Revised Monitoring Plan

Destruction of HFC-23 at refrigerant (HCFC-22) manufacturing facility of Chemplast Sanmar Ltd

CDM Project: 0499

Implemented by:

Chemplast Sanmar Limited
Plant – I, Mettur Dam RS
Tamilnadu – 636402

Revision: 30/05/08

Revision History

Document reference	**Date**	**Applicability period**
Monitoring Plan as a part of registered PDD.[1]	Date of registration: 16/02/2007	-
Revised Monitoring Plan during first verification after EB-35.[2]	Date of approval of revision in monitoring plan: 01/02/2008	16/02/2007 to 16/11/2007
Revision in Monitoring Plan after third verification site visit.	Proposed in this document dated 30/05/08	Since 17/11/2007

[1] http://cdm.unfccc.int/UserManagement/FileStorage/12IY50M86DDL0KY9OXCGXL1KDU4RA3

[2] http://cdm.unfccc.int/Projects/DB/DNV-CUK1152277768.87/MonitoringPlanRevisions/01/RevisedMonitoringPlan

1. **Title of Project activity:**

Destruction of HFC-23 at refrigerant (HCFC-22) manufacturing facility of Chemplast Sanmar Ltd

2. **Introduction**

The purpose of the revised monitoring plan is to revise the monitoring protocol revised earlier after guidance from EB-35. The changes shall take into account the verification findings during the third verification by DOE.

The monitoring plan applicable till date was revised monitoring plan registered on 01 February 2008. (Revised monitoring plan – Registered on 01 February 2008.)

3. **Registration Details and monitoring till second verification period i.e. 16th Nov 2007.**

The project is based on approved baseline methodology, AM0001; Version 3/Sectoral Scope 11 / 13 May 2005.

Destruction of HFC-23 at refrigerant (HCFC-22) manufacturing facility of Chemplast Sanmar Ltd;

Version 1.1,

Dated 10th January 2006

4. **About the project activity.**

The project activity aims to reduce Green House Gas (GHG) emissions by decomposing HFC-23 at refrigerant (HCFC 22) manufacturing facility of Chemplast Sanmar Limited (CSL). CSL belongs to the Sanmar Group of companies. HFC-23 is an inevitable by-product generated during production of HCFC-22. HFC-23 has a high Global Warming Potential (GWP) (11700 - reference: The IPCC 2nd Assessment Report).

The project proponents have started storing HFC-23 from 17th February and the same is being incinerated and emission reductions are calculated as per estimation method described in PDD. (Project reference: 499).

5. **Revisions in Monitoring Plan**

A revision in monitoring plan is proposed as per the verification findings during third verification visit. The key findings on account of which revision in monitoring plan is requested are as follows:

- *The data types of a few parameters that are being monitored are not matching with registered monitoring plan. The difference in the detail is described as below.*

Parameter	Data type as per Monitoring methodology AM0001 version3 and according to unit used	Data type as per approved first monitoring plan
P_HFC23_y	%	Mass

$F_{\_NaOH,\ Fuel,y}$	Volume per unit mass	Mass
$F_{\_Na2SO3\ power,\ y}$	Energy per unit mass	Energy
$F_{\_Na2SO3\ fuel,\ y}$	Volume per unit mass	Mass
$Q_{\_HYDROGEN,\ y}$	Volume	Mass
$F_{\_HYDROGEN,\ Power,\ y}$	Energy per unit volume	Energy
$F_{\_HYDROGEN,\ Fuel,\ y}$	Volume per unit volume	Mass

- *The description of parameter P_HFC23 in registered monitoring plan does not match with the applicable methodology.*
- *The quantity of NaOH and Na2SO3 used in the process is not directly measured in mass units but estimated based on measured volume and estimated concentration of the solution. The formula is inserted in section D.2.3.2.*

6. Revised Monitoring Plan;

Below is revised monitoring plan to be followed during future verifications for the project activity. The changes are reflected clearly.

SECTION D. Application of a monitoring methodology and plan

D.1. Name and reference of approved monitoring methodology applied to the project activity:

Methodology: "Incineration of HFC 23 waste streams"

Reference: Revision to approved baseline methodology AM0001; Version 03/Sectoral Scope 11/13 May 2005.

D.2. Justification of the choice of the methodology and why it is applicable to the project activity:

This methodology is applicable to HFC-23 (CHF_3) waste streams from an existing HCFC-22 production facility with at least three (3) years of operating history between beginning of the year 2000 and the end of the year 2004 where the project activity occurs and where no regulation requires the destruction of the total amount of HFC-23 waste. The present project activity satisfies these conditions.

Note 1 : The revised methodology suggests "Most of the time, under normal operation, both flow meters measure the same amount of HFC 23 flows simultaneously. Where the flow-meter readings differ by greater than twice their claimed accuracy (for example 10% if the accuracy is claimed to be ±5%), then the reason for the discrepancy is investigated and the fault remedied. For the sake of conservativeness, the lower value of the two readings will always be used to estimate the HFC 23 waste flows."

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 variable & Data Type	Source of data	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)	Comment
1	*q_HFC23_y :* *Quantity of Waste Stream supplied to the destruction process* *Data Type: Mass*	*Actual Plant data*	*Tonnes -HFC*	*m*	*Continuous*	*100%*	*Electronic*	*Measured using flow meters, that are calibrated every six months and zero check is done every week.*
2	*P_HFC23_y :* *Purity of HFC23 in the waste stream supplied to the decomposition process* *Data Type: %*	*Actual plant data*	*%*	*m*	*Every shift*	*100%*	*Electronic*	*Samples to be taken from the gas stream and gas chromatography method to be used to measure purity.*
3	*ND_HFC23_y :* *Quantity of HFC23 in Gaseous*	*Actual plant data*	*Tonnes -HFC*	*m*	*Monthly*	*100%*	*Electronic*	*As per technical specifications of the plant, there will be no such discharge in the gaseous effluent and there will be automatic process control. However analysis will be carried out on monthly basis.*

	effluent from destruction process *Data Type: Mass*							

In addition the quantities of gaseous effluents (CO, HCl, HF, Cl_2 , dioxin and NOX) and liquid effluents (pH, COD, BOD, n-H (normal hexane extracts), SS (suspended solid), phenol, and metals (Cu, Zn, Mn and Cr) are measured in a manner and with a frequency that complies with local environmental regulations.

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

The emissions due to the destruction process (E_DP_y) are the emissions due to HFC-23 not destroyed in the process and the greenhouse gas emissions of the destruction process. The fuel used is hydrogen hence there won't be any emissions associated with the fuel burning. However if in future natural gas is being used for destruction process, same should be monitored as per approved methodology.

E_DPy = ND_HFC23y * GWP_HFC23 + Q_HFC23y * EF

where

E_DP_y	=	Emission due to the destruction process, tCO_2e
ND_HFC23_y	=	Quantity of HFC23 not destroyed during the year, tonnes
GWP_HFC23	=	Global Warming Potential of HFC23, tCO_2e/t HFC23
Q_HFC23_y	=	Quantity of waste destroyed in the year y, tonnes
EF	=	Emission Factor for HFC23 destruction into CO_2; value = 0.62857 (44/70)

Q_HFC23y = q_HFC23y * P_HFC23y

where

Q_HFC23_y	=	Quantity of waste destroyed in the year y, tonnes
q_HFC23y	=	Quantity of HFC23 supplied to the destruction process in the year y, tonnes
P_HFC23y	=	Purity of the HFC23 supplied to the destruction process in the year y

The quantity of HFC 23 not destroyed (ND_HFC23y) is typically small; the monitoring plan provides for its periodic on site measurement. Theoretically, HFC 23 can also leak to the water effluent and then escape to the atmosphere. This possibility is ignored because it is infinitesimally small; the solubility of HFC 23 is 0.1% wt at 25^oC water.

The project activity converts the carbon in the HFC 23 into CO_2, which is released in to the atmosphere. The quantity of CO_2 produced by the destruction process is the product of the quantity of waste HFC 23 (Q_HFC23y) destroyed and the emission factor (EF). The emission factor is calculated as follows:

EF = 44/[(molecular weight of HFC 23)/(number of C in a molecule of HFC 23)] = 44/[70/1] = 0.62857

There are no other GHG emissions related to the project activity.

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 number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (Electronic/ paper)	Comment
4	*Q_HCFC_y: The quantity of HCFC22 produced in the plant generating the HFC23 waste* *Data Type: Mass*	*Actual plant data*	*Tonnes-HCFC22*	*m*	*Monthly*	*100%*	*Electronic*	*Reference data to check cut off condition and rough estimation of Q_HFC23_y*
5	*HFC23_sold: HFC23sold by the facility generating the HFC23 waste* *Data Type: Mass*	*Actual plant data*	*Tonnes-HFC 23*	*m*	*Monthly*	*100%*	*Electronic*	*Based on actual sales data in the year*

6	*r_y The fraction of the waste stream required to be destroyed by the regulations that apply during the year y* *Data Type: %*	*National/ State/ Local Regulations*	*Fraction*	*e*	*Yearly*	*100%*	*Electronic*	*Reference to country regulation mandating the destruction of HFC 23*

D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

The baseline quantity of HFC 23 destroyed is the quantity of the HFC 23 waste stream required to be destroyed by the applicable regulations. If the entire waste stream is destroyed, Q_HFC23_y is the total amount of HFC 23 waste generated and the quantity required to be destroyed by the applicable regulations

$B\_HFC23_y = Q\_HFC23_y * r_y$ is the baseline quantity of HFC 23 destroyed during the year measured in metric tonnes.

Where r_y is the fraction of the waste stream required to be destroyed by the regulations that apply during year y. In the absence of regulations requiring the destruction of HFC 23 waste, the typical situation in non-Annex B Parties, $r_y = 0$. In the absence of regulations on HFC 23 emissions, the HFC 23 waste is typically released to the atmosphere and so, the baseline is zero destruction..

Q_HFC23_y is the quantity of waste HFC 23 destroyed during the year measured metric tonnes, and B_HFC23_y is the baseline quantity of HFC 23 destroyed during the year measured in metric tonnes. Q_HFC23_y is limited to a fraction of the actual HCFC production during the year at the beginning of the plant (Q_HCFC_y).

D. 2.2. Option 2: Direct monitoring of emission reductions from the project activity (values should be consistent with those in section E).

D.2.2.1. 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 table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (Electronic/ paper)	Comment

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

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D.2.3. Treatment of leakage in the monitoring plan

D.2.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	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)	Comment
7	*$Q\_F_{1,y}$:* *Electricity consumption by the destruction process* *Data Type: Energy*	*Actual plant data*	*kWh*	*m*	*Monthly*	*100%*	*Electronic*	*Metered as part of the process in plant.*
8	*$E\_F_{electricity,,y}$:* *Green house gas emissions factor for electricity* *Data Type: Ratio of mass and energy*	*Grid data*	*Tonne CO_2/MWh*	*e*	*Yearly*	*100%*	*Electronic*	*Presently electricity is drawn from the Grid at Tamil Nadu; Tamil Nadu is part of Southern Region Electricity Grid; Emission factor is taken for the Southern Grid*
9	*$Q\_{}_{NaOH,y}$:* *Quantity of NaOH (caustic soda) used in the process.* *Data Type: Mass*	*Actual plant data*	*Tonnes*	*m/c*	*Monthly*	*100%*	*Electronic*	*Plant operation data on NaOH consumption in process is available in terms of volume of NaOH solution used. The concentration of solution is measured on regular*

								basis and the same is used to estimate the quantity of NaOH consumed.
10	*$F_{NaOH, electricity, y}$: Electricity used for production of 1MT of NaOH* *Data Type: Energy per unit mass*	*Sourcing plant data or industry benchmark*	*kWh/ Tonne of NaOH*	*e*	*Half yearly*	*100%*	*Electronic*	*Industry data accessible in public domain to be used, if actual plant data is not available*
11	*$F_{NaOH, Fuel, y}$: Fuel used for Transportation of 1MT of NaOH* *Data Type: Volume per unit mass*	*Estimations*	*KL/Tonne of NaOH*	*e*	*Half yearly*	*100%*	*Electronic*	*Estimated based on data for the type of transport, capacity, distance from the sourcing plant, fuel type, fuel emission factor*
12	*$Q_{NA2SO3, y}$: Quantity of Na2SO3 used in the absorber process in year y* *Data Type: Mass*	*Actual plant data*	*tonnes*	*m/c*	*Monthly*	*100%*	*Electronic*	*Plant operation data on Na2SO3 consumption in the absorber section is available in terms of volume of Na2SO3 solution used. The concentration of solution is measured on regular basis and the same is used to estimate the quantity of Na2SO3 consumed.*
13	*$F_{NA2SO3, electricity, y}$: Electricity used for production of 1MT of Na2SO3* *Data Type: Energy per unit mass*	*Sourcing plant data or industry benchmark*	*kWh/ Tonne of Na2SO3*	*e*	*Half yearly*	*100%*	*Electronic*	*Industry data accessible in public domain can be used, if actual plant data is not available*
14	*$F_{NA2SO3, Fuel, y}$: Fuel used for Transportation of*	*Estimations*	*KL/Tonne of Na2SO3*	*e*	*Half yearly*	*100%*	*Electronic*	*Estimated based on data for the type of transport, capacity, distance from*

	1MT of Na2SO3 *Data Type: Volume per unit mass*							*the sourcing plant, fuel type, fuel emission factor*
15	*Q_HYDROGEN, y :* *Quantity of Hydrogen used in the destruction process in the year y* *Data Type: Volume*	*Actual plant data*	*Nm^3*	*m*	*Daily*	*100%*	*Electronic*	*Measured by the number of Hydrogen cylinders used*
16	*F_HYDROGEN, electricity, y : Electricity used for production of 1Nm3 of Hydrogen* *Data Type: Energy per unit volume*	*Sourcing plant data or industry benchmark value*	*kWh/Nm^3*	*e*	*Monthly*	*100%*	*Electronic*	*Industry data accessible in public domain can be used, if actual plant data is not available*
17	*F_HYDROGEN, Fuel, y: Fuel used for Transportation of 1Nm3 o f Hydrogen* *Data Type: Volume*	*Estimations*	*l/Nm^3*	*e*	*Monthly*	*100%*	*Electronic*	*Estimated based on data for the type of transport, capacity, distance from the sourcing plant, fuel type, fuel emission factor*
18	*Q_COMPRESSED AIR, y : Quantity of Compressed Air used in the destruction process in the year y* *Data Type: Volume*	*Actual plant data*	*Nm^3*	*m*	*Monthly*	*100%*	*Electronic*	*Plant operation data on compressed air consumptions*
19	*F_COMPRESSED AIR, electricity, y :Electricity used for production of*	*Actual plant data*	*kWh/Nm^3*	*c*	*Monthly*	*100%*	*Electronic*	*Metered as part of the operation*

	1Nm3 of Compressed Air *Data Type: Energy per unit volume*							
20	*$V_{\_NaOH, y}$:Volume of NaOH solution used in the process* *Data Type: Volume*	*Actual plant data*	*l*	*m*	*Monthly*	*100%*	*Electronic*	*Metered as part of operation.*
21	*$\ell_{\_NaOH\_y}$: Concentration of NaOH solution used in the process,* *Data Type: Density*	*Actual plant data*	*g/l*	*e*	*Monthly*	*Sample based*	*Electronic*	*Concentration of the solution is lab tested.*
22	*$V_{\_Na2SO3, y}$:Volume of Na2SO3 solution used in the absorber process* *Data Type: Volume*	*Actual plant data*	*l*	*m*	*Monthly*	*100%*	*Electronic*	*Metered as part of operation.*
23	*$\ell_{\_Na2SO3\_y}$:Concentration of Na2SO3 solution used in the absorber process* *Data Type: Volume*	*Actual plant data*	*g/l*	*e*	*Monthly*	*Sample based*	*Electronic*	*Concentration of the solution is lab tested.*

D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

Leakage is emissions of greenhouse gases due to the project activity that occur outside the project boundary. The sources of leakage due to the destruction process are:

- Greenhouse gas (CO_2 and N_2O) emissions associated with the production of purchased energy (electricity)

- Greenhouse gas (CO_2 and N_2O) emissions associated with the production of NaOH using purchased electricity
- Greenhouse gas (CO_2 and N_2O) emissions associated with the production of $Na2SO_3$ which had used electricity
- Greenhouse gas (CO_2 and N_2O) emissions associated with the production of Hydrogen using purchased electricity
- Greenhouse gas (CO_2 and N_2O) emissions associated with the production of Compressed Air using purchased electricity
- CO_2 emissions due to transport of NaOH
- CO_2 emissions due to transport of $Na2SO_3$
- CO_2 emissions due to transport of Hydrogen

$$\mathbf{L_y = \sum_i (Q\_F_{i,y} * E\_F_{i,y}) + ET_y + \sum_j (Q\_F_{j,y} * E\_F_{j,y}) + + \sum_k (Q\_F_{k,y} * E\_F_{k,y})}$$

Where

L_y = Leakage emissions in the year y, tCO_2e

$Q\_F_{i,y}$ = The quantity of energy type F_i purchased for the destruction process during year y,

$E\_F_{i,y}$ = The greenhouse gas emissions factor for energy type Fi during year y,

ET_y =The greenhouse gas emissions associated with sludge transport during year y.

$Q\_F_{j,y}$ = The quantity of energy type F_j in the production of NaOH, $Na2SO_3$, compressed air, hydrogen

$E\_F_{j,y}$ = The greenhouse gas emissions factor for energy type F_j

$Q\_F_{k,y}$ = The quantity of energy type F_k in the transportation of NaOH, $Na2SO_3$, compressed air, hydrogen

$E\_F_{k,y}$ = The greenhouse gas emissions factor for energy type F_k

a. Greenhouse gas (CO_2 and N_2O) emissions associated with the purchased energy (electricity)

In the project activity only electricity is purchased from outside, hence

$\mathbf{Q\_F_{i,y} = Q\_F_{1,y}}$ = Electricity consumption by the destruction process during year y; and

$\mathbf{E\_F_{i,y} = E\_F_{electricity,,y}}$ = Greenhouse gas emissions factor for electricity during year y , t CO_2e/MWh

The greenhouse gas emissions factor for electricity is based on the emission rate of Southern grid electricity as CSL draws its requirement exclusively from the Tamil Nadu state electricity board, TNEB grid which in turn is connected to southern region grid, $\mathbf{E\_F_{electricity,,y}}$ = 0.814 tCO_2e/MWh or 0.000814 tCO_2e released per kWh of electricity consumed at CSL.

b. CO_2 emissions due to transport of sludge to the landfill

$\mathbf{ET_y}$, the greenhouse gas emissions associated with sludge transport during year y. Since no fossil fuel based transportation takes place (manually transferred to treatment site), $ET_y = 0$.

c. CO_2 emissions due to production of NaOH, Na2SO3, compressed air, hydrogen

NaOH, hydrogen and compressed air used in the process will be produced in-house with electricity bought from TNEB. Production of these require electrical energy and hence there are GHG emissions associated with its production. $Na2SO_3$ is purchased. All these, except for the compressed air, require to be transported to the plant site.

d. CO_2 emissions due to transportation of NaOH, Na2SO3, compressed air, hydrogen

All the above, but for compressed air, need to be transported to the plant site and carried through trucks and specialized tankers. It requires fuel burning in the vehicles resulting in emissions of GHGs.

Calculation of Quantity of NaOH:

$Q\_{NaOH,\ y} = V\_{NaOH,\ y} * \ell\_{NaOH\_y} / 1000 / 1000$

Where;

$Q\_{NaOH,\ y}$ = Quantity of NaOH (caustic soda) used in the process, tonne

$V\_{NaOH,\ y}$ = Volume of NaOH solution used in the process, l

ℓ_{NaOH_y} = Concentration of NaOH solution used in the process, g/l

Calculation of Quantity of NaOH:

$Q\_{Na2SO3,\ y} = V\_{Na2SO3,\ y} * \ell\_{Na2SO3\_y} / 1000 / 1000$

Where;

$Q\_{Na2SO3,\ y}$ = Quantity of Na2SO3 used in the absorber process, tonne

$V\_{Na2SO3,\ y}$ = Volume of Na2SO3 solution used in the absorber process, l

ℓ_{Na2SO3_y} = Concentration of Na2SO3 solution used in the absorber process, g/l

D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

$$\mathbf{ER_y = (Q\_HFC23_y - B\_HFC23_y) * GWP\_HFC23 - E\_DP_y - L_y}$$

Where

ER_y	=	GHG emission reduction measured in tonnes of CO_2 equivalents (tonnes CO_2e),
Q_HFC23_y	=	The quantity of waste HFC 23 destroyed during the year measured metric tonnes,
B_HFC23_y	=	The baseline quantity of HFC 23 destroyed during the year measured in metric tonnes,
GWP_HFC23	=	The Global Warming Potential converts 1 tonne of HFC 23 to tonnes of CO_2 equivalents (tonnes CO_2e/tonnes HFC 23). The approved Global Warming Potential value for HFC 23 is 11,700 tonnes CO_2e/tonne HFC 23,
E_DP_y	=	GHG emission due to the destruction process, (tonnes CO_2e)
L_y	=	Leakage in the year y (tonnes CO_2e).

D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored		
Data *(Indicate table and ID number e.g. 3.-1.; 3.2.)*	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
D.2.1.1; 1	*Low*	*Yes. A QA & QC organization will be formed and QA & QC procedures that are equivalent to International Standards in terms of equipment and analytical method will be set. Will be measured using two flow meters in Parallel, with weekly zero check and calibration in every six months.* *QA & QC procedures are set and implemented in order to,* *1. Secure a good consistency through planning to implementation of this CDM project,* *2. Stipulate who has responsibility for what and,* *3. Avoid any misunderstanding between people and organization involved.*
D.2.1.1; 2	*Low*	*Will be measured using gas chromatography*
D.2.1.1; 3	*Low*	*Will be measured from the gas effluent of the destruction process*
D.2.1.3; 4	*Low*	*Actual HCFC 22 plant production data,*
D.2.1.3; 5	*Low*	*Actual sales record*
D.2.1.3; 6	*Low*	*Government regulations mandating destruction of HFC23, currently no regulation in this regard*
D.2.3; 7, 9,12,,15,18, 19	*Low*	*Actual project activity data*
D.2.3; 8	*Low*	*Electricity is purchased from the grid. Southern grid emission factor is used*
D.2.3; 10, 13, 16	*Low*	*Electricity consumption data for production of NaOH, Na2SO3, Hydrogen is taken from the sourcing plant or industry benchmark available in public domain*
D.2.3; 11, 14, 17	*Low*	*Fuel for transportation of NaOH,* $Na2SO_3$ *and Hydrogen to be either taken from the supplier or estimated*
D.2.3.1; 20, 22	*Low*	*Volume of NaOH and Na2SO3 is measured directly.*
D.2.3.1; 21, 23	*Low*	*Concentration of NaOH and Na2SO3 is lab tested.*

All of the measurement instruments are to be recalibrated monthly as per internationally acceptable procedures except for HFC 23 flow-meters, for which recalibration frequency is six monthly. Zero check for HFC-23 flow meters is done every week.

D.4 Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity

In order to monitor data required for estimating emission reductions because of the project activity, project operator is planning following operational and management structure.

CSL will nominate a technically qualified senior person with experience of plant operations as CDM project director. CDM project director would be responsible for overall monitoring management.

A CDM project team will be constituted with participation from relevant departments. People will be trained on CDM concept and monitoring plan. This team will be responsible for data collection and archiving. This team will meet periodically to review CDM project activity, check data collected, emissions reduced etc. On a weekly basis, the monitoring reports are checked and discussed by the team. In case of any irregularity observed by any of the CDM team member, it is informed to the concerned person for necessary actions. On a monthly basis, these reports are forwarded to CDM project director. (Refer Annex 4 of registered PDD)

D.5 Name of person/entity determining the monitoring methodology:

Chemplast Sanmar Limited

7. Conclusion:

The PP shall follow above mentioned Monitoring Plan for future Verifications