	CFE_{ww}
Unit:	-
Description:	Capture and flare efficiency of the methane recovery and combustion equipment in the wastewater treatment
Source of data:	AMS III.H
Value(s) applied):	0.9
Purpose of data:	Project emissions
Additional comment:	

Data / Parameter:	[CH₄]_{y,ww,treated}
Unit:	tonnes/m ³
Description:	Dissolved methane content in the treated wastewater
Source of data:	AMS III.H
Value(s) applied):	10e ⁻⁴
Purpose of data:	Project emissions
Additional comment:	

Data / Parameter:	EF
Unit:	tCO ₂ /Million KWh
Description:	Emission factor for the Northern Grid
Source of data:	CEA, NRLDC, NREB (refer Appendix A of registered PDD)
Value(s) applied):	896
Purpose of data:	Project emissions
Additional comment:	

D.2. Data and parameters monitored

(Copy this table for each piece of data and parameter.)

Data / Parameter:	Q_{ww}																																																																								
Unit:	M ³ /day																																																																								
Description:	Flow rate of waste straw wash																																																																								
Measured/ Calculated / Default:	Measured																																																																								
Source of data:	Plant log books																																																																								
Value(s) of monitored parameter:	2937466																																																																								
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Measuring/ Reading/ Recording frequency:	Measuring: Continuous Recording: Daily Reporting: Daily values have been reported in monitoring data spreadsheets																																																																								

Calculation method (if applicable):	NA
QA/QC procedures:	Flow rate measurement is essential for calculation of both baseline and project emissions. Flow meter complying with standards is used for monitoring. The volume of waste water treated is recorded on a daily basis and reported in the plant records/log books. The calibration of the flow meter used is done annually in order to ensure the highest levels of accuracy in the measurement.
Purpose of data:	Flow rate measurement is essential for calculation of both baseline and project emissions.
Additional comment:	

Data / Parameter:	COD_{ww,untreated}																																										
Unit:	mg/litre																																										
Description:	COD (intlet)																																										
Measured/ Calculated / Default:	Measured																																										
Source of data:	Plant log books																																										
Value(s) of monitored parameter:	<table border="1"> <thead> <tr> <th rowspan="2">Date</th><th colspan="2">Internal laboratory analysis</th><th colspan="2">External laboratory analysis</th></tr> <tr> <th>COD inlet (mg/ltr)</th><th>COD outlet (mg/ltr)</th><th>COD inlet (mg/ltr)</th><th>COD outlet (mg/ltr)</th></tr> </thead> <tbody> <tr> <td>14-Jun-11</td><td>3606</td><td>1137</td><td>3590</td><td>1150</td></tr> <tr> <td>2-Dec-11</td><td>3452</td><td>1361</td><td>3440</td><td>1330</td></tr> <tr> <td>22-May-12</td><td>3512</td><td>1050</td><td>3505</td><td>1044</td></tr> <tr> <td>15-Nov-12</td><td>4162</td><td>1644</td><td>4155</td><td>1640</td></tr> <tr> <td>14-May-13</td><td>3782</td><td>1274</td><td>3779</td><td>1268</td></tr> <tr> <td>7-Nov-13</td><td>3890</td><td>1255</td><td>3885</td><td>1252</td></tr> </tbody> </table>				Date	Internal laboratory analysis		External laboratory analysis		COD inlet (mg/ltr)	COD outlet (mg/ltr)	COD inlet (mg/ltr)	COD outlet (mg/ltr)	14-Jun-11	3606	1137	3590	1150	2-Dec-11	3452	1361	3440	1330	22-May-12	3512	1050	3505	1044	15-Nov-12	4162	1644	4155	1640	14-May-13	3782	1274	3779	1268	7-Nov-13	3890	1255	3885	1252
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Measuring/ Reading/ Recording frequency:	Measuring: Daily Recording: Daily Reporting: Daily values have been reported in monitoring data spreadsheets								
Calculation method (if applicable):	NA								
QA/QC procedures:	COD (Inlet) is a measure of methane generation potential of untreated waste water and is essential for calculating both baseline and project emissions. Analysis is done in laboratory for measurement on a daily basis at the plant location and reported in the plant records/log books. Standard procedure is used for measurement. The monitoring equipments and procedure used for measuring the parameter is tested half yearly by a third party in order to ensure the highest level of accuracy in the monitoring procedure.								
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Measured/ Calculated / Default:	Measured

Source of data:	Plant log books																																															
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Purpose of data:	COD (outlet) is a measure of methane generation potential of treated waste water from digester and is essential for calculating project emissions.																																															
Additional comment:																																																

Data / Parameter:	Electricity Consumption																																																									
Unit:	kWh																																																									
Description:	Electricity consumption by the project activity																																																									
Measured/ Calculated / Default:	Measured																																																									
Source of data:	Plant log books																																																									
Value(s) of monitored parameter:	1057860																																																									
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Calculation method (if applicable):	NA																																																									
QA/QC procedures:	Electricity consumption is measured by meters provided at plant and the same would be reported in the plant records/log books. The monitoring equipment used for measuring the parameter is calibrated annually in order to ensure the highest level of accuracy in the monitoring process.																																																									

Purpose of data:	Project emissions
Additional comment:	

Data / Parameter:	Temperature of Gas																													
Unit:	°C																													
Description:	Temperature of Gas																													
Measured/ Calculated / Default:	Measured																													
Source of data:	Plant log books																													
Value(s) of monitored parameter:	Refer the monthly spreadsheets for daily values																													
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Monitored Parameter	Monitoring Equipment/ Instrument	Manufacturer of Monitoring Equipment	Meter Serial No.	Model No.	Protection/ Accuracy Class	Date of Calibration/Testing																								
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						02/01/2011	31/12/2012	29/12/2013																						
Measuring/ Reading/ Recording frequency:	Measuring: Continuous Recording: Daily (Several values taken) Reporting: Daily (Daily average value has been applied from the several values recorded on daily basis)																													
Calculation method (if applicable):	NA																													
QA/QC procedures:	Temperature of gas is measured for calculating the weight of biogas produced. The Gas Flow Meter has a provision to measure the temperature and the same is reported in the plant records/log books. The Gas Flow Meter used to measure the temperature is calibrated annually to ensure the highest level of accuracy in the monitoring.																													
Purpose of data:	Baseline Emissions																													

Additional comment:	
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Data / Parameter:	Pressure of Gas																										
Unit:	Kg/cm ²																										
Description:	Pressure of Gas																										
Measured/ Calculated / Default:	Measured																										
Source of data:	Plant log books																										
Value(s) of monitored parameter:	Refer the monthly spreadsheets for daily values																										
Monitoring equipment:	<table> <tr> <th>Monitored Parameter</th><th>Monitoring Equipment/ Instrument</th><th>Manufacturer of Monitoring Equipment</th><th>Meter Serial No.</th><th>Model No.</th><th>Protection/ Accuracy Class</th><th colspan="3">Date of Calibration/Testing</th></tr> <tr> <td>Pressure of Gas</td><td>Flow meter</td><td>Manas Microsystems Pvt. Ltd.</td><td>01071078J</td><td>µCS 3001-NOT- 2WM</td><td>-</td><td>2011 02/01/2011</td><td>2012 31/12/2012</td><td>2013 29/12/2013</td></tr> </table>									Monitored Parameter	Monitoring Equipment/ Instrument	Manufacturer of Monitoring Equipment	Meter Serial No.	Model No.	Protection/ Accuracy Class	Date of Calibration/Testing			Pressure of Gas	Flow meter	Manas Microsystems Pvt. Ltd.	01071078J	µCS 3001-NOT- 2WM	-	2011 02/01/2011	2012 31/12/2012	2013 29/12/2013
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Measuring/ Reading/ Recording frequency:	Measuring: Continuous Recording: Daily (Several values taken) Reporting: Daily (Daily average value has been applied from the several values recorded on daily basis)																										
Calculation method (if applicable):	NA																										
QA/QC procedures:	Pressure of gas is measured for calculating the weight of biogas produced. The Gas Flow Meter has a provision to measure the pressure and the same is reported in the plant records/log books. The Gas Flow Meter used to measure the pressure is calibrated annually to ensure the highest level of accuracy in the monitoring.																										
Purpose of data:	Baseline Emissions																										
Additional comment:																											

Data / Parameter:	Volume of Biogas fuelled																										
Unit:	Nm ³ /day																										
Description:	Volume of Biogas fuelled																										
Measured/ Calculated / Default:	Measured																										
Source of data:	Plant Log books																										
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Measuring/ Reading/ Recording frequency:	Measuring: Continuous Recording: Daily Reporting: Daily values have been reported in monitoring data spreadsheets																										
Calculation method (if applicable):	NA																										
QA/QC procedures:	Volume of gas fuelled is measured for calculating the weight of biogas produced. The volume of the gas is monitored with the flow meter installed at the plant location and the same is reported in the plant records/log books. The flow meter is calibrated annually to ensure the highest level of accuracy in the monitoring.																										
Purpose of data:	Baseline Emissions																										
Additional comment:																											

Data / Parameter:	Volume of Biogas flared							
Unit:	Nm ³ /day							
Description:	Volume of Biogas flared							
Measured/ Calculated / Default:	Measured							
Source of data:	Plant Log books							
Value(s) of monitored parameter:	Refer the monthly spreadsheets for daily values							
Monitoring equipment:	Monitored Parameter	Monitoring Equipment/ Instrument	Manufacturer of Monitoring Equipment	Meter Serial No.	Model No.	Protection/ Accuracy Class	Date of Calibration/Testing	
	Volume of Biogas flared	Flow meter	Manas Microsystems Pvt. Ltd.	03090704 M	µCS 3001-NOT-2WM	-	2009 02/01/2011	2010 31/12/2012
							2011 29/12/2013i	
Measuring/ Reading/ Recording frequency:	Measuring: Continuous Recording: Daily Reporting: Daily values have been reported in monitoring data spreadsheets							
Calculation method (if applicable):	NA							
QA/QC procedures:	Volume of gas flared is measured for calculating volume of biogas generated. The volume of the gas is monitored with the flow meter installed at the plant location and the same is reported in the plant records/log books. The flow meter is calibrated annually to ensure the highest level of accuracy in the monitoring.							
Purpose of data:	Baseline Emissions							
Additional comment:								

Data / Parameter:	Fraction of methane in biogas fuelled/flared																																							
Unit:	%																																							
Description:	Fraction of methane in biogas fuelled/flared																																							
Measured/ Calculated / Default:	Measured																																							
Source of data:	Plant Log books																																							
Value(s) of monitored parameter:	Refer the monthly spreadsheets for daily values																																							
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						27/04/2011	25/04/2012	22/04/2013	14/01/2014																															
Measuring/ Reading/ Recording frequency:	Measuring: Shift wise (3 times a day) Recording: Shift wise (3 times a day) Reporting: Daily values have been reported in monitoring data spreadsheets																																							
Calculation method (if applicable):	Methane fraction in biogas fuelled/flared for the current monitoring period has been calculated using the statistical analysis on 95% confidence level. The value of methane fraction in biogas fuelled/flared for the current monitoring period is 64.2979 % and the same can be verified from the monitoring data spreadsheets provided to the DOE.																																							
QA/QC procedures:	Fraction of methane fuelled/flared is measured for calculating the weight of methane fuelled/flared. Methane fraction is measured with the gas chromatograph installed at the plant location and the same would be reported in the plant records/log books. There is provision to check fraction of methane at both fuelling and flaring stage as lines of both these points are connected to the gas chromatograph Meter. The gas chromatograph is calibrated annually to ensure the highest level of accuracy in the monitoring. Moreover, the statistical analysis on 95% confidence level has been carried out for the periodic monitoring of the methane fraction during this monitoring period.																																							
Purpose of data:	Baseline Emissions																																							
Additional comment:																																								

Data / Parameter:	Quantity of Biogas fuelled
Unit:	Tonnes
Description:	Quantity of Biogas fuelled
Measured/ Calculated / Default:	Calculated
Source of data:	Plant log books
Value(s) of monitored parameter:	Refer the monthly spreadsheets for daily values
Monitoring equipment:	Not applicable as the parameter is a calculated parameter.
Measuring/ Reading/ Recording frequency:	Measuring: Not Applicable (Calculated parameter) Recording: Not Applicable (Calculated parameter) Reporting: Daily values have been reported in monitoring data spreadsheets
Calculation method (if applicable):	Quantity of biogas fuelled is computed from its volume and density.
QA/QC procedures:	Quantity of biogas fuelled is computed from its volume and density (which is calculated from its temperature and pressure conditions) and the same is reported in the plant records/log books.
Purpose of data:	Baseline Emissions
Additional comment:	

Data / Parameter:	Methane quantity fuelled
Unit:	Tonnes
Description:	Methane quantity fuelled
Measured/ Calculated / Default:	Calculated
Source of data:	Plant log books
Value(s) of monitored parameter:	Refer the monthly spreadsheets for daily values
Monitoring equipment:	Not applicable as the parameter is a calculated parameter.
Measuring/ Reading/ Recording frequency:	Measuring: Not Applicable (Calculated parameter) Recording: Not Applicable (Calculated parameter) Reporting: Daily values have been reported in monitoring data spreadsheets
Calculation method (if applicable):	Methane quantity is computed from the fraction of methane present in Biogas.
QA/QC procedures:	Methane fraction is measured in laboratory with the gas chromatograph installed at the plant location and the same reported in the plant records/log books. There is provision to check fraction of methane at both fuelling and flaring stage as lines of both these points are connected to the gas chromatograph Meter. The gas chromatograph is calibrated annually to ensure the highest level of accuracy in the monitoring. Moreover, the statistical analysis on 95% confidence level has been carried out for the periodic monitoring of the methane fraction.
Purpose of data:	Baseline emissions
Additional comment:	

D.3. Implementation of sampling plan

>> NA

SECTION E. Calculation of emission reductions or GHG removals by sinks**E.1. Calculation of baseline emissions or baseline net GHG removals by sinks**

>>

As per the approved revised monitoring plan, Ex post emission reductions shall be based on the lowest value of the following two approaches:

i) The amount of biogas fuelled or flared in the project activity during the crediting period that is monitored ex post.

ii) Ex post calculated baseline, project and leakage emissions based on actual monitored data (monitoring of the parameters like volume of waste water flow, COD inlet and COD outlet to the system, along with other ex-ante fixed parameters) for the project activity.

Baseline Emissions (Approach i)

$$BE_y = BE_{y,\text{methane fuelled}}$$

Where:

BE_y : baseline emissions in the year “y” (tonnes of CO₂ equivalent)

$$BE_{y,\text{methane,fuelled}} = \text{Methane quantity fuelled} * \text{GWP methane}$$

For Year 2011-12:

$$BE_{y,\text{methane,fuelled}} = 357.73 \times 21 = 7512 \text{ tonnes}$$

For Year 2012-13:

$$BE_{y,\text{methane,fuelled}} = 401.89 \times 21 = 8440 \text{ tonnes}$$

For Year 2013-14:

$$BE_{y,\text{methane,fuelled}} = 414.11 \times 21 = 8696 \text{ tonnes}$$

Total baseline emissions (as per approach i)

$$= 7502 + 8448 + 8696 \text{ tonnes} = 24648 \text{ tonnes}$$

Baseline Emissions (Approach ii)

Baseline emissions for the project activity include methane generation emission potential of untreated wastewater and or sludge.

$$BE_y = ME_{y,\text{ww,untreated}} + ME_{y,\text{s,untreated}}$$

Where:

BE_y = Baseline emissions in year 'y'

$ME_{y,ww,untreated}$: Methane generation potential of untreated wastewater 'y'

$ME_{y,s,untreated}$: Methane generation potential of untreated sludge 'y'

$$ME_{y,ww,untreated} = \sum (Q_{y,ww} * COD_{y,ww,untreated}) * Bo_{ww} * MCF_{ww,untreated} * GWP_{CH_4}$$

Where:

$COD_{y,ww,untreated}$: Chemical oxygen demand of the wastewater entering the anaerobic treatment reactor/system with methane capture in the year "y" (tonnes/m3)

$MCF_{ww,untreated}$: methane conversion factor for the anaerobic decay of the untreated wastewater.

For Year 2011-12:

$$ME_{y,ww,untreated} = 3215 \times 0.21 \times 1 \times 21 = 14179 \text{ tonnes}$$

For Year 2012-13:

$$ME_{y,ww,untreated} = 3661 \times 0.21 \times 1 \times 21 = 16147 \text{ tonnes}$$

For Year 2013-14:

$$ME_{y,ww,untreated} = 3819 \times 0.21 \times 1 \times 21 = 16841 \text{ tonnes}$$

$$ME_{y,s,untreated} = S_{y,untreated} * DOC_{y,s,untreated} * DOCF * F * 16/12$$

Where:

$S_{y,untreated}$: amount of untreated sludge generated in the year "y" (tonnes)

$DOC_{y,s,untreated}$: Degradable organic content of the untreated sludge generated in the year y (mass fraction).

For Year 2011-2012:

$$ME_{y,s,untreated}=0$$

For Year 2012-2013:

$$ME_{y,s,untreated}=0$$

For Year 2013-2014:

$$ME_{y,s,untreated}=0$$

Total baseline emissions (as per approach ii)

$$= 14179 + 16147 + 16841 \text{ tonnes} = 47167 \text{ tonnes}$$

E.2. Calculation of project emissions or actual net GHG removals by sinks

>>

As per the approved revised monitoring plan, Ex post emission reductions shall be based on the lowest value of the following two approaches:

- i) The amount of biogas fuelled or flared in the project activity during the crediting period that is monitored ex post.
- ii) Ex post calculated baseline, project and leakage emissions based on actual monitored data (monitoring of the parameters like volume of waste water flow, COD inlet and COD outlet to the system, along with other ex-ante fixed parameters) for the project activity.

Project Emissions (Approach i)

$$PE_y = PE_{y,power}$$

Where:

PE_y : project activity emissions in the year “y” (tonnes of CO₂ equivalent)

$$PE_{y,power} = EF * EC$$

Where:

EF = Emission factor for the Northern Grid measured in tCO₂/Million KWh

EC = Electricity consumed in KWh/annum.

For Year 2011-2012:

$$PE_{y,power} = (896 \times 318600) / 10^6 = 285 \text{ tonnes}$$

For Year 2012-2013:

$$PE_{y,power} = (896 \times 357440) / 10^6 = 320 \text{ tonnes}$$

For Year 2013-2014

$$PE_{y,power} = (896 \times 381820) / 10^6 = 342 \text{ tonnes}$$

Total project emissions (as per approach i) = 285 + 320 + 342 tonnes = 948 tonnes

Project Emissions (Approach ii)

$$PE_y = PE_{y,power} + PE_{y,ww,treated} + PE_{y,s,final} + PE_{y,fugitive} + PE_{y,dissolved}$$

Where:

PE_y : project activity emissions in the year “y” (tonnes of CO₂ equivalent)

$PE_{y,power}$: emissions through electricity or diesel consumption in the year “y”

$PE_{y,ww,treated}$: emissions through degradable organic carbon in treated wastewater in year "y"
 $PE_{y,s,final}$: emissions through anaerobic decay of the final sludge produced in the year "y".
 $PE_{y,fugitive}$: emissions through methane release in capture and flare systems in year "y".
 $PE_{y,dissolved}$: emissions through dissolved methane in treated wastewater in year "y"

$$PE_{y,power} = EF * EC$$

Where:

EF = Emission factor for the Northern Grid measured in tCO₂/Million KWh

EC = Electricity consumed in KWh/annum.

For Year 2011-12:

$$PE_{y,power} = (896 \times 318600) / 10^6 = 285 \text{ tonnes}$$

For Year 2012-13:

$$PE_{y,power} = (896 \times 357440) / 10^6 = 320 \text{ tonnes}$$

For Year 2013-2014

$$PE_{y,power} = (896 \times 381820) / 10^6 = 342 \text{ tonnes}$$

$$\text{Total project emissions } PE_{y, power} = 285 + 320 + 342 \text{ tonnes} = 948 \text{ tonnes}$$

$$PE_{y,ww,treated} = \sum (Q_{y,ww} * COD_{y,ww,treated}) * Bo_{ww} * MCF_{ww} * GWP_{CH_4}$$

Where:

$Q_{y,ww}$: volume of wastewater treated in the crediting period (m³)

$COD_{y,ww,treated}$: chemical oxygen demand of the treated wastewater in the year "y" (tonnes/m³)

Bo_{ww} : methane generation capacity of the treated wastewater

$MCF_{ww,treated}$: methane conversion factor for the anaerobic decay of wastewater.

GWP_{CH_4} Global Warming Potential for CH₄ (value of 21 is used)

For Year 2011-12:

$$PE_{y,ww,treated} = 1218 \times 0.25 \times 0.5 \times 21 = 3198 \text{ tonnes}$$

For Year 2012-13:

$$PE_{y,ww,treated} = 1344 \times 0.25 \times 0.5 \times 21 = 3528 \text{ tonnes}$$

For Year 2013-14:

$$PE_{y,s,final} = PE_{y,ww,treated} = 1418 \times 0.25 \times 0.5 \times 21 = 3722 \text{ tonnes}$$

Where:

$PE_{y,s,final}$: Methane emissions from the anaerobic decay of the final sludge generated in the wastewater system in the year “y” (tonnes of CO₂ equivalent)

$S_{y,final}$: Amount of final sludge generated by the wastewater treatment in the year y (tonnes).

$DOC_{y,s,final}$: Degradable organic content of the final sludge generated by the wastewater treatment in the year y (mass fraction).

DOCF: Fraction of DOC dissimilated to biogas (IPCC default value is 0.77).

F: Fraction of CH₄ in landfill gas (IPCC default is 0.5).

For Year 2011-12:

$$PE_{y,s,final} = 0 \text{ tonnes}$$

For Year 2012-13:

$$PE_{y,s,final} = 0 \text{ tonnes}$$

For Year 2013-14:

$$PE_{y,s,final} = 0 \text{ tonnes}$$

$$PE_{y,fugitive} = PE_{y,fugitive,ww} + PE_{y,fugitive,s}$$

Where:

$PE_{y,fugitive,ww}$: Fugitive emissions through capture and flare inefficiencies in the anaerobic wastewater treatment in the year “y” (tonnes of CO₂ equivalent)

$PE_{y,fugitive,s}$: Fugitive emissions through capture and flare inefficiencies in the anaerobic sludge treatment in the year “y” (tonnes of CO₂ equivalent)

$$PE_{y,fugitive,ww} = (1 - CFE_{ww}) * ME_{y,ww,untreated} * GWP_{CH4}$$

Where:

CFE_{ww} : capture and flare efficiency of the methane recovery and combustion equipment in the wastewater treatment

$ME_{y,ww,untreated}$: methane emission potential of the untreated wastewater in the year “y” (tonnes)

$$ME_{y,ww,untreated} = \sum (Q_{y,ww} * COD_{y,ww,untreated}) * Bo_{ww} * MCF_{ww,untreated}$$

Where:

$COD_{y,ww,untreated}$ Chemical oxygen demand of the wastewater entering the anaerobic treatment reactor/system with methane capture in the year “y” (tonnes/m³)

$MCF_{\text{ww, untreated}}$ methane conversion factor for the anaerobic decay of the untreated wastewater.

For Year 2011-12:

$$ME_{y, \text{ww, untreated}} = 3215 \times 0.25 \times 1 = 804 \text{ tonnes}$$

$$PE_{y, \text{fugitiveww}} = (1-0.9) \times 804 \times 21 = 1688 \text{ tonnes}$$

For Year 2012-13:

$$ME_{y, \text{ww, untreated}} = 3661 \times 0.25 \times 1 = 915 \text{ tonnes}$$

$$PE_{y, \text{fugitive,ww}} = (1-0.9) \times 915 \times 21 = 1922 \text{ tonnes}$$

For Year 2013-14:

$$ME_{y, \text{ww, untreated}} = 3819 \times 0.25 \times 1 = 955 \text{ tonnes}$$

$$PE_{y, \text{fugitive,ww}} = (1-0.9) \times 955 \times 21 = 2005 \text{ tonnes}$$

For Year 2011-12:

$$PE_{y, \text{dissolved}} = 912727 \times 10e^{-4} \times 21 = 1917 \text{ tonnes}$$

For Year 2012-13:

$$PE_{y, \text{dissolved}} = 1002984 \times 10e^{-4} \times 21 = 2106 \text{ tonnes}$$

For Year 2013-14:

$$PE_{y, \text{dissolved}} = 1021755 \times 10e^{-4} \times 21 = 2146 \text{ tonnes}$$

For Year 2011-12:

Project activity emissions = **7088 tonnes of CO₂e equivalent per annum**

For Year 2012-13:

Project activity emissions = **7877 tonnes of CO₂e equivalent per annum**

For Year 2013-14:

Project activity emissions = **8214 tonnes of CO₂e equivalent per annum**

Total project emissions (as per approach ii) = 7142 + 7877+8214 tonnes = 23180 tonnes

E.3. Calculation of leakage

>>

As per the registered PDD, there is no transfer of equipments involved in the SIL project activity, hence, leakages were not considered.

E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO ₂ e)	Project emissions or actual net GHG removals by sinks (t CO ₂ e)	Leakage (t CO ₂ e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO ₂ e)
Total	24648	948	0	23700

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO ₂ e)	12578 x 3 = 37734 tCO ₂	23,700 tCO ₂

E.6. Remarks on difference from estimated value in registered PDD

>>

The actual emission reductions being claimed in the monitoring period are 23,700 tCO₂ whereas, the estimated emission reductions as shown above are 37,734 tCO₂ for the present monitoring period. Hence, there is no increase in the emission reductions for the project activity.

E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards
Emission reductions or GHG removals by sinks (t CO ₂ e)	13,310	10,390

- - - - -

Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	<input checked="" type="checkbox"/> Project participant <input type="checkbox"/> Responsible person/ entity for completing the CDM-MR-FORM
Organization name	Shreyans Industries Limited (SIL)
Street/P.O. Box	Unit: Shreyans Papers
Building	----
City	Ahmedgarh, District Sangrur
State/Region	Punjab
Postcode	148021
Country	India
Telephone	91-1675-240347, 240348, 240349
Fax	----
E-mail	spm@shreyansgroup.com
Website	http://www.shreyansgroup.com/
Contact person	----
Title	Executive Director & CEO
Salutation	Mr.
Last name	----
Middle name	Kumar
First name	Anil
Department	----
Mobile	+91-9872910658
Direct fax	91-1675-240512
Direct tel.	91-1675-240347
Personal e-mail	spm@shreyansgroup.com