MONITORING REPORT FORM (CDM-MR) *
Version 01 - in effect as of: 28/09/2010

CONTENTS

MONITORING REPORT
Version number 01 Date 04/01/2012

Methane recovery from waste water generated from wheat straw wash at Paper manufacturing unit of Shreyans Industries Limited (SIL)
UNFCCC Reference No. 0935
Second Monitoring Report (02/04/2009 – 01/04/2011)

SECTION A. General description of the project activity

A.1. Brief description of the project activity: >>

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The project proponent, Shreyans Industries Limited (SIL), successfully commissioned the project activity "Methane recovery from waste water generated from wheat straw wash at Paper manufacturing unit of Shreyans Industries Limited (SIL)" on 1st September 2006.

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 1st September 2006, and utilizing the same for generating steam in boilers at the above-mentioned paper manufacturing unit of SIL.

This is the second monitoring report associated with SIL project activity. The period covered in this monitoring report is from 02/04/2009 to 01/04/2011 (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 11,580 CERs.

The first monitoring report covered the period from 02/04/2007 to 01/04/2009 (Both days included) and was issued 16,360 CERs.

A.2. Project Participants

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Shreyans Industries Limited (SIL)

A.3. Location of the 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

The geographic location of the plant is depicted in the following map:

A.4. Technical description of the project

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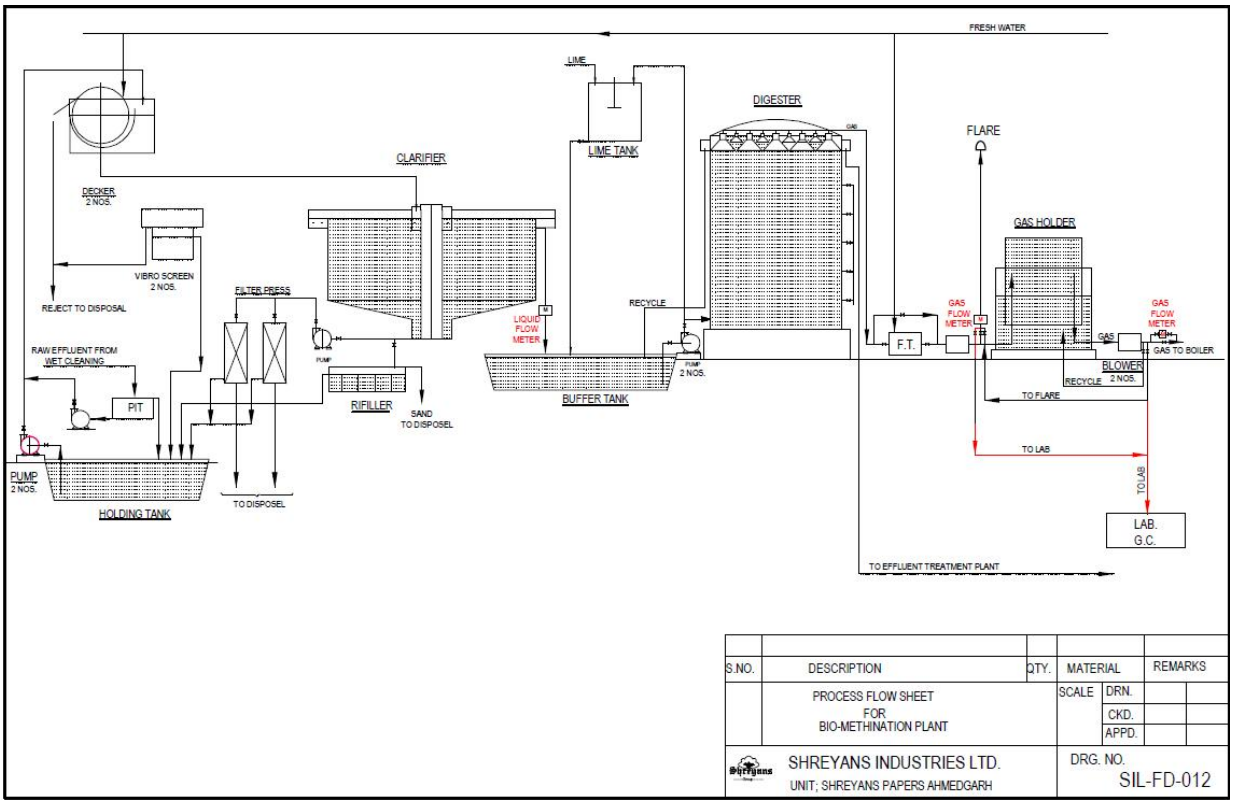
The project activity is the installation of a high rate Upflow anaerobic sludge blanket (UASB) digester which captures methane and burns it for generating steam in boilers in SIL's paper manufacturing unit at Ahmedgarh, Punjab. Paper manufacturing being a water intensive process produces large quantity of waste water with high percentage of chemical oxygen demand (COD).

Introduction of UASB digester in project activity would capture methane thereby mitigating emissions of GHG. The stench which emanates from open lagoon due to anaerobic decomposition of carbonaceous material would get reduced after UASB digesters will be commissioned.

The project activity would supply biogas produced to boilers for generating heat and electricity thereby reducing rice husk requirement in the manufacturing unit which is presently being used as fuel in boilers. Reduction in rice husk quantity to be procured would reduce operational cost of the boilers and prove economical for manufacturing facility.

The wheat straw wash wastewater from wet cleaning plant will be sent through a clarifier to remove the inert materials, the clarified effluent shall than enter buffer tank (BT) to maintain pH of the digester, temperature control and constant feed to the digester. The digester which is a large Reinforced Cement Concrete (RCC) tank is provided with a Gas, sludge and effluent separator. The effluent distribution network is placed at the bottom of the digester for ensuring proper intermingling of the influent with sludge. Methane generated would be separated by gas separator and stored in gas holders via foam trap.

The following line diagram shows all the relevant monitoring points within the project activity:



A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

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Title: "Monitoring Methodology for Methane Recovery from Waste Water" Type. III.H.
Reference: 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.6. Registration date of the project activity:

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02/04/2007

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

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A fixed crediting period of 10 years has been chosen and the start date of crediting period is from 02/04/2007 to 01/04/2017.

A.8. Name of responsible person(s)/entity(ies):

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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 the project activity

B.1. Implementation status of the project activity

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The project proponent, Shreyans Industries Limited (SIL), successfully commissioned the project activity "Methane recovery from waste water generated from wheat straw wash at Paper manufacturing unit of Shreyans Industries Limited (SIL)" on 1st September 2006. The plant is running successfully thereafter.

B.2. Revision of the monitoring plan

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The project activity applied for the revision in the monitoring plan[1] which got duly approved on 04 March 2011.

B.3. Request for deviation applied to this monitoring period

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No request for deviation was applied for the current monitoring period.

B.4. Notification or request of approval of changes

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Not Applicable.

[1] Source:

http://cdm.unfccc.int/filestorage/Z/W/G/ZWGB4RQ6KOCPHT0S3MUEYJAFN5LI29/Revised%20Monitoring%20Plan.pdf?t=eXR8MTMwNTExMzk5MC45Mw==|RT-TiYcoI_2_i_k8Vyo5NZz2dqo=

SECTION C. Description of the monitoring system

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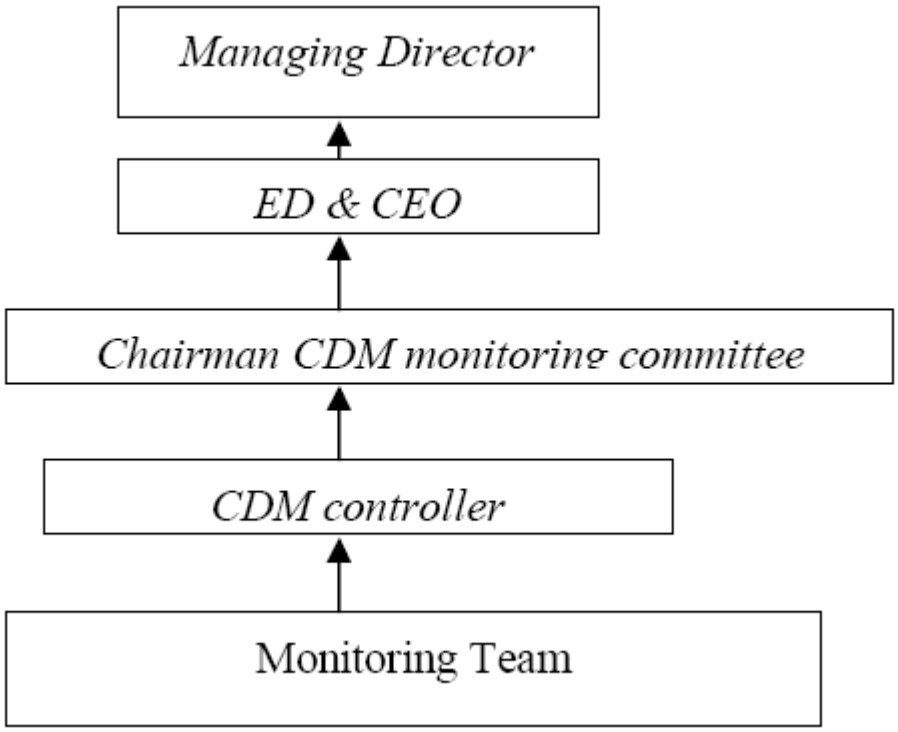
SIL has planned an operation and management structure for the project activity with roles and responsibilities of individuals defined. The management is responsible for monitoring and reporting of the parameters involved. All parameters are being monitored and reported in a transparent manner so that 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. Management structure for monitoring and reporting is presented in following block diagram:



SECTION D. Data and parameters

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors	
Data / Parameter:	**BO,ww**
Data unit:	kg CH4/kg.COD
Description:	Methane generation capacity of the treated wastewater
Source of data used:	IPCC default value
Value(s) :	For baseline scenario: 0.21 For project scenario: 0.25
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions Project emissions
Additional comment:	

Data / Parameter:	**GWP_CH4**
Data unit:	$tCO2e/tCH_4$
Description:	Global Warming Potential for CH4
Source of data used:	UNFCCC GHG Data
Value(s) :	21
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions Project emissions
Additional comment:	

Data / Parameter:	**$MCF_{ww,untreated}$**
Data unit:	-
Description:	Methane conversion factor for the anaerobic decay of the untreated wastewater
Source of data used:	IPCC default value
Value(s) :	1
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions Project emissions
Additional comment:	

Data / Parameter:	**$MCF_{ww.treated}$**
Data unit:	-
Description:	Methane conversion factor for the anaerobic decay of wastewater
Source of data used:	IPCC default value
Value(s) :	0.5
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emissions
Additional comment:	

Data / Parameter:	**CFEww**
Data unit:	-
Description:	Capture and flare efficiency of the methane recovery and combustion equipment in the wastewater treatment
Source of data used:	AMS III.H
Value(s) :	0.9
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emissions
Additional comment:	

Data / Parameter:	**$[CH4]_{y,ww,treated}$**
Data unit:	tonnes/m3
Description:	Dissolved methane content in the treated wastewater
Source of data used:	AMS III.H
Value(s) :	10e-4
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emissions
Additional comment:	

Data / Parameter:	**EF**
Data unit:	tCO2/Million KWh
Description:	Emission factor for the Northern Grid
Source of data used:	CEA, NRLDC, NREB (refer Appendix A of registered PDD)
Value(s) :	896
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emissions
Additional comment:	

D.2. Data and parameters monitored

Data / Parameter:	Q ,ww
Data unit:	M3/day
Description:	Flow rate of waste straw wash
Measured /Calculated /Default:	Measured
Source of data:	Plant log books
Value(s) of monitored parameter:	1602460
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Flow rate measurement is essential for calculation of both baseline and project emissions.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	

Monitored Parameter	**Monitoring Equipment/ Instrument**	**Manufacturer of Monitoring Equipment**	**Meter Serial No.**	**Model No.**	**Protection/ Accuracy Class**	**Date of Calibration/Testing**			**Date of Installation**
						2009	**2010**	**2011**	
Flow rate of waste water wash	Flow meter	Forbes Marshall	060765	IFS 4000	IP67	02-March-09			-
	Flow meter	Krohne Marshall	I091474	IFS 4000	IP67	28 – Apr – 09			26 – Feb – 10
	Flow meter	Forbes Marshall	060765	IFS 4000	IP67	01 – March – 10			26 – Feb – 11

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 applied:	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.

<table>
<tr><td>Data / Parameter:</td><td>$COD_{ww, untreated}$</td></tr>
<tr><td>Data unit:</td><td>mg/litre</td></tr>
<tr><td>Description:</td><td>COD (intlet)</td></tr>
<tr><td>Measured /Calculated /Default:</td><td>Measured</td></tr>
<tr><td>Source of data:</td><td>Plant log books</td></tr>
<tr><td>Value(s) of monitored parameter:</td><td>
<table>
<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>
<tr><td>14 November, 2008</td><td>3444</td><td>1025</td><td>3456</td><td>1088</td></tr>
<tr><td>05 May, 2009</td><td>3224</td><td>1446</td><td>3160</td><td>1392</td></tr>
<tr><td>08 November, 2009</td><td>3480</td><td>1100</td><td>3450</td><td>1085</td></tr>
<tr><td>25 June, 2010</td><td>2759</td><td>861</td><td>2717</td><td>813</td></tr>
<tr><td>22 December, 2010</td><td>3672</td><td>1280</td><td>3576</td><td>1265</td></tr>
<tr><td>14 June, 2011</td><td>3606</td><td>1137</td><td>3590</td><td>1150</td></tr>
</table>
</td></tr>
<tr><td>Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)</td><td>COD (Inlet) is a measure of methane generation potential of untreated waste water and is essential for calculating both baseline and project emissions.</td></tr>
<tr><td>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</td><td>
<table>
<tr><th rowspan="2">Monitored Parameter</th><th rowspan="2">Monitoring Equipment/ Instrument</th><th rowspan="2">Manufacturer of Monitoring Equipment</th><th rowspan="2">Meter Serial No.</th><th rowspan="2">Model No.</th><th rowspan="2">Protection/ Accuracy Class</th><th colspan="3">Date of Calibration/Testing</th></tr>
<tr><th>2009</th><th>2010</th><th>2011</th></tr>
<tr><td>COD (inlet)</td><td>Laboratory Analysis (conducted by Central Pulp & Paper Research Institute – CPPRI)</td><td>Not Applicable</td><td>Not Applicable</td><td>Not Applicable</td><td>Not Applicable</td><td>05 – May – 2009

08 – Nov – 2009</td><td>25 – Jun – 2010

22 – Dec – 2010</td><td>14 – Jun – 2011</td></tr>
</table>
</td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Measuring: Daily
Recording: Daily
Reporting: Daily values have been reported in monitoring data spreadsheets</td></tr>
</table>

Calculation method (if applicable):	NA
QA/QC procedures applied:	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.

Data / Parameter:	$COD_{ww,treated}$
Data unit:	mg/litre
Description:	COD (outlet)
Measured /Calculated /Default:	Measured
Source of data:	Plant log books
Value(s) of monitored parameter:	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	COD (outlet) is a measure of methane generation potential of treated waste water from digester and is essential for calculating project emissions.

Date	**Internal laboratory analysis**		**External laboratory analysis**	
	COD inlet (mg/ltr)	**COD outlet (mg/ltr)**	**COD inlet (mg/ltr)**	**COD outlet (mg/ltr)**
14 November, 2008	3444	1025	3456	1088
05 May, 2009	3224	1446	3160	1392
08 November, 2009	3480	1100	3450	1085
25 June, 2010	2759	861	2717	813
22 December, 2010	3672	1280	3576	1265
14 June, 2011	3606	1137	3590	1150

<table>
<tr><td>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</td><td>
<table>
<tr><th rowspan="2">Monitored Parameter</th><th rowspan="2">Monitoring Equipment/ Instrument</th><th rowspan="2">Manufacturer of Monitoring Equipment</th><th rowspan="2">Meter Serial No.</th><th rowspan="2">Model No.</th><th rowspan="2">Protection/ Accuracy Class</th><th colspan="3">Date of Calibration/Testing</th></tr>
<tr><th>2009</th><th>2010</th><th>2011</th></tr>
<tr><td>COD (outlet)</td><td>Laboratory Analysis (conducted by Central Pulp & Paper Research Institute – CPPRI)</td><td>Not Applicable</td><td>Not Applicable</td><td>Not Applicable</td><td>Not Applicable</td><td>05 – May – 2009

08 – Nov – 2009</td><td>25 – Jun – 2010

22 – Dec – 2010</td><td>14 – Jun – 2011</td></tr>
</table>
</td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Measuring: Daily
Recording: Daily
Reporting: Daily values have been reported in monitoring data spreadsheets</td></tr>
<tr><td>Calculation method (if applicable):</td><td>NA</td></tr>
<tr><td>QA/QC procedures applied:</td><td>COD (outlet) is a measure of methane generation potential of treated waste water from digester and is essential for calculating 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 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.</td></tr>
</table>

Data / Parameter:	Electricity Consumption
Data unit:	kWh
Description:	Electricity consumption by the project activity
Measured /Calculated /Default:	Measured
Source of data:	Plant log books
Value(s) of monitored parameter:	512580
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emissions

<table>
<tr><td>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</td><td>
<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><th>Date of Installation</th></tr>
<tr><th></th><th></th><th></th><th></th><th></th><th></th><th>2009</th><th>2010</th><th>2011</th><th></th></tr>
<tr><td rowspan="3">Electricity Consumption</td><td>Energy Meter</td><td>L&T</td><td>08813568</td><td>ACRUX</td><td>Class 1</td><td>21-Apr–08</td><td></td><td></td><td>15 – Nov – 2008</td></tr>
<tr><td>Energy Meter</td><td>L&T</td><td>06894046</td><td>ACRUX</td><td>Class 1</td><td>07 – Nov – 2009</td><td></td><td></td><td>16 – Nov – 2009</td></tr>
<tr><td>Energy Meter</td><td>HPL-SOCOMEC Pvt. Ltd.</td><td>IK028575</td><td>CT-2E</td><td>Class 1</td><td>07 – Nov – 2009</td><td></td><td></td><td>10 – Apr – 2010</td></tr>
</table>
</td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Measuring: Continuous
Recording: Daily
Reporting: Daily values have been reported in monitoring data spreadsheets</td></tr>
<tr><td>Calculation method (if applicable):</td><td>NA</td></tr>
<tr><td>QA/QC procedures applied:</td><td>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.</td></tr>
</table>

Data / Parameter:	Temperature of Gas
Data unit:	^{0}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
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions

<table>
<tr><td>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</td><td>
<table>
<tr><th rowspan="2">Monitored Parameter</th><th rowspan="2">Monitoring Equipment/ Instrument</th><th rowspan="2">Manufacturer of Monitoring Equipment</th><th rowspan="2">Meter Serial No.</th><th rowspan="2">Model No.</th><th rowspan="2">Protection/ Accuracy Class</th><th colspan="3">Date of Calibration/Testing</th></tr>
<tr><th>2009</th><th>2010</th><th>2011</th></tr>
<tr><td>Temperature 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>07 – Jan – 2009</td><td>05 – Jan – 2010</td><td>02 – Jan – 2011</td></tr>
</table>
</td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Measuring: Continuous
Recording: Daily (Several values taken)
Reporting: Daily (Daily average value has been applied from the several values recorded on daily basis)</td></tr>
<tr><td>Calculation method (if applicable):</td><td>NA</td></tr>
<tr><td>QA/QC procedures applied:</td><td>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.</td></tr>
</table>

<table>
<tr><td>Data / Parameter:</td><td>Pressure of Gas</td></tr>
<tr><td>Data unit:</td><td>Kg/cm^2</td></tr>
<tr><td>Description:</td><td>Pressure of Gas</td></tr>
<tr><td>Measured /Calculated /Default:</td><td>Measured</td></tr>
<tr><td>Source of data:</td><td>Plant log books</td></tr>
<tr><td>Value(s) of monitored parameter:</td><td>Refer the monthly spreadsheets for daily values</td></tr>
<tr><td>Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)</td><td>Baseline emissions</td></tr>
<tr><td>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</td><td>
<table>
<tr><th rowspan="2">Monitored Parameter</th><th rowspan="2">Monitoring Equipment/ Instrument</th><th rowspan="2">Manufacturer of Monitoring Equipment</th><th rowspan="2">Meter Serial No.</th><th rowspan="2">Model No.</th><th rowspan="2">Protection/ Accuracy Class</th><th colspan="3">Date of Calibration/Testing</th></tr>
<tr><th>2009</th><th>2010</th><th>2011</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>07 – Jan – 2009</td><td>05 – Jan – 2010</td><td>02 – Jan – 2011</td></tr>
</table>
</td></tr>
</table>

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 applied:	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.

Data / Parameter:	Volume of Biogas fuelled
Data unit:	Nm^3/day
Description:	Volume of Biogas fuelled
Measured /Calculated /Default:	Measured
Source of data:	Plant log books
Value(s) of monitored parameter:	Refer the monthly spreadsheets for daily values
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	See table below
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 applied:	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.

Monitored Parameter	**Monitoring Equipment/ Instrument**	**Manufacturer of Monitoring Equipment**	**Meter Serial No.**	**Model No.**	**Protection/ Accuracy Class**	**Date of Calibration/Testing**		
						2009	**2010**	**2011**
Volume of Biogas fuelled	Flow meter	Manas Microsystems Pvt. Ltd.	01071078J	µCS 3001-NOT-2WM	-	07 – Jan – 2009	05 – Jan – 2010	02 – Jan – 2011

Data / Parameter:	Quantity of Biogas fuelled

Data 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
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	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 applied:	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.

Data / Parameter:	Methane quantity fuelled
Data 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
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable as the parameter is a calculated parameter.
Measuring/ Reading/ Recording	Measuring: Not Applicable (Calculated parameter)

frequency:	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 applied:	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.

Data / Parameter:	Volume of Biogas flared
Data 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
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	

Monitored Parameter	**Monitoring Equipment/ Instrument**	**Manufacturer of Monitoring Equipment**	**Meter Serial No.**	**Model No.**	**Protection/ Accuracy Class**	**Date of Calibration/Testing**		
						2009	**2010**	**2011**
Volume of Biogas flared	Flow meter	Manas Microsystems Pvt. Ltd.	03090704 M	µCS 3001-NOT-2WM	-	09 – Apr – 2008 03 – Apr – 2009	06 – Jan – 2010	02 – Jan – 2011

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 applied:	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.

Data / Parameter:	Fraction of methane in biogas fuelled/flared
Data 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
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	

Monitored Parameter	**Monitoring Equipment/ Instrument**	**Manufacturer of Monitoring Equipment**	**Meter Serial No.**	**Model No.**	**Protection/ Accuracy Class**	**Date of Calibration/Testing**		
						2009	**2010**	**2011**
Methane Fraction	GLC	Netel Make	06/030	OMEGA QC+	-	11 – Nov – 2008 09 – Nov – 2009	28 – Sep – 2010	

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 65.96 % and the same can be verified from the monitoring data spreadsheets provided to the DOE.
QA/QC procedures applied:	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.

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

>>

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)

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

Where:
BE_y: baseline emissions in the year "y" (tonnes of CO_2 equivalent)

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

For Year 2009-10:

$\mathbf{BE_{y,\ methane\ fuelled}}$ **= 290.11 X 21 = 6092 tonnes**

For Year 2010-11:

$\mathbf{BE_{y,\ methane\ fuelled}}$ **= 316.28 X 21 = 6642 tonnes**

Total baseline emissions (as per approach i) **= 6092 + 6642 tonnes**
= 12734 tonnes

Baseline Emissions (Approach ii)

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

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

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'

$$\mathbf{ME_{y,ww,untreated} = \sum(Q_{y,ww} * COD_{y,ww,untreated}) * Bo_{,ww} * MCF_{ww,untreated} * GWP\_CH_4}$$

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/m^3)
$MCF_{ww,untreated}$: methane conversion factor for the anaerobic decay of the untreated wastewater.

For Year 2009-10:

$ME_{y,ww,untreated}$ = 2396 X 0.21 X 1 X 21 = 10565 tonnes

For Year 2010-11:

$ME_{y,ww,untreated}$ = 2752 X 0.21 X 1 X 21 = 12134 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 2009-10:

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

For Year 2010-11:

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

Total baseline emissions (as per approach ii) **= 10565 + 12134 tonnes**
= 22699 tonnes

E.2. Project emissions calculation

>>
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 CO_2 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 2009-10:

$PE_{y,power}$ = (896 X 247220)/10^6= 222 tonnes

For Year 2010-11:

$PE_{y,\ power}$ = (896 X 265360)/10^6= 238 tonnes

Total project emissions (as per approach i) **= 222 + 238 tonnes**
= 459 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 CO_2 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 2009-10:

$PE_{y,\ power}$ = (896 X 247220)/10^6= 222 tonnes

For Year 2010-11:

$PE_{y,\ power}$ = (896 X 265360)/10^6= 238 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 (m^3)
$COD_{y,ww,treated}$: chemical oxygen demand of the treated wastewater in the year "y" (tonnes/m^3)
$Bo_{,ww}$: methane generation capacity of the treated wastewater
$MCF_{ww,treated}$: methane conversion actor for the anaerobic decay of wastewater.
GWP_CH_4 Global Warming Potential for CH_4 (value of 21 is used)

For Year 2009-10:

$PE_{y,ww,treated}$ = 762 X 0.25 X 0.5 X 21 = 2000 tonnes

For Year 2010-11:

$PE_{y,ww,treated}$ = 987 X 0.25 X 0.5 X 21 = 2592 tonnes

$PE_{y,s,final} = S_{y,final} * DOC_{y,s,final} * DOCF * F * 16/12 * GWP\_CH_4$
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 CO_2 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 CH_4 in landfill gas (IPCC default is 0.5).

For Year 2009-10:

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

For Year 2010-11:

$PE_{y,s,final}$ = 0 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 CO_2 equivalent)
$PE_{y,fugitive,s}$: Fugitive emissions through capture and flare inefficiencies in the anaerobic sludge treatment in the year "y" (tonnes of CO_2 equivalent)

$PE_{y,fugitive,ww} = (1 - CFE_{ww}) * ME_{y,ww,untreated} * GWP\_CH_4$
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/m^3)
MCFww,untreated methane conversion factor for the anaerobic decay of the untreated wastewater.

For Year 2009-10:

$ME_{y,ww,untreated}$ = 2396 X 0.25 X 1 = 599 tonnes

$PE_{y,fugitive,ww}$ = (1-0.9) X 599 X 21 = 1258 tonnes

For Year 2010-11:

$ME_{y,ww,untreated}$ = 2752 X 0.25 X 1 = 688 tonnes

$PE_{y,fugitive,ww}$ = (1-0.9) X 688 X 21 = 1445 tonnes

$PE_{y,dissolved} = Q_{y,ww} * [CH_4]_{y,ww,treated} * GWP\_CH_4$

For Year 2009-10:

$PE_{y,dissolved}$ = 742082 X $10e^{-4}$ X 21 = 1558 tonnes

For Year 2010-11:

$PE_{y,dissolved}$ = 860784 X $10e^{-4}$ X 21 = 1808 tonnes

For Year 2009-10:
Project activity emissions = **5037 tonnes of CO_2e equivalent per annum**

For Year 2010-11:
Project activity emissions = **6082 tonnes of CO_2e equivalent per annum**

Total project emissions (as per approach ii) **= 5037 + 6082 tonnes**
= 11118 tonnes

E.3. Leakage calculation

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

E.4. Emission reductions calculation / table

>>
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.

Approach i

This approach is based on the amount of methane fuelled or flared in the project activity during the crediting period that is monitored ex post.

Emission reduction (using approach i) = Baseline emissions – Project emissions – Leakage

Baseline emissions = 12734 tonnes CO_2 equivalent per annum
Project emissions = 459 tonnes CO_2 equivalent per annum
Leakage emissions = 0
Emission reduction = 12734 - 459 - 0
= 12275 tonnes CO_2 equivalent per annum

Approach ii

The second approach is based on actual monitored data 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.

Emission reduction (using approach ii) = Baseline emissions – Project emissions - Leakage

Baseline emissions = 22705 tonnes CO_2 equivalent per annum
Project emissions = 11121 tonnes CO_2 equivalent per annum
Leakage emissions = 0
Emission reduction = 22699 – 11118 - 0
= 11580[2] tonnes CO_2 equivalent per annum

Thus, as seen above that during the 2nd Monitoring Period (2nd April, 2009 to 1st April, 2011), the emission reductions due to approach (i) as demonstrated above is 12275, whereas, the emission reductions due to approach (ii) as stated above is 11580.

As per the approved RMP, the emission reductions shall be based on the lower of the two values as per approach (i) and (ii). Therefore, emission reductions claimed for the current monitoring period are 11580 tCO_2.

E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

>>
It should also be noted that as per the registered PDD, 12578 CERs were envisaged per annum by the project proponent. As, the present monitoring period is for two years, therefore, emission reductions envisaged by the project proponent during this monitoring period is of 12578*2 = 25156.

Item	Values applied in ex-ante calculation of the registered CDM-PDD (for a two year period)	Actual values reached during the monitoring period
Emission reductions (tCO_2e)	**25,156**	**11,580**

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

>>
The actual emission reductions being claimed in the monitoring period are 11,580 tCO_2 whereas, the estimated emission reductions as shown above are 25,156 tCO_2 for the present monitoring period. Hence, there is no increase in the emission reductions for the project activity.

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History of the document

Version	Date	Nature of revision
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory **Document Type**: Guideline, Form **Business Function**: Issuance		

[2] Rounded down value has been used while claiming the emission reductions.