CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 02 - in effect as of: 1 July 2004)

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SECTION A. General description of project activity

A.1 Title of the project activity:

No.2 HFC23 Decomposition Project of Zhejiang Juhua Co., Ltd, P. R. China

Current PDD Version: 2

Date: June 25, 2006

A.2. Description of the project activity:

The proposed project will install an incinerator using submerged combustion process technology, which is imported from Japan, to decompose HFC23 gas, the by-product generated from two HCFC22 production lines in Zhejiang Juhua Co. Ltd. By decomposing HFC23 to CO_2, the proposed project is estimated to reduce GHG emissions by 4,987,444 tCO_2e per year, thus mitigating climate change.

China has no mandatory limitation on HFC23 emissions at present. Furthermore, the decomposition of HFC23 requires the installation of corresponding facilities and large amount of investment and has no economic benefit other than GHG mitigation. The owner of the proposed 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 and for the future. This project activity will decompose HFC23 released from two HCFC22 production lines, which were put into operation in 1993 with the production of 7501 tons in 2003 and put into operation in 1997 with the production of 6711.9 tons in 2004 respectively. Without the proposed project, the HFC23 generated in these two production lines will be emitted directly to the atmosphere as waste gas.

Most of the economic benefits from the sales of CERs generated by this project will be used to support activities dealing with climate change in China and thus contribute to the sustainable development of China. This project will create also 15 new jobs.

A.3. Project participants:

Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
China (Host)	– Zhejiang Juhua Co., Ltd., owner and operator of the project	No

UK	– Climate Change Capital China Limited (CCC China Limited)	No
UK	– Climate Change Capital Carbon Fund 2 s.a.r.l. (C4F2)	No

For detailed information, please refer to Annex 1.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1.Host Party (ies):

People's Republic of China

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

Zhejiang Province

A.4.1.3.City/Town/Community etc:

Quzhou City

A.4.1.4.Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

The proposed project activity is located in the plant area of Zhejiang Quhua Fluor-Chemistry Co., Ltd., which is in the northern part of Zhejiang Juhua Co., Ltd (hereinafter referred to as the company). Zhejiang Juhua Co., Ltd is 6.5 kilometers south of the Quzhou City in western Zhejiang Province. To its east is the Wuxi Rive, to its west Jiangshan Port, to its south Loess Hill and to its north Zhegan Railway, as shown in Figure 1.

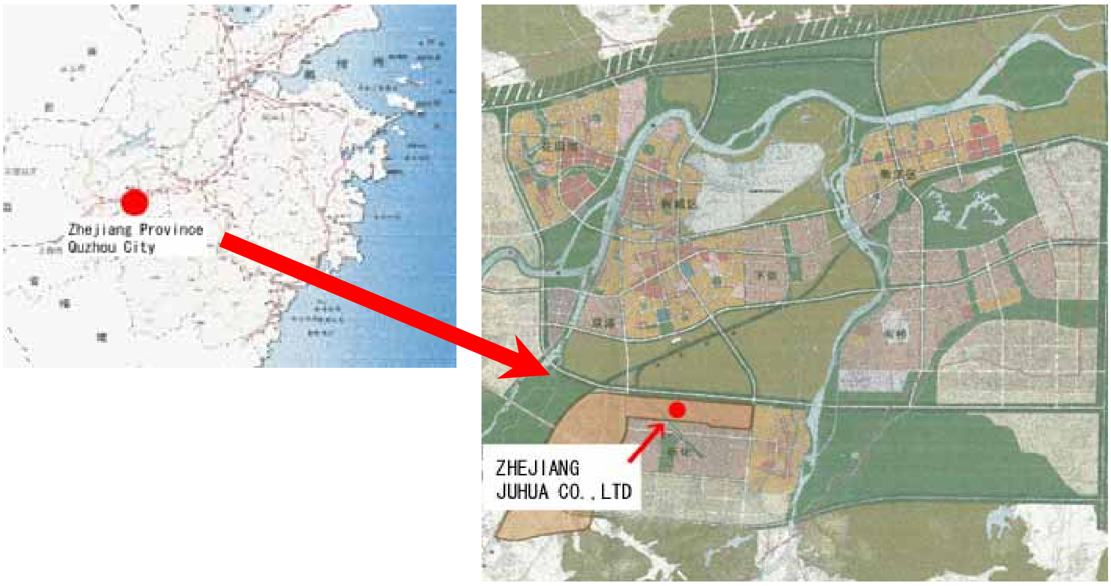

Figure 1: Location of the Project Activity

A.4.2. Category (ies) of project activity:

Category 11: Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride.

A.4.3. Technology to be employed by the project activity:

The proposed project activity will utilize the submerged combustion process technology, developed by Tsukishima Kankyo Engineering Ltd of Japan, to destruct the HFC23 generated in two HCFC22 production lines of the company.

The technology has following characteristics:

- Excellent burning of fuel to keep high incineration temperature;
- Efficient turbulence by vortex burner;
- Good mixture of hot gas and waste;
- Stable and quick gas quenching to minimize dioxins;
- Excellent durability by the adoption of the fittest material.

The decomposition technology to be used in this project encompasses HFC23 incineration furnace, quencher, absorber, neutralization tank, and waste gas disposal equipment. The proposed system first sends the recovered HFC23 to the incineration furnace, into which compressed air, steam and H_2 are sprayed to create, through combustion, the needed high temperature for incineration. After complex reactions, HFC23 is completely destructed to HF, CO_2 and HCl. The acidic gases of HF and HCl are then sent to the quencher, the absorber, the scrubber, the neutralization tank. The acid solution from the quencher will be sold as by-product, but in case of sale difficulty, it will be sent to the company's fluoric waste fluid treatment center for disposal. The alkali waste water from the scrubber will also be sent to the company's fluoric waste fluid treatment center for disposal. Sludge from the disposal process of both the acid solution and the alkali waste water will be disposed in a landfill.

The discharged waste gas and waste water will be in compliance respectively with the second standard as set in *the Integrated Discharge Standards for Gas Pollutants* (GB16297-1996) and the first standard as set in *the Integrated Discharge Standards for Waste Water* (GB8978-1996).

The detailed technical process is shown in Figure 2.

The submerged combustion system has already been utilized in more than 300 plants all over the world, of which more than a dozen are for fluorinated waste incineration, and is a proven technology.

The equipment to be used in this project activity will be imported from Japan. Relevant operating know-how will be transferred to the project owner by training the Chinese staff to operate and maintain the system appropriately. This project will thus promote technology transfer to China.

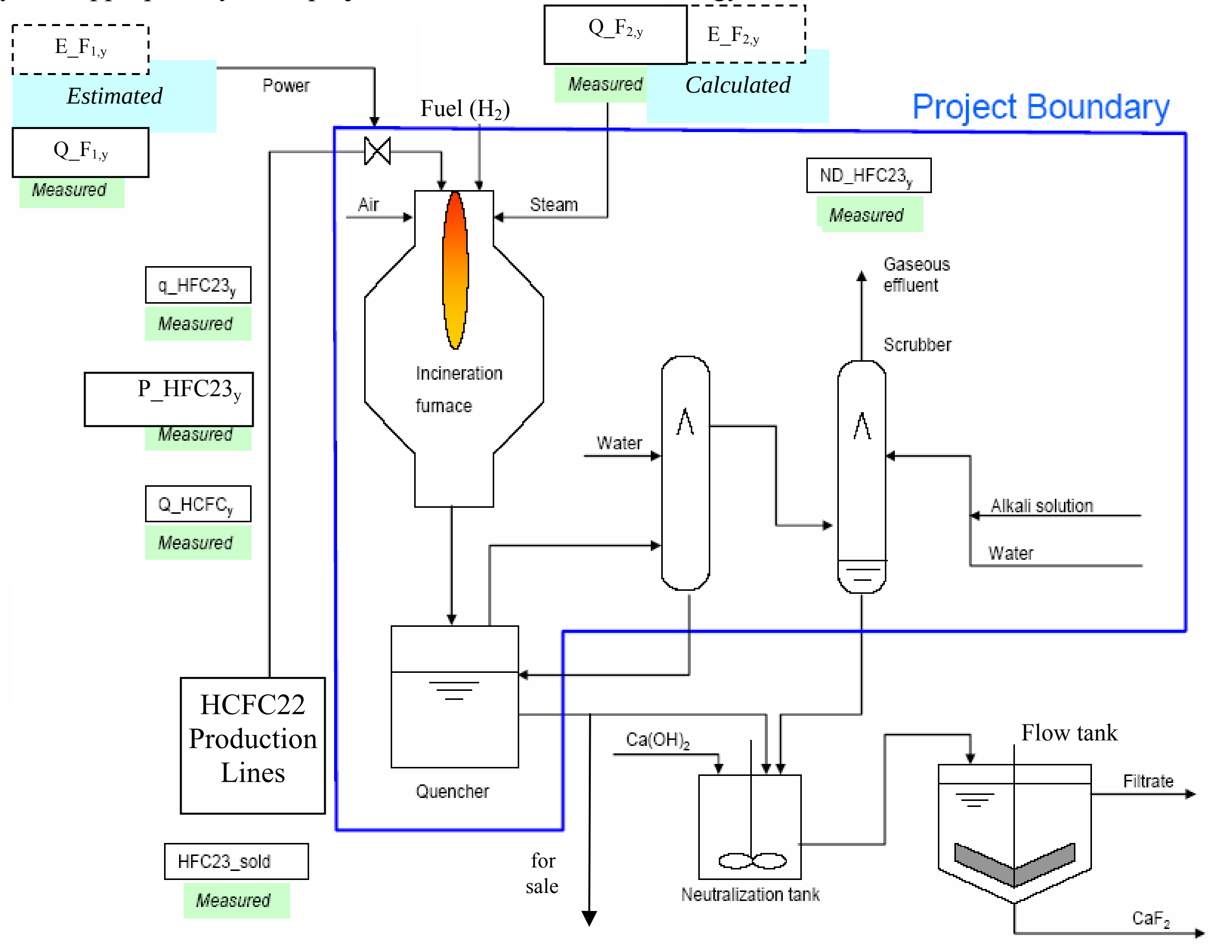

Figure 2: HFC23 Decomposition Process

A.4.4. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed CDM project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances:

The proposed project activity is to decompose HFC23 which has strong greenhouse effect. Without it, the HFC23 generated in the two HCFC22 production lines of the company will be directly emitted to atmosphere for following considerations:

1. There is no mandatory limitation to HFC23 emission in China and such requirement will not be formulated in the foreseeable future.

2. The construction and operation of HFC23 decomposition facilities needs investment as well as operation and maintenance costs while will produce no economic revenue other than the carbon benefits.

Implementation of the proposed project activity will decompose almost all of the HFC23 generated in the two HCFC22 production lines of the company, and thus will generate additional GHGs emission reduction benefits.

A.4.4.1. Estimated amount of emission reductions over the chosen crediting period:

Annual GHG emission reductions of the proposed project are estimated to be 4,987,444 tCO_2e. For detailed calculation please refer to section E.6. During the 21-year crediting period (2007-2028), the total GHG emission reductions of the proposed project are estimated to be 104,736,326 tCO_2e.

years	Annual estimation of emission reductions in tonnes of CO_2 e
2007	1,454,671
2008	4,987,444
2009	4,987, 444
2010	4,987, 444
2011	4,987, 444
2012	4,987, 444
2013	4,987, 444
2014	4,987, 444
2015	4,987, 444
2016	4,987, 444
2017	4,987, 444
2018	4,987, 444
2019	4,987, 444
2020	4,987, 444
2021	4,987, 444
2022	4,987, 444
2023	4,987, 444
2024	4,987, 444
2025	4,987, 444
2026	4,987, 444
2027	4,987, 444
2028	3,532,773
Total estimated reductions (tonnes of CO_2 e)	104,736,326
Total number of crediting years	21
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	4,987,444

A.4.5. Public funding of the project activity:

No public funding is involved in this project activity.

B. Application of a baseline methodology

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

Methodology used for this project is the approved baseline methodology AM0001/version 04: "Incineration of HFC23 Waste Streams".

This methodology is available on the following website:
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html.

B.1.1. Justification of the choice of the methodology and why it is applicable to the project activity:

AM0001 is applicable to HFC23 waste streams from an existing HCFC22 production facility, where the project activity occurs,

1. with at least three (3) years of operating history between beginning of the year 2000 and the end of the year 2004; and

2. where no regulation requires the destruction of the total amount of HFC23 waste.

The proposed project activity fully meets both of the above requirements:

1. It will decompose the HFC23 waste stream from two existing HCFC22 production lines of Zhejiang Juhua Co., Ltd, which have been in operation since year 1993 and year 1997 respectively;
2. There is no regulation restricting HFC23 emissions and there will no such restriction in the foreseeable future in China.

Hence, AM0001 is applicable to this project activity.

B.2. Description of how the methodology is applied in the context of the project activity:

Emission Reduction

According to AM0001, the greenhouse gas (GHG) emission reduction (ERy) achieved by the project activity during a given year (y) is estimated as follows:

$$ER_y = (Q\_HFC23_y - B\_HFC23_y) \times GWP\_HFC23 - E\_DP_y - L_y \qquad (1)$$

Where:

ER_y is GHG emission reduction measured in tonnes of CO_2 equivalents during a given year (y);

Q_HFC23_y is the quantity of HFC23 destroyed during the year y measured in metric tones;

B_HFC23_y is the baseline quantity of HFC23 destroyed during the year measured in metric tones;

GWP_HFC23 is the Global Warming Potential of HFC23, i.e. 11,700;

E_DP_y is the GHG emissions due to the decomposition process measured in tones of CO_2e,;

L_y is the leakage measured in tones of CO_2e.

Among these, the quantity of waste HFC23 destroyed (Q_HFC23_y) is calculated as the product of the quantity of waste HFC23 supplied to the decomposition process (q_HFC23_y) measured in metric tonnes and the purity of the waste HFC23 (P_HFC23_y) supplied to the decomposition process expressed as the fraction of HFC23 in the waste [$Q\_HFC23_y = q\_HFC23_y \times P\_HFC23_y$].

Emission due to the Decomposition Process

The destruction process of this project activity uses H_2, electricity, steam, while H_2 will be converted to H_2O after the reaction, so the GHG emissions (E_DP_y) due to the HFC23 decomposition process are calculated as follows:

$E\_DP_y = ND\_HFC23_y \times GWP\_HFC23 + Q\_HFC23_y \times EF$……...……(2)

Where:

ND_HFC23y: the quantity of HFC23 not destroyed during the year measured in metric tonnes, for the purpose of estimating ex ante the emission reductions of this project activity, the HFC23 decomposition rate is assumed to be 99.99% in accordance with the technical performance of the decomposition equipment to be utilized;

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.

Baseline Emission

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

$B\_HFC23_y = Q\_HFC23_y \times r_y$...(3)

Where:

r_y: the fraction of the HFC23 waste required to be destroyed by the regulations during year y. China has no mandatory requirement on HFC23 decomposition, so r_y=0. The HFC23 waste is typically released to the atmosphere, so the baseline scenario is zero decomposition. If there is any new regulation on the HFC23 emission, r_y will be modified then.

To exclude the possibility of manipulating the production process to increase the quantity of waste, the quantity of HFC23 waste (Q_HFC23_y) is limited as shown below:

$Q\_HFC23_y \leq Q\_HCFC_y \times w$

Where:

Q_HCFC_y is the actual production of HCFCs during the year at the production lines where the HFC23 waste originates measured in metric tones. Q_HCFC_y is limited to the maximum historical annual production level at the production lines (in tonnes of HCFC22) during any of the last three (3) years between beginning of the year 2000 and the end of the year 2004, including CFC production at swing plants adjusted appropriately to account for the different production rates of HCFC22 and CFCs.

W is the waste generation rate (HFC23)/(HCFC22) for the originating production lines. 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 between 2000-2004, the HCFC22 outputs and the waste generation rates of the two production lines are respectively:

1. Production line No. 1: 6854 t in 2002, 7501 t in 2003, and 6997 t in 2004 and the waste generation rates are: 3.11% in 2002, 3.046% in 2003, and 3.012% in 2004. So, for this production line, w equals to 3.0%, and the maximal (annual) output of HCFC22 is 7501t.

2. Production line No. 2: 5438 t in 2002, 5798 t in 2003, and 6711.9 t in 2004 and the waste generation rates are: 4.03% in 2002, 3.66% in 2003, and 3.51% in 2004. So, for this production line, w equals to 3.0%, the maximal (annual) output of HCFC22 is 6711.9t.

Therefore, for this project activity, w equals to 3.0%, the maximal (annual) output of HCFC22 will be 14212.9t.

Leakage

The leakage sources include the GHG emissions caused by the consumption of energy (steam and electricity) during the HFC23 decomposition process and the GHG emission due to transportation of sludge (mainly CaF_2) to the landfill.

$$L_y = Q\_Power_y \times E\_Power_y + Q\_Steam_y \times E\_Steam_y + ET_y \quad \text{………………………………..(4)}$$

Where:

Q_Power_y is the quantity of electricity consumed by the destruction process during year y (MWh);
E_Power_y is the GHG emissions factor of the consumed electricity (tCO_2e/MWh);
Q_Steam_y is the quantity of steam consumed by the destruction process during year y (t-steam);
E_Steam_y is the GHG emissions factor of the consumed steam during year y (tCO_2e/t-steam);
ET_y is the GHG emissions from the use of diesel associated with sludge transport during year y.

Key Baseline Information and Data

ID	Data Variable	Value	Source
w	the waste generation rate (HFC23/HCFC22) for the originating production lines	Production line No. 1: 3.11% in 2002, 3.046% in 2003, and 3.012% in 2004; Production line No. 2: 4.03% in 2002, 3.66% in 2003, and 3.51% in 2004.	Measured by the project owner
GWP_HFC23	the Global Warming Potential of HFC23	11,700	AM0001
Q_HCFC_y	the actual production of HCFC22 during the year at the originating production lines	Production line No. 1: 6854 t in 2002, 7501 t in 2003, and 6997 t in 2004; Production line No. 2: 5438 t in 2002, 5798 t in 2003, and 6711.9 t in 2004.	Measured by the project owner
r_y	the fraction of the HFC23 waste required to be destroyed by the regulations during year y	0	Analysis of China's relevant regulation

B.3. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity:

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 the proposed project activity will decompose all of the HFC23 generated from the two HCFC22 production lines of the company, and thus compared to direct emissions of HFC23 to the atmosphere, the proposed project will generate additional GHGs emission reduction benefits.

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the project activity:

Project boundary of this project activity includes the facility to decompose the HFC23, while does not include the neutralization tank, the flow tank and the HCFC22 production facility, as shown in Figure 2 contained in section A4.3.

B.5. Details of baseline information, including the date of completion of the baseline study and the name of person (s)/entity (ies) determining the baseline:

Date of completing this baseline section: June 25, 2006.
Name of person/entity determining the baseline:
Dr. DUAN Maosheng, Institute of Nuclear and New Energy Technology, Tsinghua University, P.R. China
Tele: +86 10 6277 2596
Email: duanmsh@mail.tsinghua.edu.cn
Dr. ZHOU Sheng, Institute of Nuclear and New Energy Technology, Tsinghua University, P.R. China
Tele: +86 10 6279 5352
Email: zhshinet@mail.tsinghua.edu.cn
Tsinghua University is not one of the project participants.

C. Duration of the project activity / Crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

15/09/2007 (expected).

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

30 years, depending on future regulation.

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

C.2.1. Renewable crediting period

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

15/09/2007 (expected)

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
Not applicable.

C.2.2.2. Length:

>>
Not applicable.

D. Application of a monitoring methodology and plan

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

The approved monitoring methodology of AM0001/version 4: "Incineration of HFC23 Waste Streams".

This methodology is available on the following website:
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html.

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

AM0001 is applicable to HFC23 waste streams from an existing HCFC22 production facility, where the project activity occurs,

1. with at least three (3) years of operating history between beginning of the year 2000 and the end of the year 2004; and

2. where no regulation requires the destruction of the total amount of HFC23 waste.

The proposed project activity fully meets both of the above requirements:

1. It will decompose the HFC23 waste stream from two existing HCFC22 production lines of Zhejiang Juhua Co., Ltd, which have been in operation since year 1993 and year 1997 respectively ;
2. There is no regulation restricting HFC23 emissions and there will no such restriction in the foreseeable future in China.

Hence, AM0001 is applicable to this project activity.

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	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)	For how long is archived data kept?	Comment
1. q_HFC23_y	mass	Quantity of HFC23 supplied to the decomposition process	kg-HFC	(m) measured by two flow meters simultaneously. The flow meters shall be calibrated every six months by an officially accredited entity. The zero check on the flow meters shall be conducted every week.	monthly	100%	paper	Project lifetime	The monthly quantity of HFC 23 waste flows (q_HFC23_m) is the sum of the lower periodic reading of the two meters.
2. P_HFC23_y	%	Purity of the HFC23 supplied to the decomposition process	%	(m) measured monthly by sampling	monthly		paper	Project lifetime	Measured using gas chromatography

In addition the quantities of gaseous effluents (CO, HCl, HF, Cl2, 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 project emissions (E_DP_y) due to the HFC23 decomposition process are:

$$E\_DP_y = ND\_HFC23_y \times GWP\_HFC23 + Q\_HFC23_y \times EF \quad \text{……………………………………………}(2)$$

Where：

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

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.

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)	For how long is archived data kept?	Comment
3. Q_HCFC_y	mass	The quantity of HCFC22 produced by the two production lines generating the HFC 23 waste	t – HCFC22	m	monthly	100%	paper	Project lifetime	Reference data to check cut-off condition & rough estimation of Q_HFC23_y
4. $HFC23\_sold_y$	mass	HFC23 sold by the two HCFC22 production lines	t – HFC23	m	yearly	100%	paper	Project lifetime	Reference data to check cut-off condition & rough estimation of Q_HFC23_y

		generating HFC23							

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 HFC23 destroyed is the quantity of the HFC23 waste stream required to be destroyed by the applicable regulations:

$B\_HFC23_y = Q\_HFC23y * r_y$

Where:

r_y : The ratio of the HFC23 waste to be decomposed according to the regulation.

China has no mandatory requirement on the decomposition of HFC23, $r_y = 0$. If there is any new regulation on the HFC23 emission, r_y will be modified then.

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

Not applicable.

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)	For how long is archived data kept?	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.):

>>

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)	For how long is archived data kept?	Comment
5. ND_HFC23_y	mass	Quantity of HFC 23 in gaseous effluent	Kg-HFC	m	monthly	100%	paper	Project lifetime	When the thermal oxidizer stops, analysis of the effluent gas is done to check leaked HFC23 by sampling.
6. $Q\_F_{1,y}$	energy	Electricity consumption by the decomposition process	MWh	m	monthly	100%	paper	Project lifetime	metered
7. $Q\_F_{2,y}$	energy	Steam consumption by the decomposition process	t-steam	m	monthly	100%	paper	Project lifetime	metered
8. $E\_F_{1,y}$	energy	Emission factor of electricity supply	tCO_2e/MWh	Estimated ex ante	estimated once before the project operation		paper	Project lifetime	Set at 1.2 tCO_2e/MWh for conservative purpose
9. $E\_F_{2,y}$	energy	emission factor of steam supply	tCO_2e/t-steam	c	monthly	100%	paper	Project lifetime	Metered and calculated
10． Q_T_y	mass	Solid waste	t-sludge	Estimated ex ante	estimated once before the project operation		paper	Project lifetime	Estimated conservatively using the facilities performance data

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

The leakage is calculated as below：

$L_y = \Sigma i\,(Q\_F_{i,y} \times E\_F_{i,y}) + ET_y$ ……………………………………………………………............………....................................…….(4)

$= Q\_F_{1,y} \times E\_F_{1,y} + Q\_F_{2,y} \times E\_F_{2,y} + Q\_T_{,y} \times E\_sludge_{,y}$

Where,

$Q\_F_{1,y}$: Electricity consumption, from the self-used power plant with coal fuel during the year y (MWh).

$E\_F_{1,y}$: Emission factor of electricity supply of the East China Electric Grid (tCO_2e / MWh).

$Q\_F_{2,y}$: Steam consumption, from the self-used boiler with coal fuel during the year y (t-steam).

$E\_F_{2,y}$: Emission factor of steam supply of the self-used boiler (tCO_2 e/ t-steam).
$Q\_T_{,y}$: Annual quantity of sludge produced (t- sludge).
$E\_sludge_{,y}$: CO_2 emission factor of the consumption of diesel oil during transportation of sludge (mainly CaF_2) to landfill.(tCO_2e／t-sludge).

The acid solution from the quencher will be sold as by-product, but in case of sale difficulty, it will be sent to the company's fluoric waste fluid treatment center for disposal. For conservativeness, in the calculation of the leakage, it is assumed that all of the waste fluid will be sent to the company's fluoric waste fluid treatment center for disposal. Since the center also disposes of waste fluid from other processes, it is not possible to monitor the amount of sludge resulted from the disposal of waste fluid from this project activity directly. The equipment supplier has already signed a contract assuring the technical performance of the equipment, it is therefore reasonable to estimate ex ante, according to the technical performance data, the amount of sludge to be resulted from the treatment of waste fluid from this project activity.

According to the contract between the equipment supplier and the company, this project activity will produce 300kg of acid fluid each hour, and less than 20% of the fluid is HCL and HF; the alkali fluid produced each other is 1040kg, and less than 0.1% of the fluid is Na_2CO_3, $NaHCO_3$, NaF, and NaCl. $Ca(OH)_2$ will be used to treat the fluoric fluid. According to these data and the reaction equations, the amount of sludge produced annually is 1034t. For conservativeness, 2000t per year is selected to calculate relevant leakage of this project activity.

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.)

The project emission reductions are calculated as follows:

$ER_y = (Q\_HFC23_y - B\_HFC23_y) \times GWP\_HFC23 - E\_DP_y - L_y$……………………………………………………………………………(1)

Where,

ER_y: GHG emission reductions measured in tonnes of CO_2 equivalent during a given year(y).

Q_HFC23_y: the quantity of decomposed HFC23 measured in metric tones during the year y.

B_HFC23_y: the baseline quantity of the decomposed HFC23 measured in metric tones during the year y.

GWP_HFC23: The Global Warming Potential converts 1 tonne of HFC23 to tonnes of CO_2 equivalent (tonnes CO_2e/tonne HFC23). The approved Global Warming Potential value for HFC 23 is 11,700.

E_DP_y: GHG emissions in tones of CO_2e, due to the decomposition process.

L_y: GHG leakage in tones of CO_2e, due to the decomposition process.

Among these, the quantity of waste HFC23 destroyed (Q_HFC23_y) is calculated as the product of the quantity of waste HFC23 supplied to the decomposition process (q_HFC23_y) measured in metric tonnes and the purity of the waste HFC23 (P_HFC23_y) supplied to the decomposition process expressed as the fraction of HFC23 in the waste, i.e. $Q\_HFC23_y = q\_HFC23_y \times P\_HFC23_y$.

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)	Are QA/QC procedures planned for these data?	Outline explanation why QA/QC procedures are or are not being planned.

1. q_HFC23 $_y$	Low	Yes. A QA & QC organization will be formed and QA & QC procedures that are equivalent to JIS (Japanese Industrial Standard) in terms of equipment and analytical method will be set. Will be measured using two flowmeters in parallel. The flow meters shall be calibrated every six months by an officially accredited entity. The zero check on the flow meters shall be conducted every week. If the zero check indicates that flow meter is not stable, an immediate calibration of the flow meter shall be undertaken.	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.
2. P_HFC23 $_y$	Low	Will be measured using gas chromatography	Ditto
3. Q_HCFC$_y$	Low	Will be obtained from production records of the facility where the HFC23 originates	Ditto
4 HFC23_sold $_y$	Low	Will be obtained from production records of the facility where the HFC23 originates	Ditto
5. ND_HFC23 $_y$	Low	Will be measured from the gas effluent of the decomposition process	Ditto
6. Q_F$_{1,y}$	Low	Will be metered using electricity meter	Ditto
7. Q_F$_{2,y}$	Low	Will be metered using steam meter	Ditto
8. E_F$_{1,y}$	Low	Estimated ex ante	Set at 1.5 tCO_2e/MWh for conservative purpose
9. E_F$_{2,y}$	Low	Will be got by meter & calculation	Ditto

All of the measurement instruments are to be recalibrated monthly per internationally accepted procedures except for the HFC23 flow meters The HFC23 flow meters shall be calibrated every six months by an officially accredited entity. The zero check on the flow meters shall be conducted every week. If the zero check indicates that flow meter is not stable, an immediate calibration of the flow meter shall be undertaken.

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 the project emission reductions and leakage, the project operator plans to establish the operational and administration structure as shown in figure 3. Details are illuminated as follows:

1、Project Operator, Zhejiang Juhua Co., Ltd. (JH) will nominator a Chinese CDM Project Director, who will supervise the operation manager and monitor manager. The respective responsibilities are as follows：

1) Chinese CDM project director：Receive the report from operation manager and monitor manager; manage the CDM project jointly with the UK side; Coordinate with the Chinese Government and stakeholders; submit the monitoring report to DOE.
2) Operation manager: Based on the operation manual, take care of the project operation management and supervision, and is responsible to the Chinese CDM project director.
3) Monitoring manager: Based on monitoring manual, take care of the monitor of emission reduction and leakage data, including environment influence, and is responsible to the Chinese CDM project director.

2、The UK CDM project director will be also be responsible for the management of the CDM project jointly with Chinese side, provide the plan for project implementation, operation and maintenance etc. , and coordinate with UK Government.

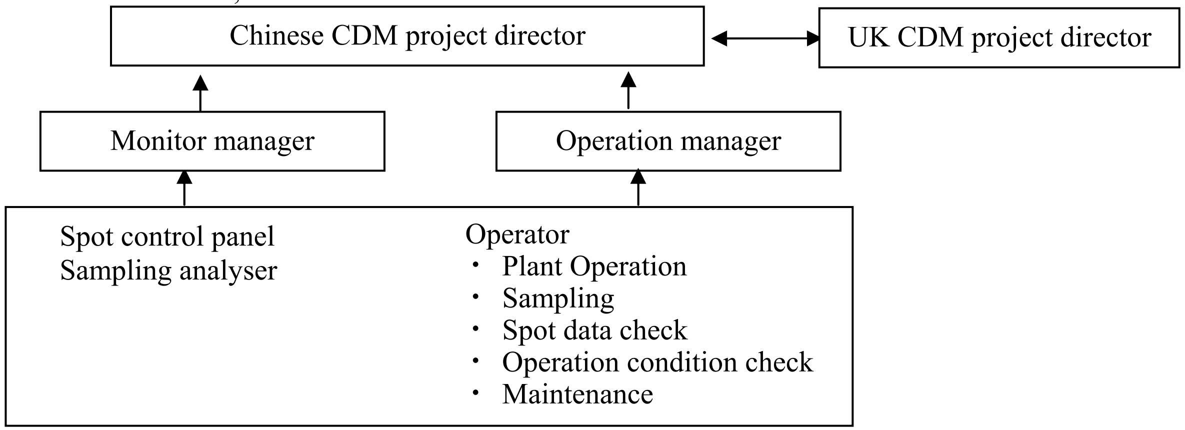

Figure3 Operational and Management Structure

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

Date of completing this monitoring section: June 25, 2006.
Name of person/entity determining the baseline:
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Tsinghua University is not one of the project participants.

SECTION E. Estimation of GHG emissions by sources

E.1. Estimate of GHG emissions by sources:

The total GHG emissions within the project boundary in the year y are calculated as follows: (for detailed explanation of the formula, please refer to B.2)

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

$= 767\ tCO_2e$

E.2. Estimated leakage:

Estimated leakage(for detailed explanation of the formula, please refer to D.2.3.2.)：

$L_y = Q\_F_{1,y} \times E\_F_{1,y} + Q\_F_{2,y} \times E\_F_{2,y} + Q\_T_y \times E\_sludge_y$

$= 517\ tCO_2e$

E.3. The sum of E.1 and E.2 representing the project activity emissions:

The project activity emissions:

$EP_y = E\_DP_y + L_y$

$= 1284\ tCO_2e$

E.4. Estimated anthropogenic emissions by sources of greenhouse gases of the baseline:

Emissions of baseline scenario (EB_y), (for detail explanation of the formula, please refer to B.2):

$EB_y = (Q\_HFC23_y - B\_HFC23_y) \times GWP\_HFC23$

$B\_HFC23_y = Q\_HFC23_y \times r_y$

$Q\_HFC23_y \leq Q\_HCFC22_y \times w$

As described in B.2, $r_y = 0$, w＝3.0%, Q_HCFC22_y equals to 14,212.9 t, so

$EB_y = 4{,}988{,}728\ tCO_2e$

E.5. Difference between E.4 and E.3 representing the emission reductions of the project activity:

The emission reductions of the proposed project activity are calculated as follows:

$ER_y = EB_y - EP_y$

$= 4{,}987{,}444\ tCO_2e$

E.6. Table providing values obtained when applying formulae above:

Year	**Estimation of Project activity Emissions (tonnes of CO2e)**	**Estimation of baseline emissions (tonnes of CO2 e)**	**Estimation of leakage (tonnes of CO2e)**	**Estimation of emission reductions (tonnes of CO2 e)**
2007	224	1,455,046	151	1,454,671

2008	767	4,988,728	517	4,987,444
2009	767	4,988,728	517	4,987,444
2010	767	4,988,728	517	4,987,444
2011	767	4,988,728	517	4,987,444
2012	767	4,988,728	517	4,987,444
2013	767	4,988,728	517	4,987,444
2014	767	4,988,728	517	4,987,444
2015	767	4,988,728	517	4,987,444
2016	767	4,988,728	517	4,987,444
2017	767	4,988,728	517	4,987,444
2018	767	4,988,728	517	4,987,444
2019	767	4,988,728	517	4,987,444
2020	767	4,988,728	517	4,987,444
2021	767	4,988,728	517	4,987,444
2022	767	4,988,728	517	4,987,444
2023	767	4,988,728	517	4,987,444
2024	767	4,988,728	517	4,987,444
2025	767	4,988,728	517	4,987,444
2026	767	4,988,728	517	4,987,444
2027	767	4,988,728	517	4,987,444
2028	543	3,533,682	366	3,532,773
Total (tonnes of CO_2e)	**16,105**	**104,763,286**	10,856	**104,736,326**

SECTION F. Environmental impacts

F.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

Main conclusions of the Environmental Impacts Assessment (EIA) of the proposed project activity are as follows:

1) This project activity belongs to the disposal of "three wastes" (waste water, waste gas and solid waste) and comprehensive utilization of resources, as listed in article 6.21 of *Current List of Key Industries, Products and Technologies Supported by the State*, and is thus consistent with state industry policies.
2) This project activity is to be constructed within the boundary of Zhejiang Quhua Fluor-Chemistry Co., Ltd., and is thus consistent with the city's development program.
3) This project activity will incinerate HFC23 which has been released directly to the atmosphere in the past and will thus reduce GHG emissions. The technology to be used will produce limited "three wasts" which will be discharged after disposal, in compliance with relevant laws and regulations. This technology will be imported from Japan and is a proven advanced technology.
4) The incineration offgas of this project activity will be released after treatment in the scrubber and is compliance with relevant discharge standards. With regard to the contents of the offgas, HF$\leq$9.0 mg/m^3, HCl$\leq$100mg/m^3, CO$\leq$20mg/m^3, dioxin$\leq$0.5ng-TEQ/Nm^3. The production waste water will be disposed in the company's waste fluid treatment system and will be discharged in compliance with relevant standards.
5) After the operation of this project activity, the total discharge amount of fluoric pollutants (gas) in Juhua Group will be reduced below 1995 and 2004 levels. This project activity will produce very limited amount of fluoric substance (gas) and will have very minor effects on local environment.
6) Although this project will produce some "three wastes", the increased pollutants, after treatment, will have no obvious effect on local environment.

In short, the project activity has good social benefits and some environmental benefits, is consistent with the city's general urban development program and state industry policy, and will utilize internationally advanced technology. Pollutants from this project activity could be discharged in accordance with relevant standards, the total amount of pollutants could be controlled and thus the project activity will have no obvious effect on local environment.

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

According to the EIA Report, this project activity will generate certain environment benefits, is consistent with relevant state and local laws and regulations, and will have no obvious impact on local environment.

SECTION G. Stakeholders' comments

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

In June 2006, Zhejiang Environmental Engineering Co. Ltd. entrusted Quzhou Research Institute of Environmental Sciences to investigate pulic participation in this project activity. This has been done through questionnaires. The original documents are conserved in Zhejiang Quhua Fluor-Chemistry Co.,Ltd..

Contents of the distributed questionnaires include: major purpose and contents of the project activity, environmental protection measures to be taken, expected discharge of pollutants and relevant standards etc. The environmental analysts have also given some explanations to the public regarding questions raised. The investigated stakeholders include peasants living nearby, employees of relevant enterprises and organizations. The investigation was conducted according to the principle of both pertinence and random in order to objectively reflect the public comments and recommendations without any prejudice.

Major investigated issues include:

(1) Major environmental issues with regard to Zhejiang Juhua Co, Ltd that the public is concerned;
(2) Impression of the public on the environmental work of Zhejiang Juhua Co, Ltd in recent years;
(3) Attitude towards the current environmental status in the proposed construction site;
(4) Environmental benefits of the project activity;
(5) Opinion on the effects of this project activity on local economic development;
(6) Opinion on the major environmental problems of the project activity;
(7) Impacts of the project activity on local water environment;
(8) Impacts of the project activity on local atmospheric environment;
(9) Impacts of the project activity on ecological environment;
(10) Possible impacts of the project activity on human health;
(11) Attitudes towards this project;
(12) Other recommendations on the project (including environmental protection)

Questionnaires have been distributed to 40 individuals and 12 organizations and all of the distributed questionnaires have been returned. These stakeholders are summarized in tables G.1 and G.2:

Table G.1: Consulted Organizations

Category	Number	Name
Governmental entities, enterprises and public entities	6	Quzhou Municipal Economic Commission, Quzhou Municipal Planning Bureau, Quzhou Municipal Political Consultation Congress Standing Committee, Committee of Agriculture, Resource Conservation and Environmental Protection of Quzhou Municipal People's Congress, Zhejiang Jusheng Fluoric Chemical Co, Ltd, Zhengjiang Kaisheng Fluoric Chemical Co, Ltd
Residents' and village committees	6	Residents' Committee of Juhua Group, Residents' Committee of Tatanshi Village, Residents' Committee of Luzhai Village, Residents' Committee of Chenjia Village, Residents' Committee of Dongzhou Village, Residents'

		Committee of Caopu Village

Table G.2: Consulted Individuals

Category		Number	Ratio (%)
Sex	Male	27	67.5
	Female	13	32.5
Age	≤30	5	12.5
	31-40	20	50.0
	41-50	13	32.5
	≥51	2	5.0
Occupation	top-ranking personnel	5	12.5
	staffer	9	22.5
	workers	7	17.5
	peasants	12	30.0
	others	7	17.5

G.2. Summary of the comments received:

Table G.3: Summary of the Stakeholder Consultation Results

No.	Issue	Attitude	Organizations		Individuals	
			number	Ratio (%)	number	Ratio (%)
1	Major environmental issues with regard to Zhejiang Juhua Co, Ltd that the public is concerned	Waste gas	11	91.7	38	95.0
		Waste water	9	75.0	28	70.0
		Noise	3	25.0	7	17.5
		Solid waste	2	16.7	3	7.5
		others	1	8.3	1	2.5
2	Impression on the environmental work of Zhejiang Juhua Co, Ltd in recent years	Good	8	66.7	13	32.5
		normal	4	33.3	22	55.0
		Bad	0	0.0	5	12.5
3	Attitude towards the current environmental status in the proposed construction site	Satisfied	2	16.7	3	7.5
		Generally satisfied	9	75.0	27	67.5
		Not satisfied	1	8.3	10	25.0
4	Environmental benefits of the project activity	Good	3	25.0	15	37.5
		Generally good	1	8.3	10	25.0
		Normal	3	25.0	0	0.0
		No idea	5	41.7	15	37.5
5	Opinion on the effects of this project	Promote	11	91.7	36	90.0
		Not promote	0	0.0	0	0.0

	activity on local economic development	No change	0	0.0	2	5.0
		No idea	1	8.3	2	5.0
6	Opinion on the major environmental problems of the project activity	Air pollution	7	58.3	32	80.0
		Water pollution	9	75.0	17	42.5
		Noise pollution	0	0.0	2	5.0
		No pollution	0	0.0	6	15.0
7	Impacts of the project activity on local water environment	Improve	7	58.3	10	25.0
		Destroy	0	0.0	12	30.0
		No change	3	25.0	16	40.0
		No idea	2	16.7	2	5.0
8	Impacts of the project activity on local atmospheric environment	Improve	7	58.3	13	32.5
		Destroy	0	0.0	13	32.5
		No change	2	16.7	13	32.5
		No idea	3	25.0	1	2.5
9	Impacts of the project activity on ecological environment	Improve	7	58.3	11	27.5
		Destroy	1	8.3	8	20.0
		No change	2	16.7	18	45.0
		No idea	2	16.7	3	7.5
10	Possible impacts of the project activity on human health	Some impacts	3	25.0	14	35.0
		No impact	0	0.0	3	7.5
		No idea	9	75.0	23	57.5
11	Attitudes towards this project	Support	12	100.0	35	87.5
		Object	0	0.0	0	0.0
		Don't care	0	0.0	5	12.5

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

From the comments received, it can be seen that most organizations and individuals support this project activity, while pay great attention to the environmental issues and asks for the treatment of waste gas, waste water and solid waste and also a long-term monitoring and management program. During the construction and operation of the project activity, the company will take all public comments and recommendations into account and take all countermeasures required by the environmental protection assessment report, in order to achieve environmental, social and economical benefits.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is involved in this project activity.

Annex 3

BASELINE INFORMATION

Emission reductions related information:

NO.	Variable	Value	Source
1.	the waste generation rate (HFC23/HCFC22) for the originating production lines	Production line No. 1: 3.11% in 2002, 3.046% in 2003, and 3.012% in 2004; Production line No. 2: 4.03% in 2002, 3.66% in 2003, and 3.51% in 2004.	Measured by the project owner
2.	the actual production of HCFC22 during the year at the originating production lines	Production line No. 1: 6854 t in 2002, 7501 t in 2003, and 6997 t in 2004; Production line No. 2: 5438 t in 2002, 5798 t in 2003, and 6711.9 t in 2004.	Measured by the project owner
3.	the Global Warming Potential of HFC23, GWP_HFC23	11,700	AM0001
4.	CO_2 emission factors		
4.1	CO_2 emission factor of electricity supply: $E\_F_{1,y}$	1.2 (tCO_2e/MWh)	Estimated conservatively
4.2	CO_2 emission factor of steam supply, $E\_F_{2,y}$	0.365 (tCO_2e/ t-steam)	Calculated (see below)
4.3	CO_2 emission factor for waste transport, E_sludge_y	0.000668339 (tCO_2e/ t-sludge)	Calculated (see below)
4.4	HFC23 emission factor after decomposition, EF	0.62857 (tCO_2e／t-HFC23)	AM0001
5	Leakage		
5.1	Electricity consumption, from the East China Electric Grid during the year y	350.4 MWh	feasibility study report
5.2	Steam consumption, from the self-used boiler with coal fuel during the year y	262.8 t-steam	feasibility study report
5.3	Solid waste, Q_T_y	2000 t-sludge	estimated conservatively in accordance with technical performance data of the equipment

CO_2 emission factor of electricity supply $E\_F_{1,y}$

The emissions factor of electricity from the North China Grid is less than 1 tCO_2e/MWh. For conservativeness, the factor is set to be 1.2 tCO_2e/MWh, i.e. $E\_F_{1,y}$= 1.2 tCO_2e/MWh.

CO_2 emission factor of steam supply, $E\_F_{2,y}$

Steam for this project is supplied by Juhua Thermal Power Plant. Related parameters of the plant are:
Coal consumption for steam supply: 0.127kgce/ kg-steam

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

Emission factor: 0.0983 $kgCO_2$/ MJ (IPCC default value)

Thus, $E\_F_{2,y}$ = 0.127 * 29.3 * 0.0983 ($kgCO_2$ e / kg-steam)

= 0.365 ($kgCO_2$ e / kg-steam)

= 0.365 (tCO_2e / t-steam)

CO_2 emission factor for waste transport, E _sludge $_y$

F_transport: Required fuel for the transportation of 1 ton of waste to the disposal site (t-gasoline/t-sludge)

Haulage Truck: 10t (load)

Distance: 10 km

Average fuel consumption: 4km / l

Density of diesel oil: 0.833 kg / l

F_transport = 1/10*10/4*0.833 (kg / t-sludge)

= 0.20825 (kg / t-sludge)

= 0.00020825(t-gasoline / t-sludge)

E_transport: 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 (tC / TJ) (IPCC default value)

E_transport = 43.33 * 20.2 * (44/12) / 1000 (t-CO_2 / t-gasoline)

= 3.21(t-CO_2 / t-gasoline)

E_sludge $_y$ = F_transport ×E_transport

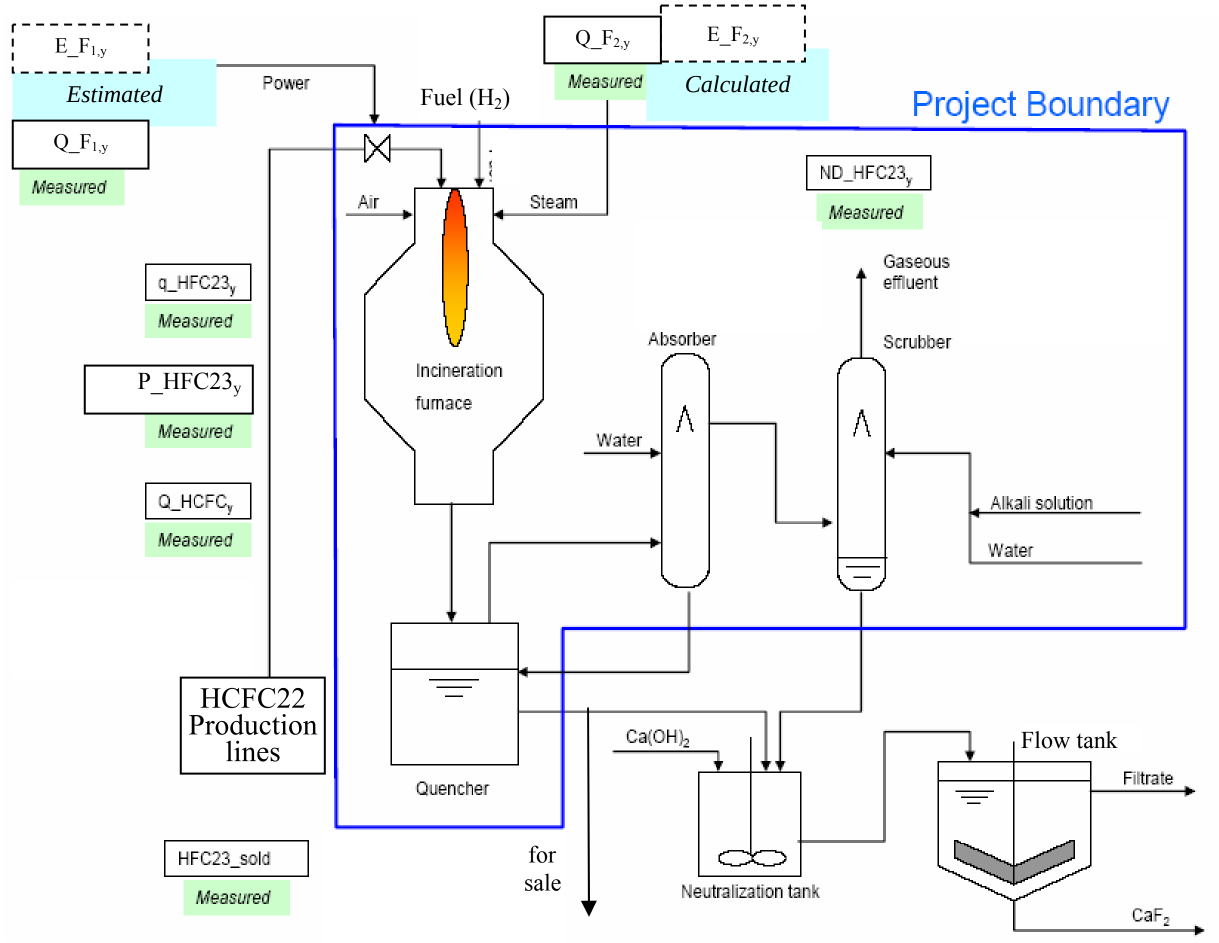
= 0.00020825×3.21 (t-CO_2 / t-sludge)

= 0.000668339 (t-CO_2 / t-sludge)

Annex 4

MONITORING PLAN

The monitoring points are shown below.



1. q _HFC23$_y$: Quantity of HFC23 supplied to the decomposition process;
2. P_HFC23$_y$: Purity of the HFC23 supplied to the decomposition process;
3. Q_HCFC$_y$: The quantity of HCFC22 produced by the two production lines generating the HFC23 waste;
4. HFC23_sold$_y$: HFC23 sold by the two HCFC22 production lines generating the HFC23 waste;
5. ND_HFC23$_y$: Quantity of HFC23 in gaseous effluent;
6. Q_F$_{1,y}$: Electricity consumption by the decomposition process;
7. Q_F$_{2,y}$: Steam consumption by the decomposition process;
8. E_F$_{1,y}$: Emission factor of electricity supply;
9. E_F$_{2,y}$: Emission factor of steam supply.

In order to monitor the project emission reductions and leakage, the project operator plans to establish the operational and administration structure as shown in the figure below. Details are illuminated as follows:

1、Project Operator, Zhejiang Juhua Co., Ltd. (JH) will nominator a Chinese CDM Project Director, who will supervise the operation manager and monitor manager. The respective responsibilities are as follows：

1) Chinese CDM project director：Receive the report from operation manager and monitor manager; manage the CDM project jointly with the UK side; Coordinate with the Chinese Government and stakeholders; submit the monitoring report to DOE.
2) Operation manager: Based on the operation manual, take care of the project operation management and supervision, and is responsible to the Chinese CDM project director.
3) Monitoring manager: Based on monitoring manual, take care of the monitor of emission reduction and leakage data, including environment influence, and is responsible to the Chinese CDM project director.

2、The UK CDM project director will be also be responsible for the management of the CDM project jointly with Chinese side, provide the plan for project implementation, operation and maintenance etc. , and coordinate with UK Government.

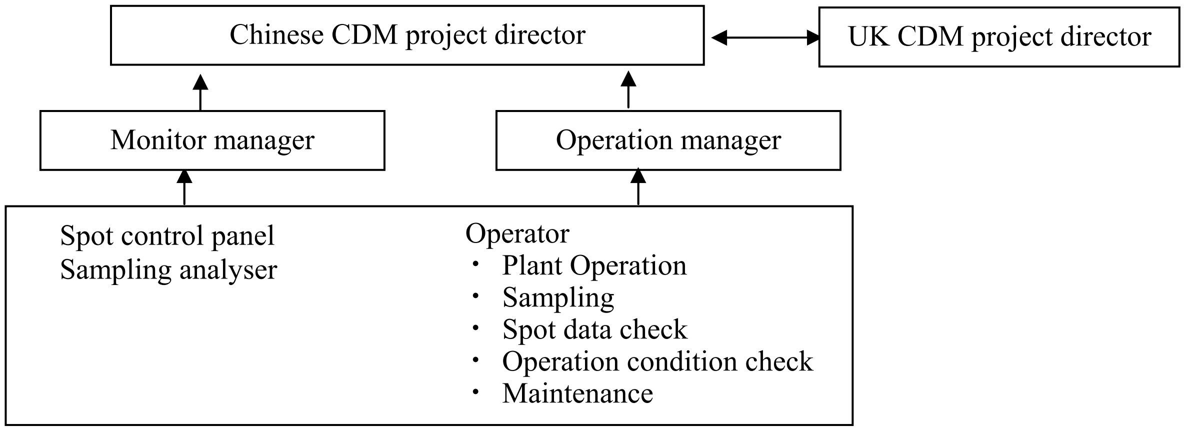


Figure: Operational and Management Structure