Revised Monitoring Plan

For

Project Title:

Process Waste Heat utilization for power generation at Phillips Carbon Black Limited, Gujarat

Methodology:

ACM0004 version 01

Date: 23/10/2008

Project Participant:

Phillips Carbon Black Limited

Reference:

UNFCCC Reference No. 0309

D 2.1 Option 1: Monitoring of the emissions in the project scenario and the baseline scenario

D.2.1.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:									
ID number *(Please use numbers to ease cross-referencing to D.3)*	Data type	Data Variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept	Comment
1.	Auxiliary fuel consumption	Consumption of LDO during usage of same in boiler as auxiliary fuel in boiler	m^3 or lit	m	Continuously	Total (100%)	Electronic/Paper	Credit Period + 2years	MONITORING LOCATION: The data for cumulative volume of LDO consumption will be measured shift-wise by meters at plant and displayed at the DCS. Manager In-charge would be responsible for regular calibration. The measured data of LDO consumption would be entered into the plant log book and converted from volume (lit) basis to weight (Tonnes) basis by multiplying with the specific gravity. It is then

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									entered into the in-plant electronic data recording system (SAP system).
2.	Auxiliary fuel consumption	Consumption of CBFS during usage of same in boiler as auxiliary fuel in boiler	m^3 or lit	m	Shift-wise	Total (100%)	Electronic/Paper	Credit Period + 2years	MONITORING LOCATION: The data for cumulative volume of CBFS consumption will be measured shift-wise by meters at plant and displayed at the DCS. Manager In-charge would be responsible for regular calibration. The measured data of CBFS consumption would be entered into the plant log book and converted from volume (lit) basis to weight (Tonnes) basis by multiplying with the specific gravity. It is then

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									entered into the in-plant electronic data recording system (SAP system).
3.	Specific Gravity	Specific Gravity of LDO	-	M	Once for each consignment	Sample (Random)	Electronic/Paper	Credit Period + 2years	Data will be obtained from the results of the measurements for each consignment of LDO in the in-house laboratory.
4.	Specific Gravity	Specific Gravity of CBFS	-	M	Once for each consignment	Sample (Random)	Electronic/Paper	Credit Period + 2years	Data will be obtained from the test results of an independent accredited external agency.
5.	Auxiliary fuel consumption	Consumption of LDO during usage of same in boiler as auxiliary fuel in boiler	tonnes	C	Shift-wise	Total (100%)	Electronic/Paper	Credit Period + 2years	Please refer to the comment on the monitored parameter mentioned in ID No. 1
6.	Auxiliary fuel consumption	Consumption of CBFS during usage	tonnes	C	Shift-wise	Total (100%)	Electronic/Paper	Credit Period + 2years	Please refer to the comment on the monitored parameter

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		of same in boiler as auxiliary fuel in boiler							mentioned in ID No. 2
7.	Net Calorific Value (NCV)	NCV of LDO/ CBFS	TJ/Tonne or Kcal/Kg	M	Once for each consignment	Sample (Random)	Paper	Credit Period +2 years	The NCV of the auxiliary fuel (LDO/CBFS) would be tested in the in-house laboratory (or the values sourced from the IPCC Guidelines for Greenhouse Gas Inventories or other public domain data if not available from the laboratory test results and updated regularly).
8.	Carbon Emission Factor	Carbon Emission Factor of LDO/ CBFS	tC/TJ or tC/Kcal	M/C	Monthly	-	Electronic/Paper	Credit Period + 2years	The carbon emission factor of the auxiliary fuel (LDO/CBFS) would be sourced from the IPCC Guidelines for Greenhouse Gas Inventories or other

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									public domain data and updated regularly.
9.	Oxidation Factor	Oxidation Factor of LDO/ CBFS	%	M/C	Monthly	-	Electronic/Paper	Credit Period + 2years	The oxidation factor of the auxiliary fuel (LDO/CBFS) would be sourced from the IPCC Guidelines for Greenhouse Gas Inventories or other public domain data and updated regularly.
10.	Import of electricity	Electricity import from the grid to PCBL	kWh	m	Continuously	Total (100%)	Electronic/paper	Credit Period +2 years	MONITORING LOCATION: The data will be measured by ABT meter and then entered into the in-plant electronic data recording system (SAP system) at the plant on a shift-wise basis. SOURCE OF DATA: Electricity/ Purchase

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ID number *(Please use numbers to ease cross-referencing to D.3)*	Data type	Data Variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept	Comment
									Bills

D.2.1.2. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

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Project emissions,

$$PE_y = \sum_i Q_i \times NCV_i \times EF_i \times \frac{44}{12} \times OXID_i$$

Where,

PE_y Project emissions in year y

Q_i Mass or volume unit of fuel i (LDO/ CBFS) consumed

NCV_i Net calorific value per mass or volume unit of fuel i (LDO/ CBFS)

EF_i Carbon emissions factor per unit of energy of the fuel i (LDO/ CBFS)

$OXID_i$ Oxidation factor of the fuel i (%)

D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :

ID No.	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (Electronic/ paper)	For how long is archived data to be kept?	Comments
1. EG_{gen}	Quantitative	Total Electricity Generated	MWh/year	Online measurement	Continuously	Total (100%)	Electronic/ paper	Credit Period + 2 years	MONITORING LOCATION: The data will be measured by energy meter at plant and displayed at the DCS. Generation data is recorded in the plant log-book shift-wise and also entered in the in-plant electronic data recording system (SAP system) at the plant on a shift-wise basis. Manager In-charge would be responsible for calibration of the meters.
2. EG_{aux}	Quantitative	Auxiliary consumption of Electricity	MWh/year	Online measurement	Continuously	Total (100%)	Electronic/paper	Credit period + 2 years	MONITORING LOCATION: The data will be measured by meters at plant and displayed at the DCS. It is then entered in the plant log-book shift-wise and also entered into the in-plant monitoring system (SAP system) on a shift-wise basis. Manager In-charge would be responsible for regular calibration.
3. EG_{in}	Quantitative	Net Electricity consumed	MWh/year	Calculated	Shift-wise	Total (100%)	Electronic/paper	Credit Period + 2 years	The quantity of electricity to be consumed in-house by the plant would be

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		inhouse by PCBL							calculated as a difference of the "Total Electricity Generated" and the sum of the "Auxiliary consumption of Electricity" and "Net Electricity exported to GEB grid".
4. EG_{exp}	Quantitative	Net Electricity exported to GEB grid through Adani Exports Ltd.	MWh/year	Measured	Continuously	Total (100%)	Electronic/paper	Credit Period + 2 years	MONITORING LOCATION: The data will be continuously measured by ABT meter at point of export to GEB Grid. It will be recorded in the plant log-book and entered into the in-plant monitoring system (SAP system) on s shift-wise basis. GEB would be responsible for regular calibration of the meter as per their internal schedule that is beyond the purview of the project proponent However, based on past records, it may be said that the calibration is done by GEB once in two years.

D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :										
ID No.	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	For which baseline method(s) must this element be included	Recording frequency	Proportion of data to be monitored	How will the data be archived? (Electronic/ paper)	For how long is archived data to be kept?	Comments
5. EF_y	Emission factor	CO2 emission factor of the grid	tCO2/ MWh	Calculated	Simple OM, BM	Once during baseline estimation	Total (100%)	Electronic	During the crediting period and two years after	Calculated as weighted sum of OM and BM emission factors
6. $EF_{OM,y}$	Emission factor	CO2 operating margin emission factor of the grid	tCO2/ MWh	Calculated	Simple OM	Once during baseline estimation	Total (100%)	Electronic	During the crediting period and two years after	Calculated as indicated in the relevant OM baseline method above
7. $EF_{BM,y}$	Emission factor	CO2 Build Margin emission factor of the	tCO2/ MWh	Calculated	BM	Once during baseline estimation	Total (100%)	Electronic	During the crediting period and two years after	Calculated as [∑IFi,y*COEFi]/ [∑mGENm,y] over recently built

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		grid								power plants defined in the baseline methodology
8. $F_{i,j,y}$	Fuel Quantity	Amount of each fossil fuel consumed by each power source/ plant	t or m^3/year	Measured	Simple OM, BM	Once during baseline estimation	Total (100%)	Electronic	During the crediting period and two years after	Obtained from authorised latest local statistics
9. $COEF_{i,k}$	Emission factor coefficient	CO2 emission coefficient of each fuel type and each power source/plant	tCO2/ t or m^3	Measured	Simple OM, BM	Once during baseline estimation	Total (100%)	Electronic	During the crediting period and two years after	Calculated based on the IPCC default value of the Emission Factor, Net Calorific Value and Oxidation Factor of the fuel used by the power plants feeding to Western Regional

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										Grid
10. $GEN_{j,y}$	Electricity quantity	Electricity generation of each power source/plant	MWh/ year	Measured	Simple OM, BM	Once during baseline estimation	Total (100%)	Electronic	During the crediting period and two years after	Obtained from the authorised latest local statistics

Justification for Revision of the Monitoring Plan:

A. Auxiliary fuel consumption:

The auxiliary consumption of fuel by the boiler (LDO/CBFS) is measured on a cumulative volume (liters) basis by the cumulative type flow meters at the plant location and displayed at the DCS. The same is mentioned in the in the Monitoring Plan of the Registered PDD. This fuel consumption value is entered into CPP log books and is converted into the cumulative weight (tonnes) basis by multiplying with the specific gravity of the respective fuel. This monitoring procedure is followed in a shift-wise basis and the daily values are recorded in in-plant electronic data recording system (SAP system). The unit of measurement of the fuel consumption in liters as per the in the Monitoring Plan of the Registered PDD, whereas the parameter is recorded and archived in tonnes as per the monitoring practice mentioned above (and this value is used for emissions reduction calculations). Hence this parameter appears twice in the revised monitoring plan, once in the volumetric basis (measured data) and once more in the mass basis (archived data).

B. Specific Gravity:

The specific gravity of the LDO is measured by the laboratory analysis of sample taken from each fuel consignment arriving conducted by in-house laboratory. The specific gravity of the CBFS is measured by the laboratory analysis of sample taken from each fuel consignment arriving conducted by an independent accredited agency. The same is cross-verified from PCBL's in-house laboratory test conducted from samples taken from every fuel tanker arriving at the plant. As per the in the Monitoring Plan of the Registered PDD, the parameter monitored in this regard is density, which is a similar parameter as specific gravity. Density (unit kg/m^3) and specific gravity (a unit-less parameter) are similar parameters (density of a substance is ratio of its density to that of an equal volume of water). Hence measurement of one parameter implies measuring the other also at the same time. The Monitoring Plan has been revised to incorporate the name of the parameter monitored as specific gravity instead of density.

C. Import of electricity:

The amount of electricity imported by the plant, measured by the ABT meter (as mentioned in the Monitoring Plan of the Registered PDD), is monitored and entered into the plant log-book shift-wise. From there the same data is entered into the SAP system at the plant on a daily basis. However, for estimation of emission reductions, the value of the parameter is being taken from the electricity import bills which represent the most

conservative figure of electricity import by the plant. The Monitoring Plan has been revised to incorporate the same.

D. Net electricity export:

The amount of electricity exported outside the power plant by PCBL is measured by the ABT meter and recorded shift-wise in the plant log-book. From there it is entered into the SAP system at the plant on a daily basis. However for the purpose of emission reduction calculation, the values for the parameter under consideration are sourced from the electricity export bills which represent the most conservative figure of electricity export. The Monitoring Plan has been revised to incorporate the same.

E. Electricity generation of each power source/plant:

The in the Monitoring Plan of the Registered PDD mentions the yearly monitoring of the electricity generation at each of the power plant/source at the grid used for the calculation of the emission factor of the Western Regional Electricity Grid of India. However, the grid emission factor has been fixed ex-ante as per the in the Monitoring Plan of the Registered PDD and the same value is used for the calculation of the ex-post CER quantum. The parameter under consideration finds no relevance or participation in the CER calculation and thus may be fixed at the value determined ex-ante. The Monitoring Plan has been revised to incorporate the same.

F. Other Parameters:

Further to the revisions to the parameters monitored as mentioned above, a few more parameters have been incorporated in the Revised Monitoring Plan as per the guidance of the Monitoring Methodology:

- Net Calorific Value (NCV) of the auxiliary fuels (LDO/CBFS) used in the boiler
- Carbon Emission Factor of the auxiliary fuels (LDO/CBFS) used in the boiler
- Oxidation Factor of the auxiliary fuels (LDO/CBFS) used in the boiler