CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Annexes

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

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Methane recovery by bio methanation process at Pulp and Paper manufacturing facility in Punjab, India

Version: 01

29/10/07

A.2. Description of the small-scale project activity:

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The project proponent, Abhishek Industries Limited (AIL), a flagship industry of Trident Group, is one of the leading paper manufacturing units in the state of Punjab, India. The AIL's paper manufacturing facility at Barnala, Punjab is agro (wheat straw) based and has a daily paper producing capacity of 110 tons per day.

Purpose of the project activity

The process of paper manufacturing generates a large quantity of liquid effluent from the various in-plant operations. One such stream of effluent is generated from the washing of wheat straw which is the basic raw material used in the paper manufacturing unit of AIL. This stream is highly bio-degradable and is capable of generating a large quantity of energy in the form of methane rich biogas.

The AIL's project activity entails the installation of a high rate Up flow anaerobic sludge blanket (UASB) digester which would capture the methane emanating from the effluent.. The captured methane will be burnt to generate steam in boilers which would aid in curbing the emissions of methane into the atmosphere which otherwise would have been caused had the effluent been treated in open anaerobic lagoons as was the practice prior to the implementation of project activity.

The effluent characteristics [1] at the inlet and outlet of the UASB digester are as given below:

Parameter	Inlet	Outlet
pH	4-6	Around 7
COD	3500 mg/l	800 mg/l
BOD	1100 mg/l	110 mg/l

The flow of effluent into the reactor is 4200 m^3\day.

[1] The figures have been taken from the Detailed Project Report

Project's contribution to sustainable development

The indicators of sustainable development as stipulated by the Government of India in the interim approval guidelines for CDM projects are:

- ✓ Environmental well being
- ✓ Technological well being
- ✓ Economic well being
- ✓ Social well being

The project activity proposed by AIL contributes to the above in following manner:

Environmental well being:

The existing open lagoon emanates large quantity of methane into the atmosphere which is a potent GHG. The introduction of UASB digester in the project activity would capture methane, thereby mitigating emissions of GHG which otherwise would have occurred in the absence of project activity.

Technological well being:

The technology used in project activity is safe and sound and would also provide a highly replicable model for other industries in this sector.

Economical well being:

The project activity would supply biogas (methane) produced to boilers for generating heat and thus would lead to a reduction in the amount of rice husk requirements in the boilers.

Social well being:

The project activity would lead to the generation of employment opportunities for the labour .This will improve the local standard of living.

A.3. Project participants:

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India	Abhishek Industries Limited	No

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

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A.4.1.1. Host Party(ies):

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India

A.4.1.2. Region/State/Province etc.:

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Punjab

A.4.1.3. City/Town/Community etc:

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Barnala

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

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The project site can be located at the intersection of longitude 75° 29''32" E and latitude 30° 17''57" N and falls in the Survey of India Topographical sheet Nos. 44 N/8 & 44 N/11. The nearest highway to the project activity site is State highway – 13 which is just 600 m away and the nearest railway station is Barnala which is 12 Km from the project site. The following maps can depict the exact location of the project activity.

A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

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The project activity satisfies the eligibility criteria to adopt simplified modalities and procedure for small-scale CDM project activities as explained in paragraph 6 (c) of decision 17/CP.7.

Type: **III** Other project activities

Category: III.H. Methane recovery in wastewater treatment

Version 08, EB 36

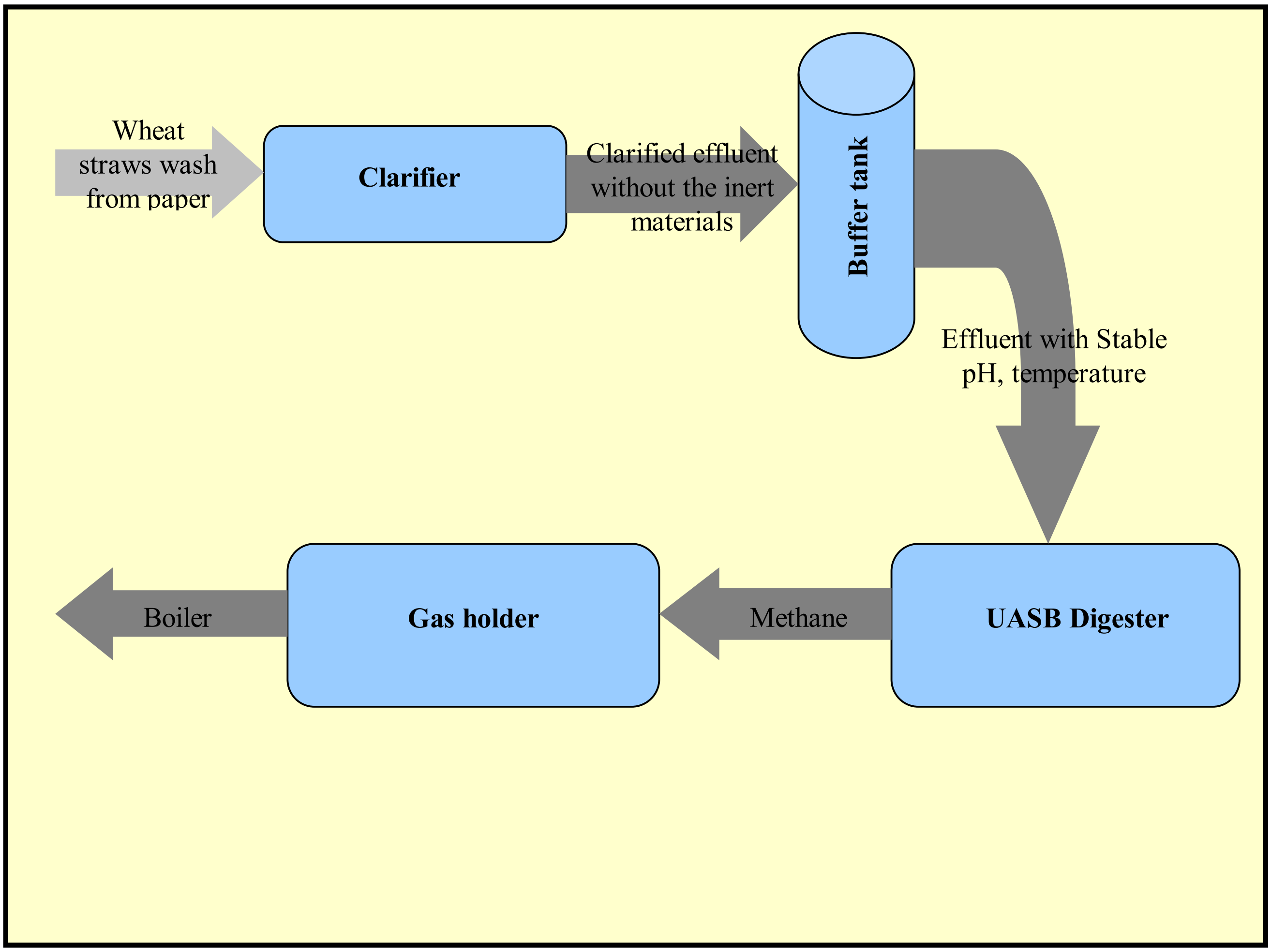
Technology involved in the project activity

The effluent generated from wet wash plant is sent through a clarifier to remove the inert material such as sand. The clarified effluent thus obtained is then headed to the Buffer Tank (BT) so that the effluent characteristics like pH, temperature; load to the digester is maintained at the desired level.

The effluent is then sent to the UASB (up flow anaerobic sludge blanket) digester from the buffer tank. The digester consists of a large Steel tank fitted with gas, sludge and effluent separator termed as GSS. The COD & BOD reduction achieved for the effluent is around 70-75% and 85-90% respectively.

The biogas produced due to biodegradable property of the effluent, is in the form of small tiny bubbles and rises upwards through the sludge bed, is removed by gas separator and is further sent to gas holder via foam trap. The gas holder serves the purpose of gas storage and acts as a pressure control vessel. The biogas stored in gas holder is then directed to boiler through positive displacement booster.

The schematic representation of the process is given in the following figure:


Wheat straws wash from paper
Clarifier
Clarified effluent without the inert materials
Buffer tank
Effluent with Stable pH, temperature
UASB Digester
Methane
Gas holder
Boiler

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

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Years	Annual Estimation of emission reduction in tons of CO_2e
2008-2009	11957
2009-2010	11957
2010-2011	11957
2011-2012	11957
2012-2013	11957
2013-2014	11957
2014-2015	11957
2015-2016	11957
2016-2017	11957
2017-2018	11957
Total estimated reductions (tons of CO_2e)	11957
Total number of crediting years	**10**
Annual Average over the crediting period of estimated reduction (tons of CO_2e)	119570

A.4.4. Public funding of the small-scale project activity:

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No public funding as part of project financing from parties included in Annex I of the convention is involved in the project activity.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

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According to, appendix–C of the indicative simplified modalities and procedure for small scale CDM project activity. A project activity is considered to be a debundled component of large project activity if there is a registered small scale CDM project or request for registration by another small scale project activity

- By the same project participants;
- In the same project category and technology/measure; and
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale

activity at the closest point.

AIL has implemented only a small scale project on chemical recovery which is in the process of availing the CDM benefits. The chemical recovery project by AIL is based on category III . M., and is different from the biomethanation project (category III.H.). Hence, it can be said that above points are not valid in case of AIL project activity and it is not a debundled component of a large project activity.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the small-scale project activity:

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Title: Methane recovery in wastewater treatment.

Type III – Other project activities

Category: III.H., Version 08, Sectoral scope 13, EB 36

B.2 Justification of the choice of the project category:

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According to the methodology, category III.H, is applicable under the following conditions;

- **This project category comprises measures that recover methane from biogenic organic matter in wastewaters by means of one of the following options:**

1. Substitution of aerobic wastewater or sludge treatment systems with anaerobic systems with methane recovery and combustion.
2. Introduction of anaerobic sludge treatment system with methane recovery and combustion to an existing wastewater treatment plant without sludge treatment.
3. Introduction of methane recovery and combustion to an existing sludge treatment system.
4. Introduction of methane recovery and combustion to an existing anaerobic wastewater treatment system such as anaerobic reactor, lagoon, septic tank or an on site industrial plant.
5. Introduction of anaerobic wastewater treatment with methane recovery and combustion, with or without anaerobic sludge treatment, to an untreated wastewater stream.
6. **Introduction of a sequential stage of wastewater treatment with methane recovery and combustion, with or without sludge treatment, to an existing wastewater treatment system without methane recovery (e.g. introduction of treatment in an anaerobic reactor with methane recovery as a sequential treatment step for the wastewater that is presently being treated in an anaerobic lagoon without methane recovery).**

The post project activity entails the installation of UASB digester which captures the methane gas, stores the gas in gas holders and sends it to the boilers for combustion , whereas, prior to the project activity the wheat straw wash was being treated in the open anaerobic lagoon without the recovery of the methane gas. This justifies the applicability of the project activity under category III.H. according to the option 6 stated above.

- **If the recovered methane is used for heat and or electricity generation that component of the project activity can use a corresponding category under type I.**

The methane gas recovered in the UASB digester is stored in the gas holders from where it is sent to the boiler for combustion. The project proponent does not intend to claim for the heat generated using the biogas.

- **If the recovered methane is utilized for production of hydrogen, that component of project activity shall use corresponding category AMS III.O.**

The methane recovered in the project activity is not utilized for the production of hydrogen.

- **If the recovered and upgraded biogas is bottled and sold outside the project boundary the end-use of the biogas shall be ensured via a contract between the bottled biogas vendor and the end-user. No emission reductions may be claimed from the displacement of fossil fuel from the end use of bottled biogas in such situations. If however the end use of the bottled biogas is included in the project boundary and is monitored during the crediting period CO_2 emissions avoided by the displacement of the fossil fuel is eligible under AMS I.C.**

The project activity entails the capturing of the biogas in the UASB digester and sending it to the boiler for combustion. It does not involve any upgrading and bottling of the biogas to sell it outside the project boundary.

- **If the project activity involves upgrading of biogas for bottling this category is only applicable if upgrade is done by way of absorption with water (with or without recovery of methane emissions from discharge) such that the methane content of the upgraded biogas shall be a minimum 96% (by volume). These conditions of the bottled biogas, comparable to the standard methane content of compressed natural gas, are required to ensure that the bottled biogas is completely destroyed through combustion in an end use.**

The project activity does not involve upgrading of biogas for bottling.

- **Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO_2 equivalent annually.**

The annual emission reductions associated with the AIL's project activity are less than 60 kt CO_2 equivalent and the same is corroborated form the CER calculations shown in the later sections of this document.

B.3. Description of the project boundary:

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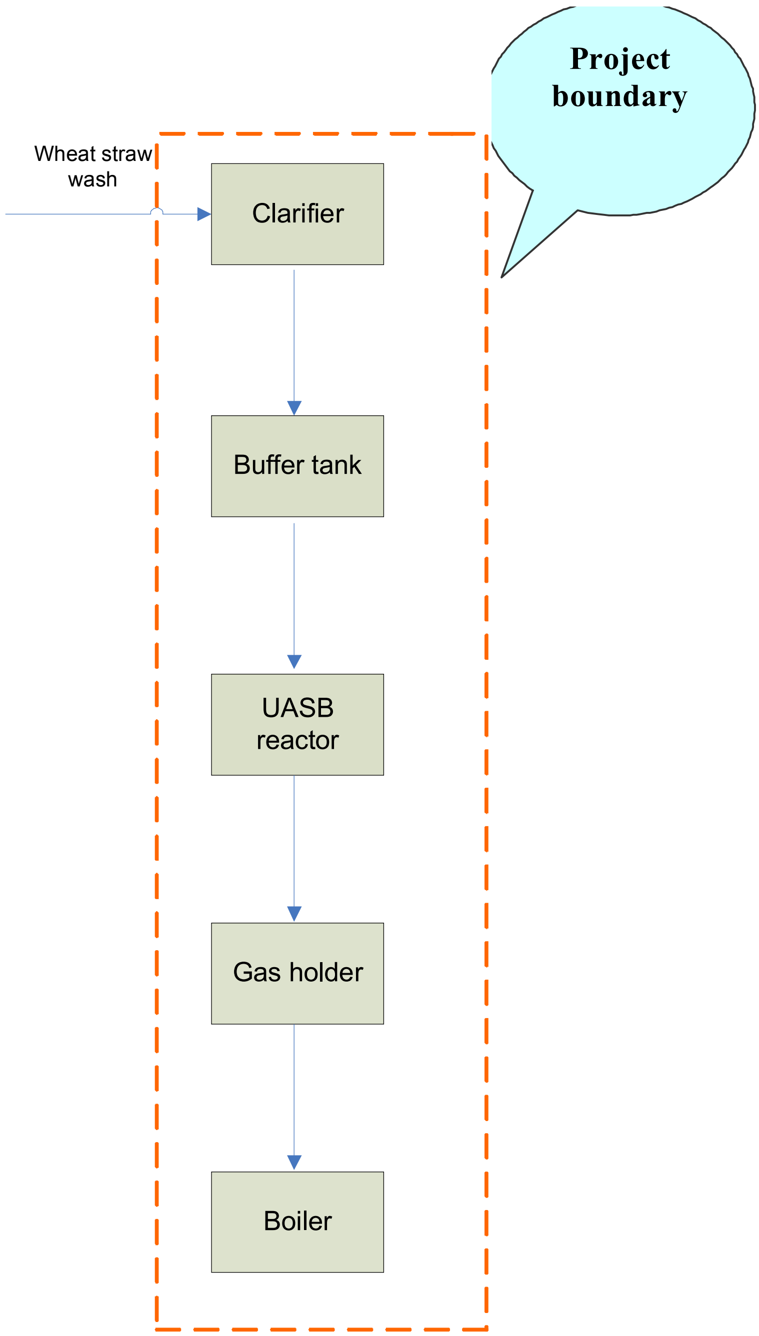
According to the paragraph 7 of the small scale methodology AMS. III.H, Version 08, EB 36, the project boundary is the physical, geographical site where the wastewater and the sludge treatment takes place.

Thus the project boundary for the AIL's project activity would include physical and geographical site of Effluent stream of wheat straw wash, clarifier , buffer tank , UASB digester, Gas holders and boiler where the gas will burn.

Anthropogenic baseline emissions included in the project boundary are emission from anaerobic lagoon which would have been there in absence of the project activity. Project emissions included in the project boundary are as follows:

- CO_2 emissions related to the power used by the project activity facilities. Emission factors for grid electricity or diesel fuel use as the case may be shall be calculated as described in category I.D.
- Methane emissions through inefficiency of the wastewater treatment and presence of degradable organic carbon in treated wastewater.
- Methane emissions from the decay of the final sludge generated by the treatment systems.
- Methane fugitive emissions through inefficiencies in capture and flare systems.
- Methane emissions resulting from dissolved methane in the treated wastewater effluent.

The schematic representation of the project boundary for the project activity is given below:


Project boundary
Wheat straw wash
Clarifier
Buffer tank
UASB reactor
Gas holder
Boiler

B.4. Description of baseline and its development:

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According to the paragraph 19 of the small scale methodology AMS.III.H , Version 08 , EB 36, baseline scenario can be one of the alternatives listed below:

Alternative 1: The existing aerobic wastewater or sludge treatment system, in the case of substitution of one or both of these systems for anaerobic ones with methane recovery and combustion;

Alternative 2: The existing sludge disposal system, in the case of introduction of anaerobic sludge treatment system with methane recovery and combustion to an existing wastewater treatment plant.

Alternative 3: The existing sludge treatment system without methane recovery and combustion.

Alternative 4: The existing anaerobic wastewater treatment system without methane recovery and combustion.

Alternative 5: The untreated wastewater being discharged into sea, river, lake, stagnant sewer or flowing sewer, in the case of introducing the anaerobic treatment to an untreated wastewater stream.

Alternative 6: The existing anaerobic wastewater treatment system without methane recovery for the case of introduction of a sequential anaerobic wastewater treatment system with methane recovery.

The AIL'S project activity introduces the anaerobic wastewater treatment system with methane recovery. The UASB digester is being deployed which captures the methane, stores it in the gas holders and sends it to the boiler for combustion, whereas, prior to the project activity the effluent was being treated in the anaerobic lagoons .Thus, the plausible baseline scenario for the project activity would be alternative 6 listed above which states; ***"The existing anaerobic wastewater treatment system without methane recovery".***

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

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In accordance with paragraph 28 of the simplified modalities and procedures for small-scale CDM project activities, a simplified baseline and monitoring methodology may be used for a small-scale CDM project activity if project participants are able to demonstrate to a designated operational entity that the project activity would otherwise not be implemented due to the existence of one or more barrier(s) listed in Attachment A to Appendix B. The AIL's project activity has the following barriers associated with its implementation and successful operation.

➢ **Technological Barrier**

The generation of methane or rather the uninterrupted working of UASB digester is dependent on a number of factors such as:

- The flow of the waste water or the COD load of the waste water coming into the digester.
- Temperature of the waste water, ambient temperature.
- pH of the waster water entering the digester

The anaerobic bacterial culture in the digester which is responsible for digestion of organic matter in the waste water can get adversely affected with even a thin variation in temperature of say 3- 5^{0}C in the reactor. Since the project activity has been planned for a country like India where high seasonal temperature variation persists, installation of a temperature sensitive technology may prove uncertain because the temperature variations can affect the bacterial film in the reactor and thus may render the digester futile.

Although the biogas generated in digesters consists mainly of methane, traces of hydrogen sulphide are also present in the gas which can prove to be corrosive for the digester, gas holders and boilers. The desulphurization is thus required to remove corrosive hydrogen sulphide from biogas. The installation of a desulphurization unit requires additional expenses which eventually would affect the financial viability of a UASB technology.

➢ **Prevailing practice barrier**

The state wise distribution of Agro based mills in the country [2] is as indicated below:

State	**No. of mills**
Andhara Pradesh	18
Bihar	3
Chandigarh	1
Chattisgarh	5
Gujarat	6
Haryana	10
Himachal Pradesh	4
Karnataka	3
Madhya Pradesh	3
Maharashtra	28

[2] http://www.cpcb.nic.in/New%20Item/images/Annexure_I.pdf

Orissa	1
Pondicherry	1
Punjab	**21**
Rajasthan	1
Tamil Nadu	3
Uttar Pradesh	51
Uttaranchal	12
West Bengal	7

The detailed description regarding the 20 (excluding the AIL) paper units in the state of Punjab is as listed below [3]:

S.No	Paper manufacturing unit	Location	Status of bio methanation	CDM consideration
1	ABC PAPER	Hoshiarpur	X	X
2	AMRITSAR PULP & BOARD MILLS (P) Ltd.	Amritsar	X	X
3	DG PAPER & BOARD MILLS	Fazilka	X	X
4	DHINGRA PAPERS MILLS	Amritsar	X	X
5	JAIBHARAT PAPER BOARD MILLS	Amritsar	X	X
6	JEET ENTERPRISES PVT. LTD.	Amritsar	X	X
7	JIT ENTERPRISES (P) LTD.	Amritsar	X	X
8	MAKIN PAPER MILLS	Ludhiana	X	X
9	EVERSHINE PAPER MILL	Ludhiana	X	X
10	MUKERIAN PAPERS LTD.	Hoshiarpur	X	X
11	NARIDERA PAPER MILLS LTD.	Amritsar	X	X
12	NOOR PAPERS LTD.	Amritsar	X	X
13	RANA MOHENDRA PAPER LTD.	Ropar	X	X
14	ROSHAN LAL PAPER MILLS (P) LTD.	Bhatinda	X	X
15	SATIA PAPER MILLS LTD. [4]	Muktsar	√	X
16	SHREE MAYA PULP AND PAPERS (P)	Patiala	X	X
17	SHREYANS INDUSTRIES LTD	Ropar	√	√
18	SRI GANAPATI PAPER PRODUCTS	Jalandhar	X	X
19	SUKHANA PAPER MILLS LTD.	Patiala	X	X
20	UNITED PULP & PAPER LTD.	Ropar	X	X

[3] http://www.cpcb.nic.in/New%20Item/images/Annexure_I.pdf

[4] The biomethanation project at Satia Paper Mills Ltd. is funded by USAID.

According to the table above there are 20 paper units (excluding AIL's) in the state of Punjab. Out of these 20 units there are only two units equipped with water treatment facility using the UASB technology. One of the unit has come up with prior consideration of the CDM [5]benefits (is in the process of availing the same) and the other one is funded by USAID. The current practice in the region is to treat the waste water through the anaerobic lagoons where the water is dumped for a period of time and the methane generated gets emitted into the atmosphere.

Thus the above analysis substantiates that the waste water treatment and methane capture with UASB technology is not a usual practice in the region and thus its implementation always carries an uncertainty with it. The project proponent being aware of these difficulties gave the final nod to this project activity only after considering the CDM benefit that it may accrue upon successful registration of the project activity with the UNFCCC.

[5] The project activity is registered with UNFCCC .http://cdm.unfccc.int/UserManagement/FileStorage/S3NGEYC2I4TA1YMFG04G8K33AHO0FM

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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The emission reduction achieved by the project activity shall be calculated as the difference between the baseline emission and the sum of the project emission and leakage.

Emission reductions

$$ER_y = BE_y - PE_y - Leakage$$

where	ER_y	Emission reduction during the year, (tCO_2)
	BE_y	Baseline emissions during the year, (tCO_2)
	PE_y	Project emissions during the year, (tCO_2)

Baseline Emissions

According to the methodology AMS.III.H., the baseline emissions for the AIL's project activity are calculated as:

$$BE_y = Q_{y,ww} * COD_{y,ww,untreated} * Bo_{,ww} * MCF_{ww,\ treatment} * GWP\_CH4$$

where

$Q_{y,ww}$	volume of wastewater treated in the year "y" (m^3)
$COD_{y,ww,untreated}$	Chemical oxygen demand of the wastewater entering the anaerobic treatment reactor/system with methane capture in the year "y" (tons/ m^3)
$Bo_{,ww}$	Methane producing capacity of the wastewater *(IPCC default value for domestic wastewater of 0.21 kg CH_4/kg.COD)*
$MCF_{ww,\ treatment}$	Methane correction factor for the existing wastewater treatment system to which the sequential anaerobic treatment step is being introduced
GWP_CH_4	Global warming potential of methane

Project Emissions

The project emissions for the AIL's project activity is calculated as:

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

where

$PE_{y,power}$	emissions from electricity or diesel consumption in the year "y"
$PE_{y,ww,treated}$	emissions from degradable organic carbon in treated wastewater in year "y"
$PE_{y,s,final}$	emissions from anaerobic decay of the final sludge produced in the year "y". If the sludge is controlled combusted, disposed in a landfill with methane recovery, or used for soil application, this term can be neglected, and the final disposal of the sludge shall be monitored during the crediting period.
$PE_{y,fugitive}$	emissions from methane release in capture and flare systems in year "y".
$PE_{y,dissolved}$	emissions from dissolved methane in treated wastewater in year "y"

$$PE_{y,power} = EC_{y} * EF_{y}$$

where

EC_{y}	Electricity consumption in the project activity (MWh)
EF_{y}	Emission factor for Northern Region Grid (tCO_2/MWh)

$$PE_{y,\,ww,\,treated} = Q_{y,ww} * COD_{y,ww,treated} * Bo_{,ww} * MCF_{ww,\,final} * GWP\_CH4$$

where

$Q_{y,ww}$	volume of wastewater treated in the year "y" (m^3)
$COD_{y,ww,untreated}$	Chemical oxygen demand of the treated water in the year "y" (tons/ m^3)
$Bo_{,ww}$	Methane producing capacity of the wastewater *(IPCC default value for domestic wastewater of 0.21 kg CH_4/kg.COD)*
$MCF_{ww,\,final}$	Methane correction factor based on the type of treatment and discharge pathway of the wastewater.
GWP_CH4	Global warming potential of methane

$$PE_{y,s,final} = S_{y,final} * DOC_{y,s,final} * MCF_{s,final} * DOC_{F} * F * 16/12 * GWP\_CH4$$

where

$PE_{y,s,final}$ Methane emissions from the anaerobic decay of the final sludge generated in the Waste water system in the year "y" (tCO_2)

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

$DOC_{y,s,final}$ Degradable organic content of the final sludge generated by the wastewater treatment in the year y (fraction). It shall be measured by sampling and analysis of the sludge produced, and estimated ex-ante using the IPCC default values of 0.05 for domestic sludge (wet basis, considering a default dry matter content of 10 percent) or 0.09 for industrial sludge (wet basis, assuming dry matter content of 35 percent).

$MCF_{s,final}$ Methane correction factor of the landfill that receives the final sludge, estimated as described in category AMS III.G.

DOC_F Fraction of DOC dissimilated to biogas (IPCC default value of 0.5)

F Fraction of CH_4 in landfill gas (IPCC default of 0.5).

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

where

$PE_{y,fugitive,ww}$ Fugitive emissions through capture and flare inefficiencies in the anaerobic wastewater treatment in the year "y" (tCO_2)

$PE_{y,fugitive,s}$ Fugitive emissions through capture and flare inefficiencies in the anaerobic sludge treatment in the year "y" (tCO_2)

$$PE_{y,fugitive,ww} = (1 – CFE_{ww}) * MEP_{y,ww,treatment} * GWP\_CH_4$$

where

CFE_{ww} capture and flare efficiency of the methane recovery and combustion equipment in the wastewater treatment (a default value of 0.9 shall be used, given no other appropriate value)

$MEP_{y,ww,treatment}$ methane emission potential of wastewater treatment plant in the year "y" (tons)

$$MEP_{y,ww,treatment} = Q_{y,ww} * COD_{y,ww,untreated} * B_{o,ww} * MCF_{ww,treatment}$$

where

$COD_{y,ww,untreated}$ Chemical oxygen demand of the wastewater entering the anaerobic treatment Reactor/system with methane capture in the year "y" ($tons/m^3$)

$MCF_{ww,\ treatment}$ methane correction factor for the wastewater treatment system that will be equipped with methane recovery and combustion

$$PE_{y,fugitive,s} = (1 – CFEs) * MEP_{y,s,treatment} * GWP\_CH4$$

where

CFE_{s}	capture and flare efficiency of the methane recovery and combustion equipment in the sludge treatment (a default value of 0.9 shall be used, given no other appropriate value)
$MEP_{y,s,treatment}$	methane emission potential of the sludge treatment system in the year "y" (tons)

$$\mathbf{MEP_{y,s,treatment} = S_{y,untreated} * DOC_{y,s,untreated} * DOC_{F} * F * 16/12 * MCF_{s,treatment}}$$

where

$S_{y,untreated}$	Amount of untreated sludge generated in the year "y" (tons)
$DOC_{y,s,untreated}$	Degradable organic content of the untreated sludge generated in the year y(fraction). It shall be measured by sampling and analysis of the sludge produced, and estimated exante using the IPCC default values of 0.05 for domestic sludge (wet basis, considering a default dry matter content of 10 percent) or 0.09 for industrial sludge (wet basis, assuming dry matter content of 35 percent)
$MCF_{s,treatment}$	Methane correction factor for the sludge treatment system that will be equipped with methane recovery and combustion

$$\mathbf{PE_{y,dissolved} = Q_{y,ww} * [CH_4]_{y,ww,treated} * GWP\_CH4}$$

where

$[CH_4]_{y,ww,treated}$	dissolved methane content in the treated wastewater (tons/m^3). In aerobic Waste water treatment default value is zero, in anaerobic treatment it can be measured, or a default value of 10e-4 tons/m^3 can be used.

B.6.2. Data and parameters that are available at validation:

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Data / Parameter:	**EF_y**
Data unit:	t CO_2/ GWh
Description:	Emission factor for Northern Region Grid
Source of data used:	Baseline Carbon Dioxide Emission Database Version 3.0 http://www.cea.nic.in
Value applied:	0.8134
Justification of the choice of data or description of measurement methods and procedures actually applied :	CEA is a statutory organisation under Ministry of Power which collects and records the data concerning the generation, transmission, trading, distribution and utilization of electricity.
Any comment:	-

B.6.3 Ex-ante calculation of emission reductions:

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Baseline emissions

The baseline emissions are calculated as follows:

$$\mathbf{BE_y = Q_{y,ww} * COD_{y,ww,untreated} * Bo_{,ww} * MCF_{ww,\,treatment} * GWP\_CH_4}$$

where

$Q_{y,ww}$ (m^3)	=	1449000
$COD_{y,\,ww,\,untreated}$ (tons/ m^3)	=	0.0035
$Bo_{,ww}$ (kg CH_4/kg.COD) [6]	=	0.21
$MCF_{ww,\,treatment}$ [7]	=	1
GWP_CH_4	=	21

Thus,

BE_y = 1449000 *0.0035 * 0.21* 1*21

= 22365 tCO_2

Project Emissions

The project emissions for the AIL's project activity is calculated as:

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

$$\mathbf{PE_{y,\,power} = EC_y * EF_y}$$

Where

EC_y (GWh)	=	0.0207
EF_y [8] (tCO_2/GWh)	=	813.4

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6 IPCC default value for domestic wastewater

7 IPCC Default values from chapter 6 of volume 5.Waste in 2006 IPCC Guidelines for National Greenhouse Gas Inventories

8 The emission factor for the project activity has been calculated in accordance with the paragraph 9 (a) of the methodology AMS.I.D. , Version 12

Thus,

$PE_{y,\ power}$ = 0.0207 * 813.4

= 17 tCO_2

$PE_{y,\ ww,\ treated}$ = $Q_{y,ww}$ * $COD_{y,ww,treated}$ * $Bo_{,ww}$ * $MCF_{ww,\ final}$ * GWP_CH_4

$Q_{y,ww}$ (m^3) = 1449000

$COD_{y,\ ww,\ treated}$ (tons/ m^3) = 0.0008

$Bo_{,ww}$ (kg CH_4/kg.COD) [9] = 0.21

$MCF_{ww,\ treatment}$ [10] = 1

GWP_CH_4 = 21

$PE_{y,\ ww,\ treated}$ = 1449000 *0.0008 * 0.21 *1 *21

= 5112 tCO_2

$PE_{y,s,final}$ = $S_{y,final}$ * $DOC_{y,s,final}$ * $MCF_{s,final}$ * DOC_F * F * 16/12 * GWP_CH4

This can be taken as zero for the project activity as the amount of sludge generated from the waste water treatment is considerably low and also has negligible methane content.

$PE_{y,fugitive,ww}$ = (1 – CFE_{ww}) * $MEP_{y,ww,treatment}$ * GWP_CH_4

where

CFE_{ww} [11] = 0.9

$MEP_{y,ww,treatment}$ = $Q_{y,ww}$ * $COD_{y,\ ww,\ untreated}$ * $B_{o,ww}$ * $MCF_{ww,treatment}$

= 1449000 * 0.0035 * 0.21 * 1

= 1065 tons

$PE_{y,fugitive,ww}$ = (1-0.9) * 1065 * 21

= 2237 tCO_2

---

[9] IPCC default value for domestic wastewater

[10] IPCC Default values from chapter 6 of volume 5.Waste in *2006 IPCC Guidelines for National Greenhouse Gas Inventories*

[11] According to the methodology AMS.III.H default value of 0.9 is to be used

$\mathbf{PE_{y,fugitive,s}}$ = $\mathbf{(1 - CFEs) * MEP_{y,s,treatment} * GWP\_CH4}$

This is taken as zero for the project activity

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

where

$Q_{y,ww}$ (m^3) = 1449000

$[CH_4]_{y,ww,treated}$ [12] = 10^{-4}

GWP_CH_4 = 21

$\mathbf{PE_{y,dissolved}}$ = $1449000 * 10^{-4} * 21$

= 3043 tCO_2

Thus ,

PE_y = 17 + 5112 + 2237 + 3043

= 10408 tCO_2

Leakage

According to the paragraph 14 of the methodology AMS.III.H. Version 08, EB 36 leakage is required to be taken into consideration if the used technology is equipment transferred from another activity or if the existing equipment is transferred to another activity.

Since the project activity does not involve the transfer of technology there are no leakage emissions associated with the project activity.

Emission reductions

ER y = BE y – PE y – Leakage

= 22365 - 10408 – 0

= 11957 tCO_2

B.6.4 Summary of the ex-ante estimation of emission reductions:

>>

[12] According to the methodology , the default value is to be used

Year	Project Emission factor (t CO_2/MWh)	Baseline emissions (tCO_2 e)	Project emissions (tCO_2 e)	Leakage emissions (tCO_2 e)	Emission Reductions (tCO_2 e)
2008-2009	0.8134	22365	10408	0	11957
2009-2010	0.8134	22365	10408	0	11957
2010-2011	0.8134	22365	10408	0	11957
2011-2012	0.8134	22365	10408	0	11957
2012-2013	0.8134	22365	10408	0	11957
2013-2014	0.8134	22365	10408	0	11957
2014-2015	0.8134	22365	10408	0	11957
2015-2016	0.8134	22365	10408	0	11957
2016-2017	0.8134	22365	10408	0	11957
2017-2018	0.8134	22365	10408	0	11957
TOTAL		**223650**	**104080**	**0**	**119570**

B.7 Application of a monitoring methodology and description of the monitoring plan:

>>

B.7.1 Data and parameters monitored:

Data / Parameter:	$Q_{,ww}$
Data unit:	m^3
Description:	Volume of wastewater treated in the year
Source of data to be used:	Plant records
Value of data	1449000
Description of measurement methods and procedures to be applied:	The volume of waste water treated will be recorded on a daily basis (using the flow meters) and reported in the plant records.
QA/QC procedures to be applied:	The calibration of the flow meters used will be done as per manufacturers' specifications in order to ensure the highest levels of accuracy in the measurement.
Any comment:	

Data / Parameter:	$COD_{ww,untreated}$
Data unit:	tons/m^3
Description:	Chemical oxygen demand of the wastewater entering the anaerobic treatment reactor/system with methane capture in the year
Source of data to be used:	Plant records
Value of data	0.0035
Description of measurement methods and procedures to be applied:	The Chemical oxygen demand of the wastewater entering the anaerobic treatment reactor/system is measured on a regular basis in the laboratory at the plant location
QA/QC procedures to	In order to ensure the highest levels of accuracy in the monitoring the parameter is

be applied:	tested on a regular interval and reported in the log books.
Any comment:	

Data / Parameter:	$COD_{ww, treated}$
Data unit:	$tons/m^3$
Description:	Chemical Oxygen Demand of the treated wastewater in the year
Source of data to be used:	Plant records
Value of data	0.0008
Description of measurement methods and procedures to be applied:	The Chemical oxygen demand of the treated wastewater is measured on a regular basis in the laboratory at the plant location
QA/QC procedures to be applied:	In order to ensure the highest levels of accuracy in the monitoring the parameter is tested on a regular interval and reported in the log books.
Any comment:	

Data / Parameter:	EC_y
Data unit:	GWh
Description:	Electricity consumption in the plant
Source of data to be used:	Plant records
Value of data	0.0207
Description of measurement methods and procedures to be applied:	The energy meters installed at the plant location will be used to measure the amount of the electricity consumed in the bio methanation plant.
QA/QC procedures to be applied:	The monitoring equipment used for measuring the parameter will be calibrated regularly as per the manufacturers' specifications in order to ensure the highest level of accuracy in the monitoring process.
Any comment:	

Data / Parameter:	Temperature of gas
Data unit:	^0C
Description:	Temperature of the methane recovered in the UASB digester
Source of data to be used:	Plant records
Value of data	35
Description of measurement methods and procedures to be applied:	The temperature measuring devices (RTD – Resistance thermocouple diode) would be used to measure the temperature of the methane gas recovered in the digester.
QA/QC procedures to be applied:	The monitoring equipment used for measuring the parameter will be calibrated regularly as per the manufacturers' specifications in order to ensure the highest level of accuracy in the monitoring process.
Any comment:	

Data / Parameter:	Pressure of gas
Data unit:	mm
Description:	Pressure of the methane recovered in the UASB digester
Source of data to be used:	Plant records
Value of data	1200
Description of measurement methods and procedures to be applied:	The pressure indicating device would be used to monitor the pressure of the recovered gas in the digester.
QA/QC procedures to be applied:	The monitoring equipment used for measuring the parameter will be calibrated regularly as per the manufacturers' specifications in order to ensure the highest level of accuracy in the monitoring process.
Any comment:	

Data / Parameter:	Volume of gas
Data unit:	m^3 / day
Description:	Volume of the methane recovered in the UASB digester
Source of data to be used:	Plant records
Value of data	5100
Description of measurement methods and procedures to be applied:	The volume of the gas is monitored with the flow meters installed at the plant location.
QA/QC procedures to be applied:	The flow meters are calibrated regularly as per the manufacturers specifications to ensure the highest level of accuracy in the monitoring
Any comment:	

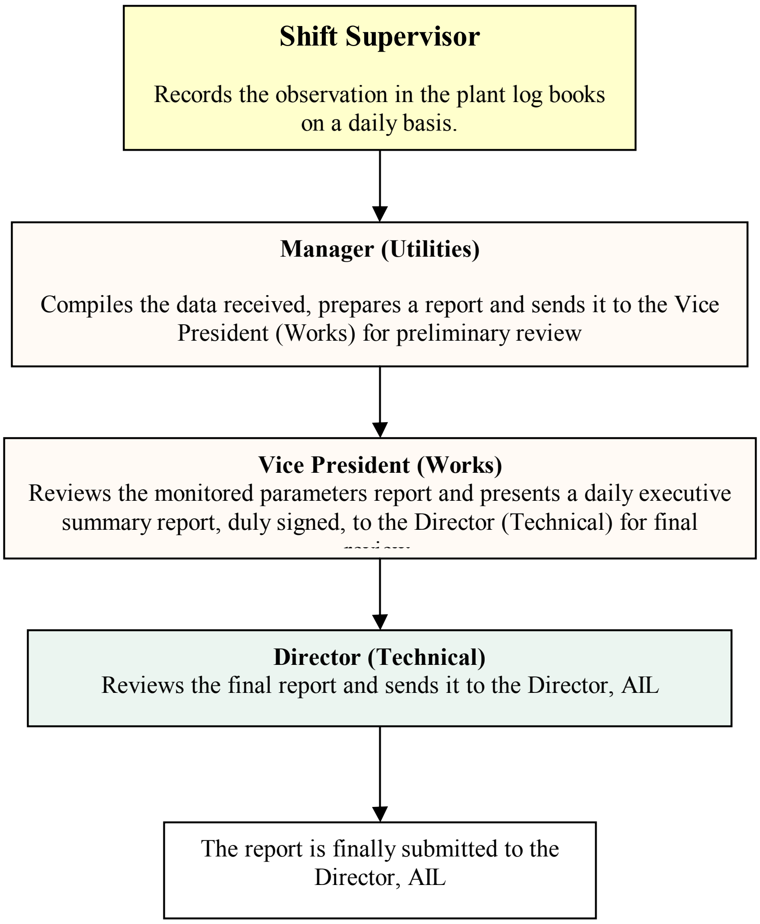
B.7.2 Description of the monitoring plan:

>>

The parameters to be monitored for the project activity include:

- Volume of wastewater treated in the year
- Chemical oxygen demand of the wastewater entering the anaerobic treatment reactor/system with methane capture in the year.
- Chemical Oxygen Demand of the treated wastewater in the year
- Electricity consumption in the plant
- Temperature of the methane recovered in the UASB digester
- Pressure of the methane recovered in the UASB digester
- Volume of the methane recovered in the UASB digester

All the above stated parameters will be monitored regularly on a daily basis and the recorded values of will be reported in the plant records / log books. In order to ensure the highest levels of accuracy in the monitoring process, the instruments (such as flow meters, energy meters etc.) used for monitoring will be calibrated regularly as per the manufacturers' specifications. The CDM monitoring team constituted by AIL is as follows:



B.8 Date of completion of the application of the baseline and monitoring methodology and the name of the responsible person(s)/entity(ies)

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Date of completion of the baseline and monitoring methodology: 15/01/2008

The contact details for the persons responsible for the monitoring have been given in the Annex 1 of this document

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>

01/01/2007

C.1.2. Expected operational lifetime of the project activity:

>>

20 years

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

>>

Not applicable

C.2.1.2. Length of the first crediting period:

>>

Not applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

01/03/2008

The crediting period will start only after the successful registration of project activity with UNFCCC.

C.2.2.2. Length:

>>

10 years

SECTION D. Environmental impacts

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D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

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The project proponent has already procured the legal consent to operate from the state pollution control board.

The basic Environmental Issues Considered is as follows:

Impact	Construction phase	Operation phase
Land use	There are no adverse impacts anticipated to occur on the surrounding land use during the construction period.	No adverse impacts have been anticipated to occur which can affect the land use at the project site during the operation of the plant. Moreover, the development of additional greenbelt in the project area would improve the aesthetics of the site.
Soil Quality	The land identified for the proposed biomethanation plant at the Paper mill has already been filled and levelled to the plant formation level and thus no significant adverse impacts on soil in the surrounding area are anticipated.	The degradation of soil quality due to the leaches from the landfill area is unlikely to occur as with the setting up of the UASB digester in the amount of sludge generated would be reduced to a great extent and thus aids in the disposal.
Air quality	The main source of emission during the construction period is the movement of equipment at site and dust emitted during the levelling, grading, earthworks, foundation works and other construction related activities.	No significant adverse impacts have been anticipated to occur during the operation phase.

	The impact will be for short duration and confined locally to the construction site.	
Water resources and quality	The water requirement during the construction phase will be met by the groundwater. Since, most of the construction work force will be constituted of floating population, the demand of water and sanitation facilities can be managed by the existing water supply system.	No surface water source is proposed to be tapped for meeting the requirements of the proposed project. Hence, no impact on the surface water resources is envisaged.
Noise level	Heavy construction traffic for loading and unloading, fabrication and handling of equipment and materials are likely to cause an increase in the ambient noise levels. These effects will remain only for a short duration.	No adverse impacts during the operation phase have been identified.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

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No adverse impacts have been anticipated to occur as a consequence of the project activity.

SECTION E. Stakeholders' comments

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E.1. Brief description how comments by local stakeholders have been invited and compiled:

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With a purpose to apprise the stakeholders of the project activity initiated by AIL, AIL organised a formal stakeholder consultation meeting with the identified stakeholders on 25/07/2007. The stakeholders were invited through a formal invitation by AIL. On the appointed day 20 stakeholders turned up for the consultation meeting.

The representatives of AIL presented the salient features of their project activity including the environmental and social impacts of the project activity, apprised them of the green houses gases, the global warming and the role of CDM to curb the GHG emissions from the environment. In the end, the stakeholders were requested to raise their concerns (if any) regarding the upcoming activity by AIL.

E.2. Summary of the comments received:

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No serious issues or comments were raised during the meeting and the stakeholders were very much appreciative of the AIL's initiative to commission a bio methanation plant which would help to curb the GHG emissions, help to generate direct and indirect employment opportunities for the villagers and would also simplify the problem of disposing effluent generated from the pulp and manufacturing unit. Minor issues raised at the time of consultation process were satisfactorily replied by the AIL representatives.

E.3. Report on how due account was taken of any comments received:

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No significant adverse comments were received during the stakeholder consultation process.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Abhishek Industries Limited
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Represented by:	
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Salutation:	
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Middle Name:	
First Name:	Rajendra
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding as part of project financing from parties included in Annex I of the convention is involved in the project activity.

Annex 3

BASELINE INFORMATION

As discussed in the section B.4. of this document.

Annex 4

MONITORING INFORMATION

As discussed in the monitoring plan in section B.7.2