SRF's Thirteenth Monitoring report

1. Title of the project activity:

Title: GHG emission reduction by thermal oxidation of HFC 23 at refrigerant (HCFC-22) manufacturing facility of SRF Ltd;

Project Reference no.: 0115

Version: Ver 04

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Date of completion of the Thirteenth Monitoring Report Version 4: September 16, 2008

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Participants in the Project:
The project has the following participants as on date:
1. Barclays Bank PLC, UK
2. BNP Paribas S.A., UK and France
3. CER Investments 1, Netherlands
4. Citigroup Global Markets Ltd., UK
5. Climate Change Capital Carbon Fund, UK
6. EDF Trading, UK
7. ENEL Trade S.p.A., Italy
8. Goldman Sachs International, UK
9. ICECAP Trading Limited, UK
10. Natixis Corporate & Investment Bank, France
11. KfW, Germany
12. Noble Carbon Credits Ltd., UK
13. Nuon Energy Trade and Wholesale, Netherlands
14. Shell Trading International Ltd, UK
15. Solvay Fluor GmbH, Germany

Current Monitoring Period: 1 January 2008 to 31 March 2008

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2. Executive Summary:

The purpose of this monitoring report is to calculate the Greenhouse Gas emission reduction achieved by the SRF CDM project for periodic verification.

The relevant details of the project activity are given below:

S.No.	Activity	Dates
1.	Start of crediting period	1 July 2004
2.	Storage of HFC23 considered from	1 July 2004
3.	Start of thermal oxidation of stored HFC23	30 August 2005
4.	First monitoring period	1 July 2004 to 30 September 2005
5.	Second monitoring period	1 October 2005 to 31 October 2005
6.	Third monitoring period	1 November 2005 to 31 December 2005
7.	Fourth monitoring period	1 January 2006 to 28 February 2006
8.	Fifth monitoring period	1 March 2006 to 30 April 2006
9.	Sixth monitoring period	1 May 2006 to 30 June 2006
10.	Seventh monitoring period	1 July 2006 to 30 September 2006
11.	Eighth monitoring period	1 Oct 2006 to 31 January 2007
12.	Ninth monitoring period	1 February 2007 to 31 March 2007
13.	Tenth monitoring period	1 April 2007 to 30 June 2007
14.	Eleventh monitoring period	1 July 2007 to 30 September 2007
15.	Twelfth monitoring period	1 October 2007 to 31 December 2007
16.	Thirteenth Monitoring period (this person)	1 January 2008 to 31 March 2008

The emission reduction during this monitoring period (**1 January 2008 to 31 March 2008**) includes the eligible generation of HFC23 during this period, as well as a part of the HFC23 stored since July 1, 2004. The remaining part of the stored HFC23 is being carried forward into the next monitoring period. (Please refer Appendix 11)

The eligible HCFC22 production is limited to the maximum historical annual production level during any of the last 3 years from 2000 to 2004, which is 11145 MT in the case of SRF. Secondly, the ratio of HFC23 generated to HCFC22 produced is limited to the lowest ratio achieved during the last 3 years, which is 2.942%. These two values have been reported in the PDD which has been registered with the UNFCCC. These two values have been checked in Appendix 10 in accordance with the Guidance provided in the EB 39 Report Annex 8 (which is reproduced in Appendix 12 of this report):

As can be seen from Appendix 10, during the Fourth Year of this CDM Project, upto the Thirteenth Monitoring Period (ending March 31, 2008):

a) the eligible HCFC22 production is within the baseline limit (8264.975 MT < 11145 MT)

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b) The HFC 23 emission is 3.11% as against the permissible limit of 2.942% (of HCFC 22 production). This has been factored in the calculations done in Table 2 (Appendix 10) as per Guidance provided during EB 39 to arrive at the quantity of HFC 23 incineration eligible for emission reduction.

- 4th year Opening HFC 23 stock eligible for GHG emission reduction (as on July 1, 2007)….7.94 MT
- Eligible generation during the 4th year till the 13th Monitoring Period…243.156 MT
- Hence total eligible stock of HFC 23 available for incineration in the 4th year till the end of the 13th Monitoring Period…251.096 MT (=7.94 + 243.156)
- Total incineration during the 4th year till the end of the 13th Monitoring Period…254.275 MT
- Hence total incineration of HFC 23 during the 4th year till the end of the 13th Monitoring Period for which credits are being claimed…251.096 MT (=min{251.096, 254.275})
- Quantity of eligible HFC 23 incinerated during the 4th year till the end of the 12th Monitoring Period for which credits have already been issued…162.479 MT
- Hence eligible HFC 23 incinerated during the 4th year for which credits are being claimed during the 13th Monitoring Period…88.617 MT (=251.096 - 162.479)

Production of HCFC 22 is measured on daily basis using load cells. This is recorded on a daily basis and accumulated for the month. This production is reflected in Form E.R.1(Production and Sale record of each product) on monthly basis and is the final authentic legal document which is used by Central Excise Authority for taxation and other regulatory purposes.

The thermal oxidation of HFC23 is being carried out from the HFC23 stored since 1 July 2004.

The HFC 23 generated during the HCFC 22 production run is stored before being fed to the incinerator. This HFC 23 is incinerated in campaigns when a reasonable amount of HFC 23 has collected in storage as it is not very efficient to run the incineration plant on a daily basis with sub-optimal load. Besides lack of sufficient HFC 23 for incineration, the incinerator may remain shut for other reasons such as: planned maintenance, unplanned stoppages, non-availability of fuel etc. Accordingly, for a combination of factors, the incineration plant was not operated for 298.02 hours in Jan' 08, 413.54 hours in Feb' 08 and 535.50 hours during Mar' 08.

The HFC23 supplied to the incinerator is monitored using two mass flow meters placed in series in line with the PDD. We have put in place a system which automatically cumulates the lower instantaneous reading of the two flow meters. This was based on the proposed revision to the methodology AM0001 by the Meth Panel, which was approved during EB24 meeting and made effective as per AM0001 ver4 dated 19 May, 2006.

Calibration of mass flow meters: Our project is registered under AM0001 version 3. AM0001 ver4 dated 19 May, 2006 requires that the flowmeters in projects approved under AM0001 ver 4 be calibrated every six months by an officially accredited entity. During the Twelfth Monitoring Period, we got the old set of mass flowmeters dismantled and a fresh set of duly calibrated mass flow meters installed under SGS supervision on Nov 27, 2007.

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The **total of Certified Emission Reduction units being claimed** in this monitoring period is **1,035,668** tCO2e.

3. Reference

The project is categorised in sectoral scope 11: "Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride".

Approved Baseline methodology: AM0001/ Version 3, applied to this project, has its Sectoral Scope 11.

Guidance on Accounting Eligible HFC 23 as provided in EB 39 Annex. 8.

Project Design Document: GHF emission reduction by thermal oxidation of HFC 23 at refrigerant (HCFC-22) manufacturing facility of SRF Limited. Version 5 dated October 15, 2005

4. Definitions in the report

PDD: Project Design Document
GHG: Greenhouse Gases
IPCC: Intergovernmental Panel on Climate Change

5. General description of the project

5.1. Project Activity

SRF Limited (hereinafter referred to as SRF) manufactures refrigerant gases in its plant in Jhiwana, Rajasthan, India. The refrigerant plant, commissioned in 1989, produces both CFCs (CFC 11 & CFC 12) and HCFC 22 alternately on campaign basis. HFC 23 is generated as a waste stream during the manufacturing of HCFC 22. The main objective of the CDM project is to reduce greenhouse gas (GHG) emission through the destruction of HFC 23 gases, using the thermal oxidation system. Since there are no regulations restricting the emission of HFC 23 in India, SRF has been releasing this gas into the atmosphere before the identification of this project as a Clean Development Mechanism (CDM) project under the Kyoto Protocol.

The project involves storage of HFC 23 and its incineration. SRF has initiated storage of HFC 23 since April 2004. The thermal oxidation facility has been commissioned end August 2005. The starting date of the crediting period is 1st July 2004. The project has been registered by the UNFCCC on December 24, 2005 (project reference 115). Twelve issuances of CERs have been made to the CDM Registry Pending Account on January 16, 2006, February 15, 2006, May 15, 2006 (two issuances) July 3, 2006, Sept. 03, 2006, Nov 2, 2006, March 21, 2007, June 01, 2007 Nov 5, 2007 and August 2, 2008.

5.2. Technical description of the project

Location of the project activity

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The project is located at SRF's existing refrigerant production facility at Village Jhiwana, Tehsil Tijara, District Alwar, Rajasthan. The site is about 70 km from Delhi, which is also the nearest airport.

Technology employed by the project activity

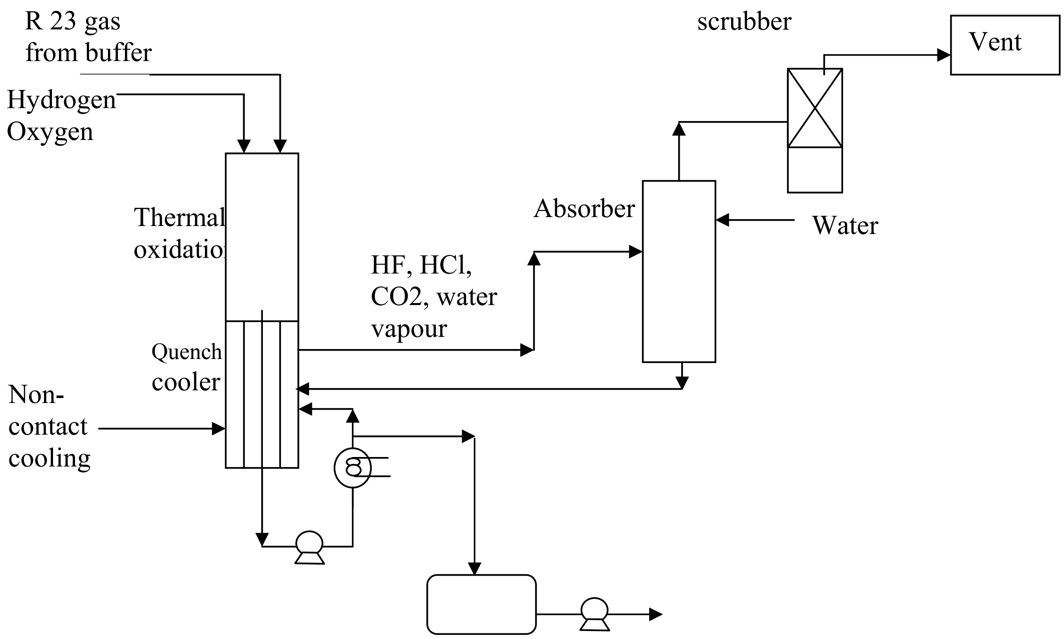
The project involves collection, storage and thermal oxidation of HFC 23 gas being generated as a waste from the HCFC 22 production.

The thermal oxidation facility has a design capacity to handle the entire emission of HFC 23 from HCFC 22 plant as well as any stored HFC 23 prior to the commissioning of this facility.

The thermal oxidation system has the following facilities as part of the system:

- Thermal oxidation chamber
- Direct Quenching system
- Absorption and Scrubbing
- Storage and piping for hydrogen / oxygen with adequate safety systems
- Storage of HFC 23 prior to commissioning

The schematic is as shown below:



The process thermally oxidises HFC 23 at a very high temperature in excess of 1200 deg C in an oxidation chamber (furnace). As HFC 23 has low calorific value, a small quantity of Hydrogen gas, as supplement fuel, along with oxygen is introduced into the oxidation chamber. The oxidation temperature of more than 1200 deg C ensures that dioxins are not formed.

In this technology of thermal oxidation, HFC 23 (containing traces of HCFC 22) is oxidised to CO_2, HF and HCl as per the following reactions:

— $2 H_2 + O_2 \Rightarrow 2 H_2O$

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— CHF_3 (=HFC 23) + H_2O + ½ O_2 ⇨ CO_2 + 3 HF
— $CHClF_2$ (=HCFC 22) + H_2O + ½O_2 ⇨ CO_2 + 2 HF + HCl

As can be seen from the above reactions, oxygen and hydrogen are necessary to ensure complete conversion of halogens in HFC 23 gases to the respective hydrogen halides. The resulting gaseous products of thermal oxidation are mainly carbon dioxide (CO_2), water vapour (H_2O), hydrogen fluoride (HF), hydrogen chloride (HCl), nitrogen (N_2) and oxygen (O_2).

The gaseous output is cooled in the bottom of the quench chamber and absorbed in water to form dilute hydrofluoric acid to be recovered as aqueous solution (a by-product).

The weak residual gas (comprising mainly of inert gases) leaves the quench chamber and fed into the bottom of the scrubber section. It passes through the scrubber tower counter-current to the flow of absorption agent, which is fed from the top of the scrubber. The scrubbed gases comprising N_2, O_2 and CO_2 with low levels of moisture, emanating from the vent scrubber are then discharged to atmosphere via an exhaust stack. Discharge to atmosphere is at an elevation as per national statutory regulations.

The effluent from the process which was being sent to the Effluent Treatment Plant earlier is now being recycled back into the process with effect from April 6, 2006.

SRF Limited has chosen technology and equipment for thermal oxidation that meets the stack emission norms complying with the Indian norms as stipulated by the Ministry of Environment and Forests, Government of India.

Based on the guarantees offered by the process licensors and plant suppliers, more than 99.99% of feed HFC 23 is destroyed. The technology is a proven one and plants with similar technology are operating in Germany. The decomposition plant is very reliable and capable of delivering complete destruction of HFC 23. Necessary safety features are built into the process design. They include excess pressure safety device, control of conditions that are a departure from design, burner safety and provision of flame arrestors. The safety norms are in accordance with national regulation on safety and include international best practices wherever applicable.

HFC 23 produced during HCFC 22 production first goes into a buffer tank.. When the Thermal Oxidation Plant is running, HFC 23 is fed to the Thermal Oxidation System from the Buffer Tank. (Please refer Annexure 7 of the PDD titled 'Diagram showing Source of HFC 23 emission').

During the time when HCFC 22 plant is running but the Thermal Oxidation Plant is not operational, we continue to store HFC 23 in the buffer tank. This ensures that there is no leakage from the buffer tank when Thermal Oxidation Plant is not working (stoppages and shutdowns).

It is a closed system between the buffer tank and the Thermal Oxidation Plant with a vent only after the Thermal Oxidation incineration facility. The following steps are part of the Standard Operating Procedure to detect if there is any leakage of HFC 23 when the Thermal Oxidation Plant is stopped:

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1. Soap Solution Bubble test is carried out for the entire buffer tank outlet as per internal Standard Operating Procedure;
2. Analysis of the vent at the Thermal Oxidation Plant is carried out just after closure of the Thermal Oxidation Plant;
3. Analysis of the vent at the Thermal Oxidation Plant is carried out on a weekly basis
4. The mass flowmeter readings on the Distributed Control System (DCS) panel are monitored

As per the registered PDD, DG based power is to be used in thermal oxidation plant (project activity). Deviation regarding change in source of electricity required for common utilities at the site (which also feed to Thermal Oxidation system) from the Diesel Generating sets to a mix of electricity generated by the Diesel Generating sets and Coal based Captive Power Plant was sought from UNFCCC in Jan' 08. This was duly approved in the 38^{th} EB meeting. The Thermal Oxidation system continues to draw electricity from Diesel based Generating set.

6. Monitoring methodology and plan:

Approved monitoring methodology AM-0001/ version 3 is applied to this project.

This methodology is applicable to HFC 23 (CHF_3) waste streams from an existing HCFC22 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 HFC23 waste. The present project activity satisfies these conditions.

Data being collected in order to monitor the GHG reduction is given in the table below:

ID number	Data Type	Data variable	Data unit	Recording frequency	Reference
1. q_HFC23y	*Mass*	*Quantity of HFC 23 supplied to the destruction process*	*kg-HFC*	*monthly*	*Appendix 1*
2. P_HFC23y	*%*	*Purity of the HFC 23 supplied to the destruction process*	*%*	*monthly*	*Appendix 2*
3. Q_NGy	*Mass*	*Quantity of gas (or fossil fuel) used (if any) by the destruction process*	*m3*	*monthly*	*Appendix 3*
4 ND_HFC23y	*Mass*	*Quantity of HFC 23 in gaseous effluent*	*kg-HFC*	*monthly*	*Appendix 4*
5. $Q\_F_{power,y}$	*Energy*	*Electricity consumption by the destruction process*	*kWh*	*monthly*	*Appendix 5*
6. $Q\_F_{steam,y}$	*Energy*	*Steam consumption by the destruction*	*Kg-steam*	*monthly*	*Appendix 6*

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ID number	Data Type	Data variable	Data unit	Recording frequency	Reference
		Process			
7. Q_HCFCy	*Mass*	*The quantity of HCFC22 produced in the plant generating the HFC 23 waste*	*tonnes - HCF C22*	*monthly*	*Appendix 7*
8. HFC23_sold	*Mass*	*HFC 23 sold by the facility generating the HFC 23 waste*	*tonnes -HFC 23*	*monthly*	*Appendix 8*
9. HFC23y_storage	*%*	*Purity of the HFC 23* of storage	*%*	*Weekly by sampling*	*Appendix 9*

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 every six months to ensure compliance with environmental regulations.

7. Quality Control (QC) and Quality Assurance (QA)

7.1. Quality Management System

The thermal oxidation plant is operated by Company operating personnel. The CEO has assigned the responsibility of the project management as also for monitoring, measurement and reporting to the Head of Works who is being assisted by Chief Manager (Production).

The operation, data transfer and reporting procedures are incorporated into the ISO 9001 procedure with the company.

The personnel have been trained by the technology and equipment suppliers i.e. M/s Solvay Fluor GmbH, Germany and M/s SGL Acotec GmbH, Germany respectively.

7.2. Quality control (QC) and quality assurance (QA) procedures that are being undertaken for data monitored

In SRF, the QA & QC procedures are equivalent to applicable International Standards as well as standards given by the technology supplier M/s Solvay Fluor and major equipment supplier M/s SGL Acotec, in terms of equipment and analytical methods. The QA & QC procedures are set and implemented in order to:

1. Secure a good consistency through planning to implementation of this CDM project and,
2. Stipulate who has responsibility for what and,
3. Avoid any misunderstanding between people and organization involved.

Data *(Indicate table and ID number e.g. 3.-1.; 3.2.)*	Uncertainty level of data (High/Medium/Low)	QA/QC procedures undertaken for these data, or why such procedures are not necessary.

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Data *(Indicate table and ID number e.g. 3.-1.; 3.2.)*	Uncertainty level of data (High/Medium/Low)	QA/QC procedures undertaken for these data, or why such procedures are not necessary.
1. q_HFC23y	*Low*	*The flow is measured using two flow meters in series with weekly calibration through Zero check.* *The lower of the two flows is considered for calculation of CERs.*
2. P_HFC23y	*Low*	*Measured using gas chromatography*
3. Q_NGy	Low	*Metered using Hydrogen gas meter*
4. ND_HFC23y	*Low*	*Measured from the gas effluent of the destruction process gas chromatography*
5. Q_F1,y	*Low*	*Metered using electricity meter and estimated with actual load for common supplies*
6. Q_F2,y	*Low*	*Metered using steam meter (Steam not used in the process)*
7. Q_HCFCy	*Low*	*Production of HCFC 22 is measured on daily basis using load cells. This is recorded on a daily basis and cumulated for the month. This production is reflected in Form E.R.1(Production and Sale record of each product) on monthly basis and is the final authentic legal document which is used by Central Excise Authority for taxation and other regulatory purposes.*
8. HFC23_sold	*Low*	*Obtained from production records of the facility where the HFC 23 waste originates*
9. HFC23y_storage	*Low*	*Same as data id 1*

7.3. Calibration/Maintenance of Measuring and Analytical Instruments

All measuring and analytical instruments are being calibrated as per the methodology AM0001 and created as a protocol in SRF's Quality management system procedures.

The maintenance methods and procedures have been incorporated as part of the ISO 9000 procedures and form an integral part of the systems and procedures for the organization.

7.4. Environmental Impact

After commissioning the Thermal oxidation plant, regular analysis/verification of the gaseous effluents was carried out to verify the gaseous releases and effluents discharged from the plant. The table below provides the details of the gaseous effluents and liquid effluent analysis. As evident from the data, the plant operation has been within compliance of the environmental standards.

Table showing analysis Gaseous Emission for Thermal Oxidation plant

Parameter	Value as per applicable standard	Actual analysis
CO, mg/Nm3	50 max	< 2

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Parameter	Value as per applicable standard	Actual analysis
HCl, mg/Nm3	10 max	< 1.52
HF, mg/Nm3	1 max	< 0.42
NOx, mg/Nm3	200 max	40-60
Cl2, mg/Nm3	15	< 0.3
Dioxin, ng/Nm3	0.1 max	0.004(max.)
Total organics in vent	30 mg/m3	Nil

Table showing analysis of Liquid discharge from the Thermal Oxidation plant to Effluent Treatment Plant.

Parameter	Value as per standard	Actual analysis
HF, %	1	Nil*

* With effect from April 6, 2006, the effluent being generated from the process is recycled back into the process. Earlier it was being sent to the E.T.P.

8. GHG Calculations

Statement of GHG emission reduction in 11th monitoring period.

As suggested by the methodology (AM0001/Version 3), the GHG emission reduction, (ER_y), achieved by the project activity for a given year is

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

8.1. Calculation of Q_HFC23_y

The quantity of waste HFC 23 destroyed (Q_HFC23_y) would be calculated as the product of the quantity of waste HFC 23 supplied to the thermal oxidation process (q_HFC23_y) measured in metric tonnes and the purity of the waste HFC 23 (P_HFC23_y) supplied to the destruction process that would be determined and expressed as the fraction of HFC 23 in the waste. [$Q\_HFC23_y = q\_HFC23_y * P\_HFC23_y$].

Parameter	Value	Reference
Q_HFC23_y	88.549.10 MT	Calculated =79.478*99.9275% +9.139*99.8872%
q_HFC23_y	88.617 MT	Appendix 1
P_HFC23_y	• 99.9275% for 79.478 MT • 99.8872% for 9.139 MT	Appendix 2

8.2. Calculation of B_HFC23_y

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,

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Q_HFC23_y is the total amount of HFC 23 waste generated and the quantity required to be destroyed by the applicable regulations is: $\mathbf{B\_HFC23_y = Q\_HFC23_y * r_y}$.

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 $r_y = 0$. Absent regulations on HFC 23 emissions, the HFC 23 waste is typically released to the atmosphere so the baseline is zero destruction

Parameter	Value	Reference
B_HFC23_y	0 MT	Calculated
Q_HFC23_y	88.54910 MT	Calculated (ref section 8.1)
r_y	0%	No regulation for destruction in India

8.3. Calculation of E_DP_y

The emissions due to the destruction process (E_DP_y) are the emissions due to any fossil fuel use, the emissions of HFC 23 not destroyed and the greenhouse gas emissions of the destruction process. Thus:

$$\mathbf{E\_DP_y = ND\_HFC23_y * GWP\_HFC23 + Q\_NG_y * E\_NG_y + Q\_HFC23_y * EF}$$

Where
ND_HFC23_y = quantity of HFC 23 not destroyed during the year,
Q_NG_y = the quantity of natural gas or any fossil fuel used by the destruction process during the year measured in cubic-metres (m^3), and
E_NG_y = the emissions coefficient for fossil fuel combustion measured in tonnes CO_2 equivalent per cubic metre of natural gas (t CO_2e/m^3).

The quantity of HFC 23 not destroyed (ND_HFC23_y) is typically small.. In SRF project the fraction not destroyed is 0.01% as per guaranteed and achieved combustion efficiency of 99.99%. The monitoring plan provides for the periodic on site measurement of ND_HFC23_y.

As stated in section D.2.1.2. of the approved Project Design Document Version 2, the quantity of HFC 23 not destroyed (ND_HFC23y) is typically small. In SRF project, the fraction not destroyed is 0.01% as per guaranteed combustion efficiency of 99.99%. Hence, although no leaks were detected, 0.01% * Q_HFC23_y * 11,700 = 103.6024 MT of Carbon Dioxide may not have been destroyed during the Thirteenth Monitoring Period. This has been considered in the calculation of E_DP_y

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°C water.

The thermal destruction process converts the carbon in the HFC 23 into CO_2, which is released to the atmosphere. The quantity of CO_2 produced by the destruction process is the

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product of the quantity of waste HFC 23 (Q_HFC23_y) 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

The thermal destruction process also produces a small quantity of NOx emissions. The NOx emissions, on a CO_2 equivalent basis, are a small fraction of the CO_2e emissions and so are ignored.

Further, the project uses Hydrogen and oxygen in the destruction process, hence, project emission due to usage of fuel for HFC 23 destruction is 'zero'. Therefore,
$Q\_NG_y * E\_NG_y = 0$

Therefore, in case of SRF project for the reference monitoring period,

$$E\_DP_y = ND\_HFC23_y * GWP\_HFC23 + Q\_HFC23_y * EF$$

Or

$$E\_DP_y = 0.0001 * 88.54910 * 11700 + 88.54910 * 0.62857$$

Or

$$E\_DP_y = 159.2617\ tCO_2e$$

Parameter	Value	Reference
E_DP_y	**159.2617** Tco_2e	Calculated above
ND_HFC23_y	0.0098146 MT	Computed from (1-DRE/100) and Q_HFC23_y above
GWP_HFC23	11700	IPCC guidelines
Q_NG_y	63111 Nm3	Appendix 3
E_NG_y	0 (for Hydrogen)	IPCC for Hydrogen
Q_HFC23_y	88.54910 MT	Calculated (Refer section 8.1)
EF	0.62857	CO2 eqvt generated by HFC23 oxidation

8.4. Calculation of L_y

L_y 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 NOx) emissions associated with the production of purchased energy (steam and/or electricity)
- CO_2 emissions due to transport of dilute HF to nearby markets.
- CO2 emissions due to transport of O2 & H2 to the location of project activity

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- CO2 emission due to Lime manufacturing used for treatment of effluent stream in the ETP

Since the project activity at SRF does not use steam, its contribution on the leakage shall be NIL.

L_y = leakage considered in the SRF project as a conservative measure

$$L_y = Q_{CaO, y} * E\_F_{Lime,,y} + Q_{40\%HF, y} * F_{Transport, y} * E\_F_{Transport\ Fuel} + Q_{O2, y} * F_{Transport, y} * E\_F_{Transport\ Fuel} + Q\_F_{power, y} * E\_F_{power, y}$$

L_y = Emissions on account of lime + emissions on account of transport of dilute HF + Emissions due to power consumption due to project activity
$Q_{CaO, y}$ = Quantity of CaO (lime) used in ETP on account of the thermal oxidation system in the year y
$Q_{40\%HF, y}$ = Dilute HF generated from the process in the year y
$Q\_F_{power, y}$ = Amount of power consumed for the project activity, kWh
$E\_F_{Lime, y}$ = CO2e emissions in the production of 1 MT of Lime = 785 kg CO2 /tonne high calcium lime
$F_{Transport, y}$ = 0.011 MT of Diesel/ Tonne of 40% HF and 0.014 MT of Diesel / tonne of oxygen or hydrogen
$E\_F_{Transport\ Fuel}$ = CO2 released per MT of Transport Fuel, which is same as that released when Diesel is used.= CO2 released per MT of Fuel used is 3.2688 MT
$E\_F_{power, y}$ = CO2 generated per unit power obtained based on Diesel Generating sets at SRF (0.72 kg of CO2 released per Kwh of power consumed)

$$L_y = Q_{CaO, y} * E\_F_{Lime,,y} + Q_{40\%HF, y} * F_{Transport, y} * E\_F_{Transport\ Fuel} + Q_{O2, y} * F_{Transport, y} * E\_F_{Transport\ Fuel} + Q\_F_{power, y} * E\_F_{power, y}$$

Or

$$L_y = 2.275 * 0.785 + 247.907 * 0.0693 * 3.2688 + 101.18 * 0.011 * 3.2688 + 187388 * 0.72/1000$$

Or

L_y = 196.5011813 tCO_2e

Parameter	Value	Reference
L_y	196.5011813 tCO_2e	Calculated above
$Q_{CaO, y}$	2.275MT	91 days operation @ 25 kg per day
$E\_F_{Lime,,y}$	0.785	IPCC figure
$Q_{40\%HF, y}$	247.907 MT	Sale figure based on Excise return
$F_{Transport, y\ (for\ HF)}$	0.0693	Based on IPCC figure for HSD and

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Parameter	Value	Reference
		estimated distance travel data. Maximum distance of 1250 km where DHF is sold has been used for calculating this value.
F $_{Transport, y}$ For Hydrogen and Oxygen)	0.011	Based on IPCC figure for HSD and estimated distance travel data
E_F $_{Transport Fuel}$	3.2688	IPCC figure for HSD
Q $_{O2, y}$	83.08 MT	Total $O_2 + H_2$ consumed in monitoring period
oF $_{Transport, y}$	0.014 (for Oxygen/ Hydrogen)	Based on IPCC figure for HSD and estimated distance travel data
Q_F $_{power, y}$	187388 kwh	Appendix 5
E_F $_{power, y}$	0.72 kg/kwh	Standard norms for High Speed Diesel

8.5. Calculation of ER_y

The total emission reduction achieved by this project activity during the Thirteenth monitoring period is therefore,

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

Or,

$$ER_y = (88.54910 - 0) * 11700 – 159.2617 – 196.5012$$

Or,

$$ER_y = 1,035,668 \text{ CERs}$$

P.S.: On a conservative basis, 1,035,668 CERs are being claimed as the emission reduction during the Thirteenth Monitoring Period.

8.6. Check against Baseline requirements

To exclude the possibility of manipulating the production process to increase the quantity of waste, the quantity of HFC 23 waste (Q_HFC23_y) is limited to a fraction (w) of the actual HCFC production during the year at the originating plant (Q_HCFC_y).

$$Q\_HFC23_y \leq Q\_HCFC_y * w$$

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Where Q_HCFC_y is the actual production of HCFCs during the year at the plant where the HFC 23 waste originates measured in metric tonnes. Q_HCFC_y is limited to the maximum historical annual production level during any of the last three (3) years between beginning of the year 2000 and the end of the year 2004 at this plant defined (in tonnes of HCFC22) as the maximum (annual) production during any of the last three (3) years, including CFC production at swing plants adjusted appropriately to account for the different production rates of HCFC22 and CFCs.

The maximum historical annual production of HCFC22 in SRF during the last three years performance (2002, 2003, and 2004) was 11,145 metric tonnes including CFC production adjusted appropriately to account for the different production rates of HCFC22 and CFCs. Therefore,

Q_HCFC_y is limited to 11,145 metric tonnes.

The coefficient w is the waste generation rate (HFC 23)/ (HCFC 22) for the originating plant. The quantity of HFC 23 used to calculate this coefficient is the sum of HFC 23 recovered for sale plus the waste HFC 23. The historical waste generation shall be estimated for the three (3) most recent years of operation up to 2004.

The lowest waste generation rate occurred in 2002 at 2.942%.

The coefficient w is therefore limited to 2.942%.

The check against these baseline requirements have been made in Appendix 10. It is found that during the Fourth Year of this CDM Project, up to the Thirteenth Monitoring Period (ending March 31, 2008):

a) the eligible HCFC22 production is within the baseline limit (8264.975 MT < 11145 MT)
b) The HFC 23 emission is 3.11% as against the permissible limit of 2.942% (of HCFC 22 production). This has been factored in the calculations done in Table 2 (Appendix 10) as per Guidance provided during EB 39 to arrive at the quantity of HFC 23 incineration eligible for emission reduction.
    - 4^{th} year Opening HFC 23 stock eligible for GHG emission reduction (as on July 1, 2007)….7.94 MT
    - Eligible generation during the 4^{th} year till the 13^{th} Monitoring Period…243.156 MT
    - Hence total eligible stock of HFC 23 available for incineration in the 4^{th} year till the end of the 13^{th} Monitoring Period…251.096 MT (=7.94 + 243.156)
    - Total incineration during the 4^{th} year till the end of the 13^{th} Monitoring Period…254.275 MT (=min{251.096, 254.275})
    - Hence total incineration of HFC 23 during the 4^{th} year till the end of the 13^{th} Monitoring Period for which credits are being claimed…251.096 MT
    - Quantity of eligible HFC 23 incinerated during the 4^{th} year till the end of the 12^{th} Monitoring Period for which credits have already been issued…162.479 MT
    - Hence eligible HFC 23 incinerated during the 4^{th} year for which credits are being claimed during the 13^{th} Monitoring Period…88.617 MT (=251.096 - 162.479)

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Appendix 1

Name of item	q_HFC23y
Description	Quantity of HFC 23 supplied to the destruction process
Value in period	88.617 MT
Method of monitoring	Mass flowmeters – 2 in series.
Recording frequency	Monthly
Calculation method	Two flowmeters are placed in series. The instantaneous lower of the two measurements is taken as the figure
Calibration details	Compliance to calibration requirements as laid down in AM0001 ver 5

Lowest of	**Jan-08**	**Feb-08**	**Mar-08**	**Total(Kg)**	**Total(MT)**
instantaneous minimum during the Thirteenth Monitoring Period	38749.00	26675.00	14054.00	**79478.00**	**79.4780**

Quantity of incineration during the 4th year which is eligible for emission reduction in excess of quantity incinerated during the 13th Monitoring Period (MT) as per EB 39 Annex. 8 Guidelines	9.139
Excess incineration done during the 12th Monitoring period which was not considered for emission reduction calculations (MT)	12.318
Total quantity of eligible HFC 23 supplied to the destruction process (MT) for which credit is being claimed during the Thirteenth Monitoring Period (=79.478 + 9.139)	88.617

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Appendix 2

Name of item	P_HFC23y
Description	**Purity of the HFC 23 supplied to the destruction process**
Value in period	99.9234%
Data Source	GC analysis data about HFC 23
Method of monitoring	Measured using Gas Chromatography.
Recording frequency	Monthly
Background data	GC Chart/ procedure of GC analysis
Calculation method	Average of the weekly analysis for a month

Month-year	Week 1	Week 2	Week 3	Week 4	Week 5	Average
Jan-08	99.9497%	99.9161%	99.9316%	-	-	99.9325%
Feb-08	-	-	99.9374%	99.9281%	-	99.9328%
Mar-08	99.9039%	-	-	-	-	99.9039%

Weighted average of purity figures:

Month-year	Average Purity	Quantity of HFC23 supplied to destruction Process q_HFC23y (kg)	Quantity of waste HFC23 destroyed Q_HFC23y (kg)
Jan-08	99.9325%	38749	38722.84
Feb-08	99.9328%	26675	26657.07
Mar-08	99.9039%	14054	14040.49
Total		79478	79420.41
Weighted average purity of qty incinerated during the 13th Monitoring Period%	99.9275%		

Quantity of incineration during the 4th year which is eligible for emission reduction in excess of quantity incinerated during the 13th Monitoring Period(kg) as per EB 39 Annex 8 Guidelines	9139.00
Excess incineration done during the 12th Monitoring period which was not considered for emission reduction calculations(kg)	12318.00
Weighted average purity of HFC 23 incinerated during the 12th Monitoring Period	99.8872%
Gross incineration eligible for emission reduction (kg)	88549.10
Overall weighted average purity of HFC 23 supplied to the destruction process (={79420.41+9128.69}/{79478+9139})	99.9234%

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Appendix 3

Name of item	Q_NG_y
Description	Quantity of Hydrogen gas used by the destruction process
Value in period	63111.00 m^3 (Normal)
Data Source	Hydrogen consumption data
Recording frequency	Monthly
Background data	Log sheet record/ flowmeter

Month – year	Q_NG_y m^3 (Normal)
Jan-08	31787.10
Feb-08	19772.85
Mar-08	11551.05
Total for Jan' 08-Mar' 08	63111.00

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Appendix 4

Name of item	ND_HFC23y
Description	Quantity of HFC 23 in gaseous effluent
Value in period	Actual vent analysis done during theThirteenth monitoring period shows that no HFC 23 was released. As stated in section D.2.1.2. of the approved Project Design Document Version 2, the quantity of HFC 23 not destroyed (ND_HFC23y) is typically small. In SRF project, the fraction not destroyed is 0.01% as per guaranteed combustion efficiency of 99.99%. Hence, although no leaks were detected, 0.01% * Q_HFC23y * 11,700 may not have got destroyed during the Thirteenth Monitoring Period. Hence
Recording frequency	Monthly
Background data	GC chart
Calculation method	When the thermal oxidizer stops, analysis of the effluent gas is done to check leaked HFC 23 by sampling. Actual analysis result in the monitoring period HFC 23 not detected.

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Month – year	ND_HFC23y Kg
Jan-08	Not detected
Feb-08	Not detected
Mar-08	Not detected
Total for Jan-Mar' 08	0

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Appendix 5

Name of item	Q_Fpower,y
Description	Electricity consumption by the destruction process
Value in period	187,388 KWH
Recording frequency	Monthly
Background data	Energy meter reading for Inside Battery Limit (ISBL) motors + connected load
Calculation method	Based on estimates for connected load for HFC 23 storage and thermal oxidation activity.

Electricity consumption in SRF's HFC 23 destruction facility is metered through two meters – Meter 1 and Meter 2. Apart from this, the Thermal Oxidation system draws on common utilities at the site such as cooling water, Reverse Osmosis water and air which are shared by operations of Refrigerants Plant, Hydrofluoric acid plant, Filling Station and Thermal Oxidation Plant The consumption of common utilities has been estimated @ 20% of the overall electricity consumption. Accordingly, the total consumption by this method comes to: 38885/0.8 = 48606 KwH. (As shown in Table 1 below)

For the purpose of arriving at project emissions, SRF also calculates power consumption using a maximum connected load of 200 Kw which is multiplied by the number of running hours. This works out to 187388 KwH for the Thirteenth Monitoring Period as shown in Table 2 below:

Table 1

Date	Jan-08	Feb-08	Mar-08	Total Power consumption(KWH)	Emission Factor applied (MT of CO_2 released per KwH of power consumed)	Actual emissions for the power consumed (MT of CO_2)
Consumption – Meter 1(KWH)	5420	13710	12540	31670	0.72/1000	22.8
Consumption – Meter 2(KWH)	3320	2137	1758	7215	0.72/1000	5.19
Sub-Total of Total metered consumption				**38885**	**0.72*/1000**	**27.99**
Estimated consumption of common utilities (KWH) (20 % of total consumption.)				9721	1.30**/1000	12.64
Total Power consumption(KWH) – Jan-Mar.' 08				**48606**		**40.63**

* Emission factor for High Speed Diesel; ** Default Emission factor for power drawn from fossil fuel based Captive Power Plant.

Table 2

Month-Year	Estimated Load KW	No. of hours operated Hours	Electricity consumption KWH	Emission Factor applied (MT of CO_2 released per KwH of power consumed)	Emissions considered for the power consumed (MT of CO_2)
Jan-08	200	445.98	89,196	0.72/1000	47.66
Feb-08	200	282.46	56,492	0.72/1000	40.67
Mar-08	200	208.50	41,700	0.72/1000	30.02
Total for Jan-Mar.' 08			**187,388**	**0.72/1000**	**118.35**

To be very conservative, higher of the above two figures are used for calculation of Leakages due to Power Consumption.

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Appendix 6

Name of item	Q_Fsteam,y
Description	Steam consumption by the destruction process
Value in period	0 Kg
Recording frequency	Monthly
Calculation method	Steam is not utilised in the thermal oxidation process. Therefore, Nil value is considered

Month – year	Steam consumption Kg
Total for Jan-March' 08	Nil

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Appendix 7

Name of item	Q_HCFCy
Description	The quantity of HCFC 22 produced in the plant generating the HFC 23 waste
Value in period	3012.134 MT
Recording frequency	Monthly
Background document	Excise Returns filed with Central Excise Department, Government of India*
Calculation method	Data from the Excise return is taken

* *Production of HCFC 22 is measured on daily basis using load cells. This is recorded on a daily basis and cumulated for the month. This production is reflected in Form E.R.1(Production and Sale record of each product) on monthly basis and is the final authentic legal document which is used by Central Excise Authority for taxation and other regulatory purposes.*

Period	Q_HCFCy MT
July 1, 2004 to June 30, 2005 (full year)	8,004.408
July 1, 2005 to June 30, 2006 (full year)	10,527.481
July 1, 2006 to June 30, 2007 (full year)	10,694.814
July 1, 2007 to Mar 31, 2008 (9 months)	8264.975

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Appendix 8

Name of item	HFC23_sold
Description	HFC 23 sold/ captively consumed by the facility generating the HFC 23 waste
Value in period	0 MT HFC 23
Recording frequency	Monthly
Background document	Excise Returns filed with Central Excise Department, Government of India
Calculation method	Data from the Excise return is taken

Month – year	HFC_sold MT
Jan 01-Mar 31, 2008	0

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Appendix 9

Name of item	HFC23y_storage
Description	Purity of the HFC 23 stored
Value in period	99.9314%
Data Source	GC analysis data about HFC 23
Method of monitoring	Measured using Gas Chromatography.
Recording frequency	Monthly
Background data	GC Chart/ procedure of GC analysis
Calculation method	Average of the weekly analysis for a month

Month-year	Week 1	Week 2	Week 3	Week 4	Week 5	Average
Jan-08	99.9467	99.9149	99.9315	99.9245	-	99.9294
Feb-08	99.9263	99.9428	99.9295	99.9280	-	99.9317
Mar-08	99.9366	99.9457	99.9348	99.9295	99.9188	99.9331
Average from Jan 01-Mar 31, 2008						99.9314

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Appendix 10

Check against Baseline requirements

A] Check against Maximum production of HCFC22 for which emission reduction can be claimed; and
B] Check against waste generation rate, w

Table 2 as per Guidance provided in EB39 Report Annex 8 on Accounting Eligible HFC23: Estimation of credits for Monitoring Period

Monitoring Period	Period	Max annual HCFC-22 production that is eligible for crediting as per registered CDM-PDD $QHCFC22_{HIST}$	Quantity of HCFC22 produced upto monitoring period 'n' of year 'y' $\sum Q_{HCFC22,n,y}$	Historical waste generation rate (w) as determined and fixed in the registered CDM-PDD w	Quantity of HFC-23 generated in the monitoring period n (monitoring periods from the start of the year upto the monitoring period I for which issuance of CERs is requested) of year y $\sum Q_{HFC23,g,n,y}$	Quantity of HFC-23 stored by the end of year y-1 and eligible for destruction in year y $Q_{HFC23,co,y}$	Quantity of HFC-23 destruction credited upto the monitoring period m(Monitoring periods of year y that preceded the moniitoring period i) of year y $\sum Q_{HFC23,cr,m,y}$	Quantity of HFC-23 destroyed in the monitoring period n(Monitoring periods from the start of the year upto the monitoring period i) of year y $\sum Q_{HFC23,d,n,y}$	MIN(QHCFC22$_{HIST}$; ∑QHCFC22,n,y)	∑QHFC23,g,n,y/ ∑QHCFC22,n,y	MIN(w; ∑QHFC23,g,n,y /∑QHCFC22,n,y)	MIN(QHCFC22HIST; ∑QHCFC22,n,y) X MIN(w; ∑QHFC23,g,n,y /∑QHCFC22,n,y)	MIN(QHCFC22HIST; ∑QHCFC22,n,y) X MIN(w; ∑QHFC23,g,n,y /∑QHCFC22,n,y)+QHFC23,co,y	MIN(MIN(QHCFC22HIST; ∑QHCFC22,n,y) X MIN(w; ∑QHFC23,g,n,y/ ∑QHCFC22,n,y) +QHFC23,co,y; ∑QHFC23,d,n,y)	QHFC,cr,i,y = MIN(MIN(QHCFC22HIST; ∑QHCFC22,n,y) X MIN(w; ∑QHFC23,g,n,y /∑QHCFC22,n,y)+QHFC23,co,y; ∑QHFC23,d,n,y)- ∑QHFC23,cr,m,y
	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col9 =MIN (Col2 ;Col3)	Col10 =Col5 /Col3	Col 11=MIN (Col4;ColK	Col12= Col9 X Col11)	Col 13=Col 6+Col12	Col14 =Min(Col8; Col13)	Col15= Col14- Col 7
Eleventh	Jul07-Sep07	11145	2432.753	2.942%	76.260	7.940	0.000	76.540	2432.753	3.135%	2.942%	71.572	79.512	76.540	76.540
Twelfth	Oct07-Dec07	11145	5252.841	2.942%	176.527	7.940	76.540	174.797	5252.841	3.361%	2.942%	154.539	162.479	162.479	85.939
Thirteenth	Jan08-Mar08	11145	8264.975	2.942%	257.005	7.940	162.479	254.275	8264.975	3.109%	2.942%	243.156	251.096	251.096	88.617

As can be seen from Appendix 10, during the Fourth Year of this CDM Project, upto the Thirteenth Monitoring Period (ending March 31, 2008):

a) the eligible HCFC22 production is within the baseline limit (8264.975 MT < 11145 MT)

b) The HFC 23 emission is 3.11% as against the permissible limit of 2.942% (of HCFC 22 production). This has been factored in the calculations done in Table 2 (Appendix 10) as per Guidance provided during EB 39 to arrive at the quantity of HFC 23 incineration eligible for emission reduction.

- 4^{th} year Opening HFC 23 stock eligible for GHG emission reduction (as on July 1, 2007)….7.94 MT
- Eligible generation during the 4^{th} year till the 13^{th} Monitoring Period…243.156 MT
- Hence total eligible stock of HFC 23 available for incineration in the 4^{th} year till the end of the 13^{th} Monitoring Period…251.096 MT (=7.94 + 243.156)
- Total incineration during the 4^{th} year till the end of the 13^{th} Monitoring Period…254.275 MT (=min{251.096, 254.275})

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- Hence total incineration of HFC 23 during the 4th year till the end of the 13th Monitoring Period for which credits are being claimed…251.096 MT
- Quantity of eligible HFC 23 incinerated during the 4th year till the end of the 12th Monitoring Period for which credits have already been issued…162.479 MT
- Hence eligible HFC 23 incinerated during the 4th year for which credits are being claimed during the 13th Monitoring Period…88.617 MT (=251.096 - 162.479)

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Appendix 11

HFC23 Material Balance

Storage of HFC23 started from April 2004. The crediting period has commenced from July 1, 2004. The thermal oxidation process commenced in late August 2005. The material balance of the stored HFC23 is given below:

Background data for calculation of the quantity of HFC-23 in Table 1 below as per Guidance provided in EB39 Report Annex 8 on Accounting Eligible HFC23: Estimation of credits for Monitoring Period

	Period	Quantity of HCFC-22 produced in year y (QHCFC 22y)	Max annual HCFC-22 production that is eligible for crediting as per registered CDM-PDD QHCFC22HIST (Q_HCFCe$_{HIST}$ or QHCFC22,y,max)	HFC generated (QHFC 23,g,y)	Historical waste generation rate (w) as determined and fixed in the registered CDM-PDD (w)	$Q_{HCFC22,y}$*w	$Q_{HCFC22,y,max}$*$Q_{HFC23,g,y}$/$Q_{HCFC22,y}$	$Q_{HCFC22,y,max}$*w	Min(QHFC23, g,y, QHCFC22,y*w , QHCFC22,y,max*QHFC23,g,y/QHCFC22,y, QHCFC22,y,max*w)
Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7=Col 3 x Col 6	Col 8=Col 4 X (Col 5/Col 3)	Col 9=Col 4 X Col 6	Col 10 = Min (Col 5, Col 7, Col 8, Col 9)
1	July04-Jun05	8004.408	11145	217.180	2.942%	235.490	302.392	327.886	217.180
2	July05-Jun06	10527.481	11145	311.992	2.942%	309.718	330.293	327.886	309.718
3	July06-Jun07	10694.814	11145	305.933	2.942%	314.641	318.811	327.886	305.933
4a	Jul07-Sep07	2432.753	11145	76.260	2.942%	71.572	349.365	327.886	71.572
4b	Jul07-Dec07	5252.841	11145	176.527	2.942%	154.539	374.539	327.886	154.539
4c	Jan08-Mar08	8264.975	11145	257.005	2.942%	243.156	346.56	327.886	243.156

Table 1: as per Guidance provided in EB39 Report Annex 8 on Accounting Eligible HFC23: Calculation of the quantity of HFC-23

Year	Period	Maximum amount of HFC-23 that is eligible for crediting in the year	Quantity of HFC-23 destruction credited in the year	Quantity of HFC-23 sold, used or vented to the atmosphere in the year	Quantity of HFC-23 eligible for storage and destruction in the subsequent year
		A	B	C	D=MAX(A-B-C;0)
1	July04- Jun05	217.180	0.000	0.000	217.180
2	July05- Jun06	526.898	506.104	1.109	19.685

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Table 1: as per Guidance provided in EB39 Report Annex 8 on Accounting Eligible HFC23: Calculation of the quantity of HFC-23

Year	Period	Maximum amount of HFC-23 that is eligible for crediting in the year	Quantity of HFC-23 destruction credited in the year	Quantity of HFC-23 sold, used or vented to the atmosphere in the year	Quantity of HFC-23 eligible for storage and destruction in the subsequent year
3	July06- Jun07	325.618	317.678	0.000	7.940

Table 2 as per Guidance provided in EB39 Report Annex 8 on Accounting Eligible HFC23: Estimation of credits for Monitoring Period

Monitoring Period	Period	Max annual HCFC-22 production that is eligible for crediting as per registered CDM-PDD $QHCFC22_{HIST}$	Quantity of HCFC22 produced upto monitoring period 'n' of year 'y' $\sum Q_{HCFC22,n,y}$	Historical waste generation rate (w) as determined and fixed in the registered CDM-PDD w	Quantity of HFC-23 generated in the monitoring period n (monitoring periods from the start of the year upto the monitoring period I for which issuance of CERs is requested) of year y $\sum Q_{HFC23,g,n,y}$	Quantity of HFC-23 stored by the end of year y-1 and eligible for destruction in year y $Q_{HFC23,co,y}$	Quantity of HFC-23 destruction credited upto the monitoring period m(Monitoring periods of year y that preceded the moniitoring period i) of year y $\sum Q_{HFC23,cr,m,y}$	Quantity of HFC-23 destroyed in the monitoring period n(Monitoring periods from the start of the year upto the monitoring period i) of year y $\sum Q_{HFC23,d,n,y}$	MIN(QHCFC22 $_{HIST}$; ∑QHCFC22,n,y)	∑QHFC23,g,n,y/ ∑QHCFC22,n,y	MIN(w; ∑QHFC23,g,n,y /∑QHCFC22,n,y)	MIN(QHCFC22HIST; ∑QHCFC22,n,y) X MIN(w; ∑QHFC23,g,n,y /∑QHCFC22,n,y)	MIN(QHCFC22HIST; ∑QHCFC22,n,y) X MIN(w; ∑QHFC23,g,n,y /∑QHCFC22,n,y)+QHFC23,co,y	MIN(MIN(QHCFC22HIST; ∑QHCFC22,n,y) X MIN(w; ∑QHFC23,g,n,y/ ∑QHCFC22,n,y) +QHFC23,co,y; ∑QHFC23,d,n,y)	QHFC,cr,i,y = MIN(MIN(QHCFC22HIST; ∑QHCFC22,n,y) X MIN(w; ∑QHFC23,g,n,y /∑QHCFC22,n,y)+QHFC23,co,y; ∑QHFC23,d,n,y)- ∑QHFC23,cr,m,y
	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col9 =MIN (Col2 ;Col3)	Col10 =Col5 /Col3	Col 11=MIN (Col4;ColK	Col12= Col9 X Col11)	Col 13=Col 6+Col12	Col14 =Min(Col8; Col13)	Col15= Col14- Col 7
Eleventh	Jul07- Sep07	11145	2432.753	2.942%	76.260	7.940	0.000	76.540	2432.753	3.135%	2.942%	71.572	79.512	76.540	76.540
Twelfth	Oct07- Dec07	11145	5252.841	2.942%	176.527	7.940	76.540	174.797	5252.841	3.361%	2.942%	154.539	162.479	162.479	85.939
Thirteenth	Jan08- Mar08	11145	8264.975	2.942%	257.005	7.940	162.479	254.275	8264.975	3.109%	2.942%	243.156	251.096	251.096	88.617

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Appendix 12: Guidance provided in EB39 Report Annex 8 on Accounting Eligible HFC23

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III. Procedures for requests for issuance

6. For the case that project participants use monitoring periods shorter than one year, the following procedures are prescribed, in order to ensure that the overall CERs issued in a year *y* are consistent with the provisions of the methodology and to minimize the risk of excessive issuance.

(a) For project activities that have been registered using version 03 or later versions of the approved methodology AM0001, the following formulae shall be used to estimate the crediting for monitoring period.

$$Q_{HFC,cr,i,y} = MIN\left\{ \begin{array}{c} MIN\left(QHCFC22_{HIST}; \sum_{n=1}^{i} Q_{HCFC22,n,y}\right) \times MIN\left(w; \frac{\sum_{n=1}^{i} Q_{HFC23,g,n,y}}{\sum_{n=1}^{i} Q_{HCFC22,n,y}}\right) + Q_{HFC23,co,i,y} \\ \sum_{n=1}^{i} Q_{HFC23,d,n,y} \end{array} \right\} - \sum_{m=1}^{i-1} Q_{HFC23,cr,m,y}$$

Where:

$Q_{HFC23,cr,i,y}$	=	Quantity of HFC-23 destruction credited in the monitoring period *i* of year *y*
$Q_{HCFC,y,max}$	=	The maximum annual HCFC-22 production that is eligible for crediting as determined and fixed in the registered CDM-PDD
$Q_{HCFC22,n,y}$	=	Quantity of HCFC-22 produced in monitoring period n of year *y*
$Q_{HFC23,co,y}$	=	Quantity of HFC-23 stored by the end of year *y-1* and eligible for destruction in year *y* (as defined above)
$Q_{HFC23,g,n,y}$	=	Quantity of HFC-23 generated in the monitoring period *n* of year *y*
$Q_{HFC23,d,n,y}$	=	Quantity of HFC-23 destroyed in the monitoring period *n* of year *y*
$Q_{HFC23,cr,m,y}$	=	Quantity of HFC-23 destruction credited in the monitoring period *m* of year *y*
I	=	Monitoring period for which issuance of CERs is requested
n	=	Monitoring periods from the start of the year up to the monitoring period i
m	=	Monitoring periods of year *y* that preceded the monitoring period i

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