HFC23 Decomposition Project of Zhejiang Juhua Co., Ltd, P. R. China

UNFCCC CDM reference number 0193

Monitoring Report

Monitoring period: Aug 1, 2007 to Oct 31, 2007

Version: 03

Date: Jan 31, 2008

The person who is in charge of this Monitoring Report: 张虹

Contents

1. Introduction

Project Name: HFC23 Decomposition Project of Zhejiang Juhua Co., Ltd, P. R. China
Date of completion of the Sixth Monitoring Report: January 31 2008

Version: Version 03

The purpose of this Monitoring Report is to calculate the Greenhouse Gas emission reduction quantity achieved by this project for periodic verification.

This Monitoring Report covers the activity from August 1, 2007 to October 31, 2007 as the sixth period.

2. Reference

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

Approved Baseline and Monitoring Methodology AM0001:"Incineration of HFC23 waste streams" Version 05. (This project activity was registered at UNFCCC on March 3, 2006. It is registered under AM0001 version 03)

Project Design Document: "HFC23 Decomposition Project of Zhejiang Juhua Co., Ltd, P. R. China" Version 3 issued on November 23, 2005

Revised Monitoring Plan, Approved on November 05, 2007

3. Definition

y: Monitoring Period (in this report, from August 1, 2007 to October 31, 2007)

PDD: Project Design Document of this project"HFC23 Decomposition Project of Zhejiang Juhua Co., Ltd, P. R. China" Version 3 issued on November 23,2005.

GHG: Greenhouse Gas

IPCC: Intergovernmental Panel on Climate Change

MT: metric tonne

4. General description of project

4.1 Project activity

HFC23 (CHF_3) is a by-product from HCFC22 production. It is low toxicity but is a greenhouse gas (GHG), whose GWP is large (GWP=11,700 in the IPCC 2nd Assessment Report). Emissions of HFC s will be controlled under the Kyoto Protocol. China still has no mandatory limitation on HFC23 emissions at present. Furthermore, the decomposition of HFC23 requires the installation of facilities with high technology and large amount of investment and has no economic benefit. Owner of this project is Zhejiang Juhua Co., Ltd of China, which has not sold HFC23 as a commodity previously and has no such market plan at present.

In this project, Zhejiang Juhua Co., Ltd installed a set of superheated steam decomposition facility at the same industrial site where the HCFC22 production occurs, which was imported from Japan. The most advanced technology of Japan is be utilized to do non-hazardous treatment of the HFC23 gas, the by-product generated in the production process of the fluoric refrigerant HCFC22. The HFC23 is been decomposed to hydrogen fluoride (HF) and carbon dioxide (CO_2). This project is to decompose the HFC23 generated by the production line (No 2-703). Without this project, the HFC23 generated in this company will be emitted directly to the atmosphere as waste gas.

The starting date of the project as well as the starting date of the crediting period is defined as 01/08/2006.

4.2 Project participants

— Zhejiang Juhua Co., Ltd, owner and operator of the project (China)

— JMD Greenhouse-Gas Reduction Co., Ltd, the project sponsor, technology supplier and CER buyer (Japan)

—JGC Corporation, one of the parent companies of JMD Greenhouse-Gas Reduction Co., Ltd. (Japan)

— Marubeni Corporation, one of the parent companies of JMD Greenhouse-Gas Reduction Co., Ltd. (Japan)

—Daioh Construction Co., Ltd, one of the parent companies of JMD Greenhouse-Gas Reduction Co., Ltd. (Japan)

4.3 Technical description of the project

Location of the project activity

The superheated steam decomposition facility was installed in the plant area of Zhejiang Quhua Fluor -Chemistry Co., Ltd that is a filiale of Zhejiang Juhua Co., Ltd in July 2006.

Technology to be employed by the project activity

This project uses the superheated steam decomposition technology to destruct the HFC23 generated in one HCFC22 production line of the company. The decomposition technology to be used in this project encompasses HFC23 destruction facility, neutralization facility, waste gas disposal equipment and waste water disposal equipment. Similar to the HFC23 decomposition technology described in the approved methodology AM0001, the system sends the recovered HFC23 (with slight amount of HCFC22) to the reactor and increase the temperature to 800 ～1000℃. After complex reactions, HFC23 (with slight amount of HCFC22) is completely destructed (>99.999%) to HF, CO_2 and HCL. After that, the acidic gases of HF and HCL are neutralized with $Ca(OH)_2$, and then treated in the waste gas disposal equipment and the wastewater disposal equipment.

This decomposition technology does not use fossil fuel, instead uses electric heater to obtain the decomposition temperature. Therefore, it can be used under comparatively lower temperature (800 ～ 1000℃) and in small scale incinerator. Characteristics of the proposed technology are described as follows:

High safety: A series of decomposition reactions happen under slight vacuum (-50～-100 mmH_2O) and thus no leakage of the noxious decomposed gases like HF, HCL will happen.

Good maintainability: The combustion chamber is small and thus it is easy to check and replace the corroded materials in the reactor. Moreover, since the decomposition reaction happens under lower temperature, corrosion of the combustion chamber caused by acidic gases is comparatively lower.

Small spatial space: Since the reactor chamber is very small, the whole volume of the facility is small too.

High-energy efficiency: Since the facility uses superheated steam decomposition technology, the decomposition temperature is rather low. No fossil fuel is used, so the consumption of process water for waste gas disposal is reduced.

The superheated steam decomposition technology utilized in the project is a proven one and has been used in more than 22 facilities in Japan.

For detailed technical process please refer to Figure 1.

5. Baseline methodology

Approved baseline methodology AM0001/version 03: "Incineration of HFC23 Waste Streams", is applied to this project. In addition, baseline methodology AM0001/version 04 is considered for conservative evaluation, as well. Moreover, this project satisfied baseline methodology AM0001/version 05 due to its condition as follows.

There is currently no mandatory restriction or limitation on HFC23 emission in China. To install the decomposition facility of HFC23, significant investment and operating costs are needed, without economic revenue, which has no attraction to the investors. Therefore the baseline scenario is that HFC23 generated in this company will be directly emitted to the atmosphere. Implementation of this project will decompose all of the HFC23 generated in the second production line of the company that has produced HCFC22 only, and thus compared to directly emissions of HFC23 to the atmosphere. As these conditions are applicable to China and to this project, the approved methodology AM0001 ensures the additionality of the GHG reductions through this project.

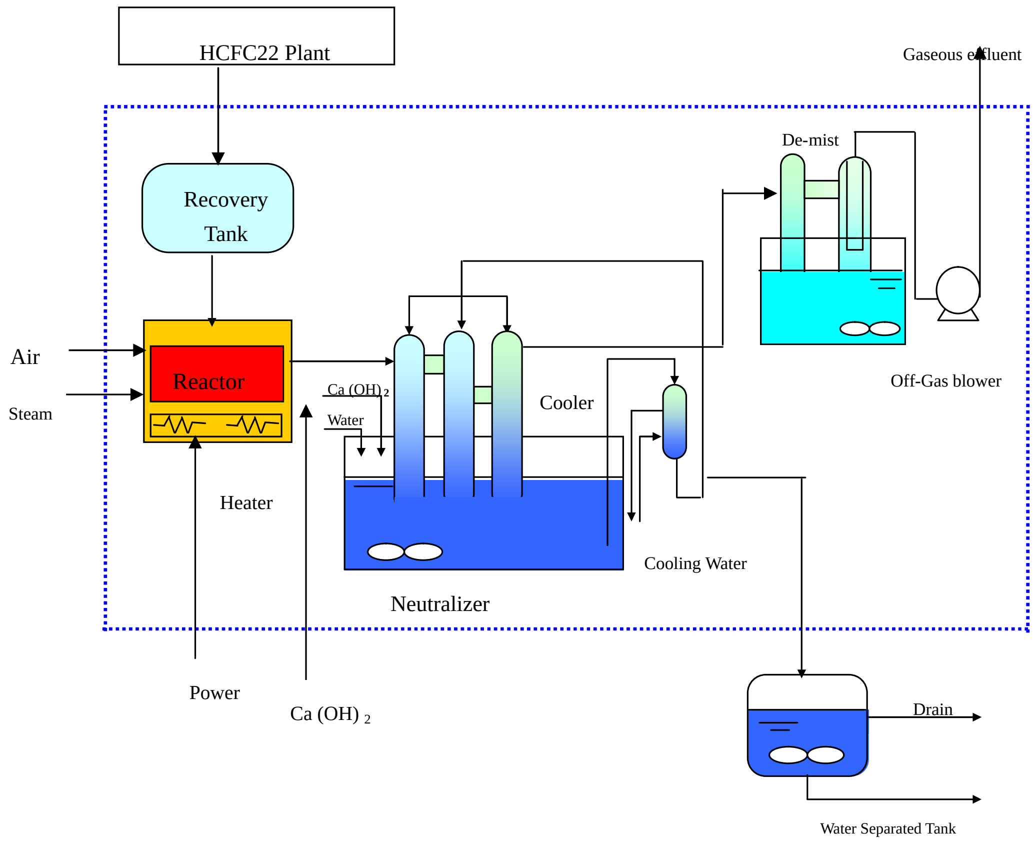
The baseline quantity of HFC23 (B_HFC23y) destroyed is the quantity of the HFC23 waste stream required to be destroyed by the applicable regulations. At present, B_HFC23y is zero.

Q_HFC23y is the quantity of HFC23 destroyed. As the baseline quantity to be destroyed (B_HFC23y) is zero, the quantity destroyed (if less than the cut-off rate) is additional. The total quantity of destroyed Q_HFC23y is offset by minor GHG emissions within the project boundary.

Therefore the emission reductions are additional to the baseline scenario.

The decomposition technology does not use fossil fuel; instead uses electric heater to obtain the decomposition temperature. Therefore, only recovery tank, reactor, neutralizer and Off-Gas disposal equipment are included in the project boundary. The solid waste disposal and sludge transportation are out of project boundary, and the GHG emissions from them are treated as leakage, as shown in the figure below:

Figure 1: HFC23 Decomposition Project Boundary



6. Monitoring methodology and plan

Methodology used for this project is the approved monitoring methodology AM0001/version 03: “Incineration of HFC23 Waste Streams”. In addition, monitoring methodology AM0001/version 04 is considered for conservative evaluation, as well. Moreover, this monitoring methodology satisfied monitoring methodology AM0001/version 05 due to its condition as chap.5.

AM0001 is applicable to HFC 23 (CHF3) 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 and has been in operation from 2005 until the start of the project activity where the project activity occurs and where no regulation requires the destruction of the total amount of HFC23 waste. This project satisfies these conditions.

Monitoring methodology AM0001 requires direct and continuous measurement of the actual quantity HFC23 destroyed, as well as the quantity of electricity, steam and fossil fuel used by the destruction process.

The actual quantity HFC23 destroyed, as well as the quantity of electricity, steam used by the destruction process were monitored in this project (The decomposition technology does not use fossil fuel; instead uses electric heater to obtain the decomposition temperature).

The monitoring points are shown as follows:

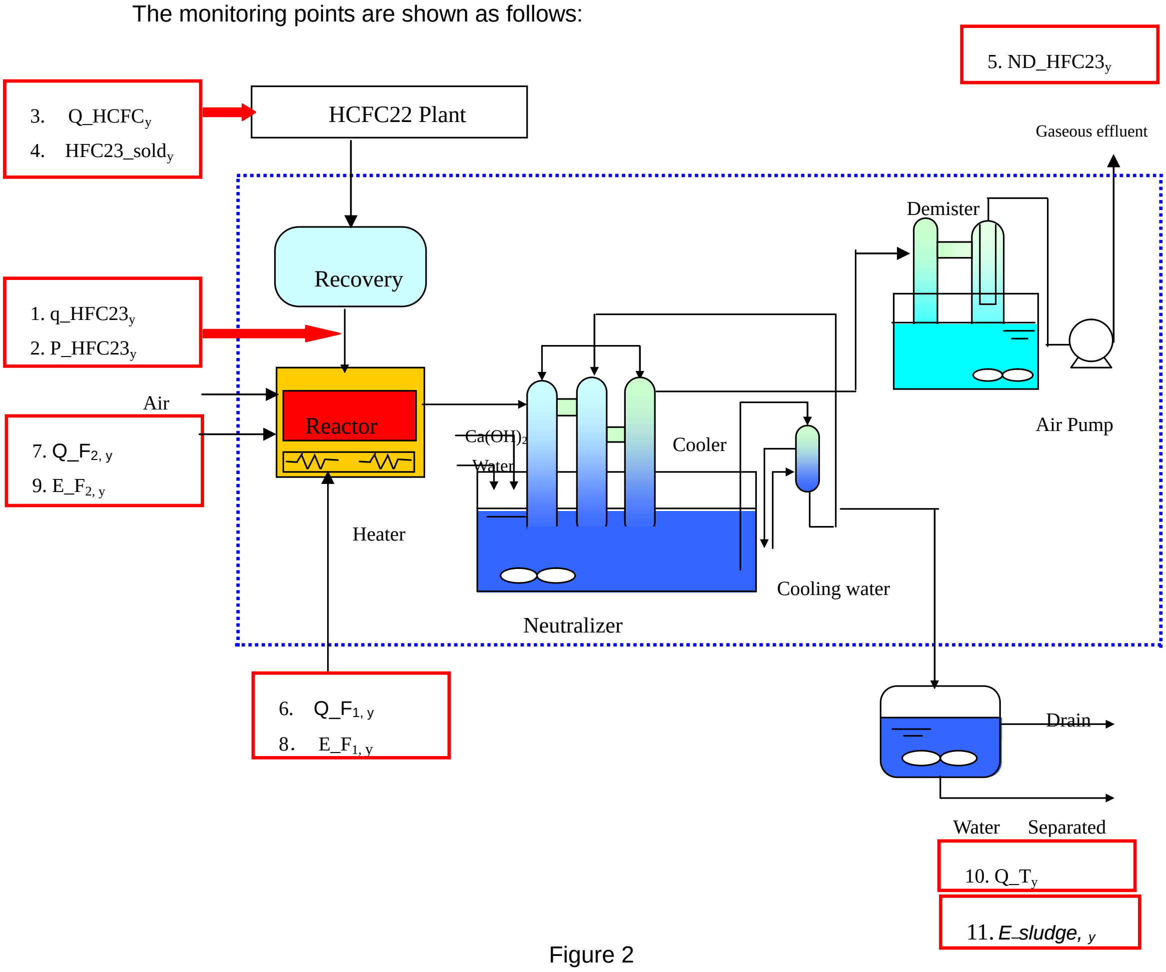


Figure 2

Data to be collected in order to monitor GHG reduction from the project activity is given in table below:

In terms of q _HFC23$_y$, lower value of two flow meters number was monitored. The monthly quantity of HFC23 waste flows (q-HFC23$_m$) is the sum of the lower each second reading of the two meters.

ID number	Data type	Date variable	Data unit	Recording frequency	Reference
1. q_HFC23_y	Mass	*Quantity of HFC23 supplied to the destruction process*	t _HFC23	Monthly	Appendix 1
2. P_HFC23_y	%	*Purity of the HFC23 supplied to the destruction process*	%	Monthly	Appendix 2
3.Q_HCFC_y	Mass	*The quantity of HCFC22 produced in the plant generating the HFC23 waste*	t_HCFC22	Monthly	Appendix 3
4. $HFC23\_sold_y$	Mass	*HFC23 sold by the facility generating the HFC23 waste*	t_ HFC23	Yearly	Appendix 4
5. ND_HFC23_y	Mass	*The quantity of Un-decomposed HFC23 of gaseous effluent*	t_HFC23	Monthly	Appendix 5
6. $Q\_F_{1,y}$	Energy	*Electricity consumption by the destruction process*	KWh	Monthly	Appendix 6
7. $Q\_F_{2,y}$	Energy	*Steam consumption by the destruction process*	t_ steam	Monthly	Appendix 7
8. $E\_F_{1,y}$	Energy	*CO_2 emission factor of electricity supply*	t_CO_2/kWh	Monthly	Appendix 9
9. $E\_F_{2,y}$	Energy	*CO_2 emission factor of steam supply*	t_CO_2/t-steam	Monthly	Appendix 10
10. Q_T_y	Mass	*Solid waste*	t_ sludge	Monthly	Appendix 8
11. $E\_sludge,_y$	Energy	*CO_2 emission factor for waste transport*	t_CO_2/t-sludge	Yearly	Appendix 11

In addition, the quantity of gaseous effluents (CO, HCL, HF, C12, dioxin and NOX) and liquid effluents (PH, COD, BOD, n-H (normally 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 decomposition facilities are operated by staff of Zhejiang Quhua Fluor-chemical Co., Ltd. Zhejiang Quhua Fluor-chemical Co., Ltd organized special team for this project activity.

Organizational structure, position, roles and responsibilities are defined. Data transfer and reporting procedures are prescribed and documented.

The necessary competencies for personnel performing work affecting project quality are determined, and training to satisfy these needs is provided.

CDM project integrated into quality system of company，see also Q/JHGF 01 SC 01-2006, Q/JHGF 01 CX 01～26－2006**.**

7.2 QA and QC Procedures for Data Monitoring

Only approved Instruments and Methods are used.

Purpose of QC&QA procedures：

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	Uncertainty level of Data (High/Medium/Low)	QA/QC procedures undertaken for these data, or why such procedures are not necessary
1、q_HFC23_y	*Low*	*The flow is measured using two meters in series with weekly calibration through Zero check. The flow meters shall be fully calibrated every six months by an officially accredited entity. If the zero check indicates that flow meter is not stable, immediate calibration of the flow meter shall be undertaken.*
2、$p\_ HFC23_y$	*Low*	*Measured using gas chromatography*
3、$Q\_ HCFC_y$	*Low*	*Obtained from production records of the facility where the HFC23 waste originates.*
4、HFC23_sold	*Low*	*Obtained from production records of the facility where the HFC23 waste originates.*
5、ND_HFC23_y	*Low*	*Measured from the gas effluent of the destruction process gas chromatography and mass spectrometer*
6、$Q\_F_{1,y}$	*Low*	*Metered using electricity meter*
7、$Q\_F_{2,y}$	*Low*	*Metered using steam meter*
8、$E\_F_{1,y}$	*Low*	*Measured and calculated*
9、$E\_F_{2,y}$	*Low*	*Measured and calculated*
10、Q_T_y	*Low*	*Metered using truck scale*
11. $E\_sludge,_y$	*Low*	*Calculated*

7.3 Calibration/Maintenance of Measuring and Analytical Instruments

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

The maintenance methods and procedures have been incorporated as part of the ISO 9001 procedures and form an integral part of the systems and procedures for the organization.

7.4 Environmental Impact

To ensure compliance with environmental regulation, the quantities of gaseous effluents (CO, HCL, HF, $C1_2$, dioxin and NOX) and fluid effluents (PH, COD, BOD, n-H (normally hexane extracts), SS (suspended solid), phenol, and metals (Cu, Zn, Mn and Cr) are measured every six months.

Gaseous effluent:

Remove the gas of HF and HCL in the neutral treatment equipment, remove mist particle at the De-mist. Then through the gas pumps, off-gas is discharged to the air. The discharged gas meets the Grade 2 of the Integrated Air Pollution Emission Standard (GB16297-1996) and reference value of United States environment program (UNEP).

Water effluent:

After neutral treatment procedure, the CaF_2 and $CaCl_2$ with a large amount of water content are sent to the drain system, after agitating, coagulation, deposition and filtering, meet the Grade 1 of the Integrated Wastewater Discharge Standard (GB8978-1996).

In September 2006, this project has passed the Environmental Protection Check and Acceptance of the completed construction project. It indicates that this project has been within compliance of the environmental standards. (EPA's approval is available upon request of DOE/EB).

In the fifth monitoring period, the project owner delegated accredited entities to analyze the environmental monitoring items in gaseous effluents and water effluents, all of results meet the requirements of local environmental regulations.

8. GHG Calculations

Summary for HCFC22 and HFC23 production up to this monitoring period in the second project year:

Period	HCFC22 cumulative production MT (A)	Approved HCFC22 annual production in PDD MT (B)	A＜B?	The cumulative amount of HFC23 decomposed MT (C)	Eligible HFC23 amount (D)=A*w if A＞B (D)=B*w	C＜D?	Eligible cumulative HFC23 amount for calculating ER MT (E)
1-Aug-07 to 31-Oct-07	4494.90	16517	Yes	140.35395	134.84700	No	134.84700

Statement of GHG emission reduction in 6th monitoring period (this monitoring period)

Total emission reduction =1577196[tCO_2e]

This result come from calculation explained in below.

As suggested by the approved methodology, the GHG emission reduction (ER_y) achieved by this project for a year is calculated as follows:

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

Monitoring Period	Period	ER_y t CO2e	Q_HFC23_y[1] MT	B_HFC23_y MT	GWP_HFC23	E_DP_y t CO2e	L_y t CO2e
6th	1-Aug-07 to 31-Oct-07	1577196.23	134.84700	0	11700	95.92	417.75

[1] In this period, the measured amount of HFC23 decomposed is140.35395 MT, however, the capped amount 134.84700 MT is used to calculate the emission reduction.

8.1 Calculation of Q_HFC23_y in this monitoring period

The quantity of waste HFC23 destroyed (Q_HFC23_y) is calculated as the product of quantity of waste HFC23 supplied to the destruction process (q_HFC23_y) measured in metric tonnes and the purity of the waste HFC23 (p_HFC23_y) supplied to the destruction process that is determined and expressed as the fraction of HFC23 in the waste.

$Q\_HFC23_y = q\_HFC23_y * p\_HFC23_y$

Q_HFC23_y=141.41405*99.25035%

$*Q\_HFC23_y$=140.35395MT

Q_HFC23_y[2]=134.84700MT

Eligible Q_HFC23 in this monitoring period is calculated as below.

Monitoring Period	Period	HCFC22 production in this period MT (A)	The amount ofHFC23 decomposed MT (B)	Eligible HFC23 amount MT (c)	The amount of HFC23 decomposed in excess of eligible emission rate MT (D)=B-C	Eligible HFC23 amount for calculating ER MT
6th	1-Aug-07 to 31-Oct-07	4494.90	140.35395	134.8470	5.50695	134.84700

Parameter	Data unit	Value	Reference
q_HFC23_y	MT	141.41405	Appendix 1
p_HFC23_y	%	99.25035	Appendix 2
$*Q\_HFC23_y$	MT	140.35395	Calculated
Q_HFC23_y	MT	134.84700	Calculated

[2] During this monitoring period, 5.50695 MT HFC23 decomposed in excess of the cap has been deducted from the amount of HFC23 decomposed and has not been used to calculate the emission reduction.

8.2 Calculation of B_HFC23_y in this monitoring period

The baseline quantity of HFC23 destroyed is the quantity of the HFC23 waste stream required to be destroyed by the applicable regulations.

$$B\_HFC23_y = Q\_HFC23_y * r_y$$

Where:

r_y is the fraction of the waste stream required to be destroyed by the regulation that apply during year y.

China is in non-annex B Parties and still no obligation to decompose HFC23, then $r_y = 0$. The HFC23 waste is typically released to the atmosphere, so the baseline scenario is zero decomposition.

To prevent the intended increase of the production quantity of HFC23 during the production process of HCFC22, the quantity of HFC23 waste (Q_HFC23_y) is limited as shown below:

$$Q\_HFC23_y \leqslant Q\_HCFC_y * w$$

Where:

Q_HCFC_y: The actual HCFC22 output from the product line where HFC23 is originating, where is limited to the "existing production capacity" of the production line defined (in tones of HCFC22) as the maximum (annual) production during any of the last three years including CFC production at swing plants adjusted appropriately to account for the different production rates of HCFC22 and CFCs.

w: the waste generation rate (HFC23)/(HCFC22) for the originating production line. The value of w is set at the lowest of the three most recent historical annual values and is not to exceed 3% (0.03 tonnes of HFC23 produced per tonne of HCFC22 manufactured).

During the most recent three years, the HCFC22 outputs of this product line are: 12,866MT in 2002, 15,499MT in 2003, and 16,517MT in 2004 and the waste generation rates are: 5.082% in 2002, 5.442% in 2003, and 4.060% in 2004. So, w equals to 3.0%, the maximum (annual) output of HCFC22 will be 16517MT.

Parameter	Data unit	Value	Reference
B_HFC23_y	MT	0	Calculated
$*Q\_HFC23_y$	MT	140.35395	Calculated (ref section 8.1)
r_y	%	0	No regulation for destruction in China

8.3 Calculation of E_DP_y in this monitoring period

In this project, since it uses electric heater to obtain the decomposition temperature instead of using LNG fuel etc, the GHG emissions (E_DP_y) due to the HFC23 decomposition process are:

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

Where:

ND_HFC23_y: the quantity of HFC23 not destroyed during the year measured in metric tones;

EF: Emission factor due to the thermal decomposition process of converting the carbon in the HFC23 into CO_2, which is released to the atmosphere, equals to 0.62857.

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

$E\_DP_y = 0.0006583*11700 + 140.35395*0.62857$

$E\_DP_y = 95.92t\ CO2e$

Parameter	Data unit	Value	Reference
E_DP_y	t CO_2e	95.92	Calculated
ND_HFC23_y	MT	0.0006583	Appendix 5
GWP_HFC23	—	11,700	IPCC guidelines
$*Q\_HFC23_y$	MT	140.35395	Calculated (ref section 8.1)
EF	—	0.62857	CO_2 eqvt generated by HFC23 destruction process

8.4 Calculation of L_y

Leakage is emission 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 (steam and /or electricity)
- CO_2 emissions due to transport of sludge to the landfill

$L_y = \Sigma i(Q\_F\ i,_y * E\_F\ i,_y) + Q\_T,_y * E\_sludge,_y$

There are two kinds of energy consumption during the destruction process, i.e. electricity and steam.

L_y=Q_F1, $_y$*E_F1, $_y$＋Q_F2, $_y$*E_F2, $_y$＋Q_T, $_y$*E_ sludge, $_y$

Where：

Q_F1, $_y$: Electricity consumption by the destruction process, kWh

E_F1, $_y$: CO_2 emission factor of electricity supply=0.00099948t CO_2/ kWh

Q_F2, $_y$: Steam consumption by the destruction process, t_ steam

E_F2, $_y$: CO_2 emission factor of steam supply=0.3237tCO_2/ t_steam

Q_T, $_y$: Solid waste, t_ sludge

E_ sludge: CO_2 emission factor for waste transport=0.000668339 tCO_2/t-sludge

L_y= Q_F1, $_y$*E_F1, $_y$＋Q_F2, $_y$*E_F2, $_y$＋Q_T, $_y$*E_ sludge, $_y$

L_y=381720*0.00099948＋110.201*0.3237＋824.02*0.000668339

L_y=417.75t CO2e

Parameter	Data unit	Value	Reference
L_y	t CO_2e	417.75	Calculated above
Q_F1, $_y$	KWh	381720	Appendix 6
E_F1, $_y$	t CO_2/ kWh	0.00099948	Appendix 9
Q_F2, $_y$	t_steam	110.201	Appendix 7
E_F2, $_y$	tCO_2/ t_steam	0.3237	Appendix10
Q_T, $_y$	t_ sludge	824.02	Appendix 8
E_ sludge, $_y$	tCO_2/t-sludge	0.000668339	Appendix11

8.5 Calculation of ER_y

The total emission reduction achieved by this project activity during the sixth monitoring period is therefore:

ER_y = (Q_HFC23$_y$－B_HFC23$_y$) *GWP_HFC23－E_DP$_y$－L_y

ER_y = (134.84700－0)*11700－95.92－417.75

ER_y =1577196t CO2e

Monitoring Period	Period	ER_y t CO2e	Q_HFC23_y MT	B_HFC23_y MT	GWP_HFC23	E_DP_y t CO2e	L_y t CO2e
1st	01-Aug-06 to 02-Oct-06	997640.61	85.3203	0	11700	70.9691	535.9276
2nd	03-Oct-06 to 30-Dec-06	1437117.14	122.8986	0	11700	92.9433	703.5398
3rd	31-Dec-06 to 28-Feb-07	1066265.16	91.1805	0	11700	66.97	479.72
4th	1-Mar-07 to 30-Apr-07	1090899.73	93.2853	0	11700	68.25	470.03
5th	1-May-07 to 31-Jul-07	1202283.79	102.8253	0	11700	91.61	680.61
6th	1-Aug-07 to 31-Oct-07	1577196.23	134.84700	0	11700	95.92	417.75

Appendices

Appendix 1: q_HFC23_y

Appendix 2: p_HFC23_y

Appendix 3: Q_HCFC_y

Appendix 4: $HFC23\_sold_y$

Appendix 5: ND_HFC23_y

Appendix 6: $Q\_F_{1,y}$

Appendix 7: $Q\_F_{2,y}$

Appendix 8: Q_T_y

Appendix 9: E_F1,y

Appendix 10：E_F2,y

Appendix 11：E_ sludge, y

Appendix 1

Name of item	q _HFC23$_y$
Description	Quantity of HFC23 supplied to the destruction process
Value in period	**141.41405 t_HFC23**
Method of monitoring	Mass flow meters — 2 in series
Recording frequency	monthly
Background data	Log sheet record/flow meter
Calculation method	two flow meters are placed in series. The instantaneous lower each second of the two measurements is taken as the figure.

Month/Year	Data unit	Value
Aug-07	MT	50.23569
Sep-07	MT	46.48524
Oct-07	MT	44.69312
Total: q _HFC23$_y$	MT	141.41405

Appendix 2

Name of item p_HFC23$_y$

Description Purity of the HFC23 supplied to the destruction process

Value in period **99.25035 %**

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	Data Unit:%					
	Week1	Week2	Week3	Week4	Week5	Average
Aug-07	99.524	99.373	99.595	99.685	99.703	99.576
Sep-07	98.529	98.524	99.781	99.412		99.062
Oct-07	98.776	97.974	99.751	99.822		99.081

Weighted average of purity figures:

Month/Year	Average Purity %	Quantity of HFC23 supplied to the decomposition process q_HFC23 MT	Quantity of waste HFC23 decomposed Q_HFC23 MT
Aug-07	99.576	50.23569	50.02269
Sep-07	99.062	46.48524	46.04898
Oct-07	99.081	44.69312	44.28228
Total		141.41405	140.35395
Weighted average purity p_HFC23y(%)	99.25035		

Appendix 3

Name of item: Q_HCFC_y

Description: The quantity of HCFC22 produced in the plant generating the HFC23 waste

Value in period: **4494.90t_HCFC22**

Method of monitoring: Measured using mass flow meter

Recording frequency: monthly

Background data: Log sheet record

Calculation method: Sum of the quantity of HCFC22 from production line to packaging shop each time

The quantity of HCFC22 from production line to packaging shop is measured by mass flow meter. The process of supply HCFC22 from production line to packaging shop is a Intermittent Feeding process, every time, when the HCFC22 is sent from production line to packaging shop, the reading of HCFC22 flow meter before delivery and the reading of HCFC22 flow meter after delivery are recorded, both data are entered into the material mutual supply list, the difference between these two readings is the amount of HCFC22 that has been sent to packaging shop during the transmission. The monthly HCFC22 production is calculated according to the amount of HCFC22 on the material mutual supply list.

The HCFC22 mass flow meter is calibrated every month as per methodology AM0001.

Month/Year	Data unit	Value
Aug-07	MT	1605.95
Sep-07	MT	1475.19
Oct-07	MT	1413.76
Total:Q_HCFCy	MT	4494.90

Appendix 4

Name of item HFC23_sold$_y$

Description HFC23 sold by the facility generating the HFC23 waste

Value in period **0 t_ HFC**

Recording frequency yearly

Background data Log sheet record

Month/Year	Data unit	Value
Aug-07	MT	**0**
Sep-07	MT	**0**
Oct-07	MT	**0**
Total:HFC23_soldy	MT	**0**

Appendix 5

Name of item	ND_HFC23_y
Description	Quantity of HFC23 in gaseous effluent
Value in period	**0.0006583 t_ HFC**
Recording frequency	monthly
Method of monitoring	Measured using gas chromatography and mass spectrometer
Background data	GC chart/procedure of GC analysis

Calculation method

Due to the high destructed ratio of the super heated decomposition facility, HFC23 in tail gas will be too small to detect under normal operation. During operation, tail gas analysis will be done on a weekly basis on Thursday to check that the undestroyed HFC23 concentration will be below detectable limit. In such case, 200ppb (detectable limit) will be recorded as m_{dl}.

At down time of any of the incinerators (the decomposition temperature lower than 800℃ is regarded as stop), the undestroyed HFC23 in tail gas will be analyzed as m_i. If m_i is higher than the analysis value under normal operation, another sampling will be taken for further analysis after the operation comes into normal conditions. The higher of the two values m_{max} will be used to calculate the undestroyed HFC23 in a day as ND_HFC23 downtime$_i$. If there are two or more stops of reaction in a day, the maximum value of analysis on the same day will be used for calculation. m_i will be recorded as 200ppb (detectable limit) in case m_i is too small to detect. ND_HFC23 downtime$_i$ will be calculated according to formula (1):

$$\mathbf{ND\text{-}HFC23\ downtime_i = m_{max} * BR * BQ * 24 * DG} \quad \cdots\cdots\cdots (1)$$

Where,

BR is Rated flow of blower: 144 Nm3/h

BQ is Quantity of blower: 8 sets

DG is Density of tail gas: 1.294 kg/m^3 at 101.325kPa, 0℃ (based on the composition of tail gas in PDD)[3]

[3]The composition and content of tail gas in PDD: H_2O, 0.6VOL%; N_2, 78.8 VOL%; O_2, 18.5 VOL%; CO_2, 2.1 VOL%.

DG is calculated as follows:

The average molar mass of tail gas=0.6%*(molar mass of H_2O)+ 78.8%*(molar mass of N_2)+18.5%*(molar mass of O_2)+ 2.1%*(molar mass of CO_2)
=0.6%*18+78.8%*28+18.5%*32+2.1%*44=29.016

Where:

Molar mass of H_2O: 18
Molar mass of N_2: 28
Molar mass of O_2: 32
Molar mass of CO_2: 44

DG = (P*M)/(R*T) (Equation of state of ideal gas)
= $(101.325*10^3*29.016)/ (8.315*10^3*273.15)$
=1.294 kg/m^3

Where:

P: The absolute pressure of gas = $101.325*10^3$ Pa
M: The molar mass of gas = the average molar mass of tail gas = 29.016
R: The gas constant=$8.315*10^3$J /(Kmol • K)
T: The absolute temperature of gas=273.15 K

$\mathbf{m}_{\mathbf{max}}$ in a day will be under detectable limit in many cases. This means, the following formula (2) can be applied for the undestroyed HFC23 in tail gas in a month as ND_HFC23$_m$ is calculated as per formula (2):

$$\textbf{ND-HFC23}= \sum \mathbf{m}_{\mathbf{max\text{-}detected}}\,\mathbf{i*BR*BQ*24*DG}+ \mathbf{m}_{\mathbf{dl}} \mathbf{*\ BR*BQ*24*DG*(DM\text{-}DD)}\cdots\cdots\cdots \quad (2)$$

Where,

$\mathbf{m}_{\mathbf{dl}}$ is estimated value of under detectable limit: 200ppb, 0.00002%

$\mathbf{m}_{\mathbf{max\text{-}detected\ i}}$ is maximum value in a day during down time

DM is Days of month

DD is Days of HFC23 detected in tail gas

i is the times of reaction stops in different days in a month.

In order to assure complete destruction of HFC23 in the decomposition process, interlocking is installed in the operation system, which will turn off HFC23 feed to a decomposition unit when this unit has an operating temperature lower than 850℃.

In this HFC23 decomposition facility, there are 8 identical incinerators in parallel. Two of them as a group, if one or some of the incinerators stop, the other incinerators can continue their operation. Under general condition, it is sufficient to run 6 incinerators for decomposition, the other incinerators act as back-up. The project owner alternately checks and maintains the 8 incinerators.

The requirement of the methodology AM0001 to analyze the content of HFC23 in off-gas was strictly observes. According to the registered PDD, the details of the analysis of off –gas is as follow:

During operation, the content of HFC23 in off-gas is analyzed on every Thursday, in this

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Formatted: Font: (Default) Arial, 10.5 pt, Complex Script Font: Arial, 10.5 pt monitoring period, 13 normal analyses have been conducted; and there is no such situation that all 8 incinerators were stop; but for conservative reason, when a single or a group of incinerator stop, project owner immediately collects the off-gas and analyze the content of HFC23 in off-gas to identify the amount of HFC23 in off-gas, during this monitoring period, a total of 78 analyses have been conducted. All the analysis results are not detected.

The analysis results in this monitoring period:

Month/Year	Day/Month	GC-MS Detection limit %	Analysis Result	Max %	Duration(Days)
Aug-07	Aug.1-Aug.31	0.00002	Not detected	0.00002	31
Sep-07	Sep.1-Sep.30	0.00002	Not detected	0.00002	30
Oct-07	Oct.1-Oct.31	0.00002	Not detected	0.00002	31

Data		**Max %**	**Rated flow of blower Nm3/h**	**Quantity of blower**	**Operating days in month**	**Operating time in month hr**	**Density of gaseous effluent Kg/ Nm3**	**ND_HFC23 MT**
Aug-07	HFC23 ND	0.00002	144	8	31	744	1.294	0.0002218
		Total of August :ND_HFC23						0.0002218
Sep-07	HFC23 ND	0.00002	144	8	30	720	1.294	0.0002147
		Total of September :ND_HFC23						0.0002147
Oct-07	HFC23 ND	0.00002	144	8	31	744	1.294	0.0002218
		Total of October :ND_HFC23						0.0002218

Month/Year	**Data unit**	**Value**
Aug-07	MT	0.0002218
Sep-07	MT	0.0002147
Oct-07	MT	0.0002218
Total:ND_HFC23y	MT	0.0006583

Appendix 6

Name of item	$Q\_F1,_y$
Description	Electricity consumption by the destruction process
Value in period	**381720 KWh**
Type of material	Power consumption data
Recording frequency	monthly
Method of monitoring	Measured using electricity meter
Background data	Log sheet record/ electricity meter

Month/Year	Data unit	Value
Aug-07	Kwh	130635
Sep-07	Kwh	123840
Oct-07	Kwh	127245
Total:Q_F1, y	Kwh	381720

Appendix 7

Name of item	Q_F2, y
Description	Steam consumption by the destruction process
Value in period	**110.201 t_ steam**
Type of material	Steam consumption data
Recording frequency	monthly
Method of monitoring	Measured using steam meter
Background data	Log sheet record/stream meter

Month/Year	Data unit	Value
Aug-07	MT	37.585
Sep-07	MT	36.890
Oct-07	MT	35.726
Total:Q_F2, y	MT	110.201

Appendix 8

Name of item Q_T y

Description Solid waste

Value in period **824.02t_ sludge**

Type of material Solid waste data

Recording frequency monthly

Method of monitoring Measured using truck scale

Background data Log sheet record

Month/Year	Data unit	Value
Aug-07	MT	279.59
Sep-07	MT	284.84
Oct-07	MT	259.59
Total:Q_T y	MT	824.02

Appendix 9

Name of item $E\_F_{1,y}$

Description CO_2 emission factor of electricity supply

Value in period **0.00099948t CO_2/ kWh**

Recording frequency monthly

Background data Coal consumption per kWh for power generation supply

Heating value of coal: 29.3 MJ/kgce (IPCC default value)

Emission factor: 0.0983 kgCO2/MJ （IPCC default value)

In the project, the electricity is supplied by Juhua Thermal Power Plant (JTPP) which is an own coal-fired power plant of Juhua.

In this monitoring period the CO2 emission factor of electricity supply is calculated as following table:

Date(Month/Year)	Coal consumption per kWh for power generation supply (kgce/kWh)	Heating value of coal (IPCC default value) (MJ/kgce)	Emission factor(IPCC default value) (kgCO2/MJ)	$E\_F_{1,y}$ (tCO_2/ kWh)
	A	B	C	D=A*B*C*0.001
Aug-07	0.346	29.3	0.0983	0.00099655
Sep-07	0.344	29.3	0.0983	0.00099079
Oct-07	0.351	29.3	0.0983	0.00101095

Weighted average of $E\_F_{1,y}$ figures:

Date (Month/Year)	**E_F1,y (tCO2/ kWh)**	**Electricity consumption by the destruction process Q_F1,y (kWh)**	**GHG leakage for electricity consumption (tCO2)**
Aug-07	0.00099655	130635	130.18375
Sep-07	0.00099079	123840	122.69886
Oct-07	0.00101095	127245	128.63791
Total		381720	381.52052

Weighted average $E\_F_{1,y}$ (tCO2/ kWh)	0.00099948		

Appendix 10

Name of item $E\_F_{2,y}$

Description CO_2 emission factor of steam supply

Value in period **0.3237**tCO_2/ t_steam

Recording frequency monthly

Background data Coal consumption for steam supply
Heating value of coal: 29.3 MJ/kgce (IPCC default value)
Emission factor: 0.0983 kgCO2/MJ （IPCC default value)

The steam consumption of the project is supplied by JTPP. In this monitoring period the CO2 emission factor of steam supply is calculated as following table:

Date(Month/Year)	Coal consumption for steam supply (kgce/ kg-steam)	Heating value of coal (IPCC default value) (MJ/kgce)	Emission factor(IPCC default value) (kgCO2/MJ)	$E\_F_{2,y}$ (tCO2/ t_steam)
	A	B	C	D=A*B*C
Aug-07	0.1126	29.3	0.0983	0.3243
Sep-07	0.1124	29.3	0.0983	0.3237
Oct-07	0.1122	29.3	0.0983	0.3232

Weighted average of $E\_F_{2,y}$ figures:

Date (Month/Year)	**E_F2,y (tCO2/t steam)**	**Steam consumption by the destruction process Q_F2,y (t_steam)**	**GHG leakage for steam consumption (tCO2)**
Aug-07	0.3243	37.585	12.18917
Sep-07	0.3237	36.890	11.94252
Oct-07	0.3232	35.726	11.54512
Total		110.201	35.67681
Weighted average $E\_F_{2,y}$ (tCO2/t steam)	0.3237		

Appendix 11

Name of item E _sludge $_y$

Description CO_2 emission factor for waste transport

Value in period **0.000668339** tCO_2/ t_sludge

Recording frequency yearly

In the second project year the CO_2 emission factor for waste transport is calculated as following:

F _Transport Fuel: Required fuel for the transportation of 1 ton of waste to the disposal site (t-diesel/t- sludge)

Haulage Truck: 10t (load)
Distance: 10 km (The actual distance from the company to the landfill is about 4Km, for conservative principle, use the value in PDD i.e.10Km to calculate.)
Average fuel consumption: 4km / l
Density of diesel oil: 0.833 kg / l
F _Transport Fuel = 1/10*10/4*0.833(kg / t-sludge)
= 0.20825 (kg / t-sludge)
= 0.00020825(t-diesel / t-sludge)

E _Transport Fuel: CO_2 emission factor of fuel consumed in haulage trunk (t-CO_2 / t-gasoline)
Unit heat value of diesel oil: 43.33 (TJ / 1000 tonnes) (IPCC default value)
Emission factor: 20. 2(t -C/ TJ) (IPCC default value)
E _Transport Fuel = 43.33 * 20.2 * (44/12) / 1000
= 3.21(t-CO_2 / t-diesel)

E _sludge $_y$=F _Transport Fuel×E _Transport Fuel
=0.00020825×3.21(t-CO_2 / t-sludge)
=0.000668339(t-CO_2 / t-sludge)