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

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

Title: Project for GHG Emission Reduction by Thermal Oxidation of HFC23 in Jiangsu Meilan Chemical CO. Ltd., Jiangsu Province, China (hereinafter referred to "JMC")

Version: Version 6

Date: March 20, 2006

A.2. Description of the project activity:

The purpose of the project activity:

JMC is a large HCFC 22 manufacturer in China. HFC 23 is generated as an inevitable by-product in HCFC 22 production. In China, there are currently no compulsory regulations on emissions of HFC 23, as a GHG with high GWP of 11,700, thus the HFC 23 generated from HCFC 22 production is typically vented directly to the atmosphere. JMC used to have three HCFC22 production facilities of which one production line with capacity of 10,000 ton/year had been installed in 1996 and stopped production in 2001 because of its out-of-date process and high unit material consumption. Thus the unit A and unit B, two existing JMC HCFC 22 production facilities were installed and in operation from July, 2001 and from October, 2001 respectively (Refer to Figure in B2 section of this document). Unit A has an annual capacity of 10,000 tonnes and Unit B has an annual capacity of 20,000 tonnes, thus the total capacity of HCFC 22 production at JMC amounts to 30,000 tonnes per year.

This project is to install an incineration system to collect and decompose the HFC23 generated from HCFC 22 production at JMC. Currently, JMC has not ever recovered or sold the HFC 23 which is a by-product of HCFC22 production to the market, the project then contributes to reducing emissions of HFC 23 as GHG, which would otherwise be released into the atmosphere if the project were not implemented.

JMC plans to start the collection and storage of HFC23 generated from production unit A and unit B with containers from the starting date of May 1st, 2006 onwards. It is regarded appropriate for the quantity of HFC23 stored and subsequently decomposed be part of the Project Activity and in line with CDM practices and rules. The HFC23 stored in the containers prior to incineration system operation and commissioning, and during period of operation suspension of the incineration system due to emergency accidence or overhaul will be monitored, recorded and documented separately for DOE verification, certification purpose.

Vichem-a French leader technology provider and facility supplier has proven the successful application of continuous process technology for the decomposition of HFCs and other fluorocarbons by thermal oxidation worldwide. The project is to apply this good -practice process technology and its associated chemical processing knowhow in JMC to reduce the emission of HFC 23 from its HCFC22 production. Detailed explanation of technology is in A4.3 of this project design document.

Process technology for thermal oxidation of HFC 23 is not available indigenously. Though there are indigenous processes for incineration of wastes but none of these companies have any experience with HFCs. JMC will import the thermal oxidation technology from experienced operating practice of Vichem in thermal oxidation of chlorinated or fluorinated or mixture of chlorinated and fluorinated hydrocarbons, and JMC is expecting not to substitute other technology within project operation period.

Initial training and maintenance efforts will be conducted during the project period and this is elaborated in other sections of this project design document.

The decomposition process of this project will adopt the baseline methodology and monitoring methodology approved by EB as AM0001 (Version 03), which was also applied to one approved similar project in Korea.

The view of the project participants on the contribution of the project activity to sustainable development: with tremendous GHG mitigation, we are convinced that this project will contribute to sustainable development from not only environmental viewpoint, but also economic benefits (CER related revenue) and technical benefits (technology transfer) to China. Employment would be generated in the plant for the project implementation and management.

In addition to the significant GHG emission reduction benefits, the project will comply with the national regulation, which stipulates that 65% of the CER proceeds of this project will be charged by Chinese government to contribute to sustainable development in China.

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) (Yes/No)**
People's Republic of China (host)	Jiangsu Meilan Chemical CO. Ltd.	No
Netherlands	International Bank for Reconstruction and Development (Public Entity) as Trustee of the First Tranche of the Umbrella Carbon Facility	Yes
Spain	International Bank for Reconstruction and Development (Public Entity) as Trustee of the First Tranche of the Umbrella Carbon Facility	No
Italy	International Bank for Reconstruction and Development (Public Entity) as Trustee of the First Tranche of the Umbrella Carbon Facility	Yes

China has signed the Kyoto Protocol on May 29, 1998 and ratified it on August 30, 2002.

As a subsidiary of Jiangsu Meilan Group founded in 1958, Jiangsu Meilan Chemical CO. Ltd. is a large-scale chlorine alkali, methylene chloride, chloroform and refrigerant products producer which has kept sound and rapid development in recent years and is expecting a continuous pleasant prospect in the growing market.

The First Tranche of the Umbrella Carbon Facility (UCF) is a trust fund established by the International Bank for Reconstruction and Development in its capacity as trustee on behalf of public and private Participants of the First Tranche of the UCF.

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.:

Jiangsu Province

A.4.1.3. City/Town/Community etc:

Taizhou City

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

This project is in JMC which is in the northwest of Taizhou city. Located in the center of Jiangsu Province, Taizhou city is situated between 119°38' and 120°38' east longitude, 31°55' and 33°12' north latitude. It faces the Yangtze River in the south, borders Yancheng in the north, adjoins Nantong in the east, and neighbors Yangzhou in the west. Please refer to following Figure 1-3.

Figure 1 Location of JMC in Jiangsu   Figure2 Location of JMC in Taizhou City
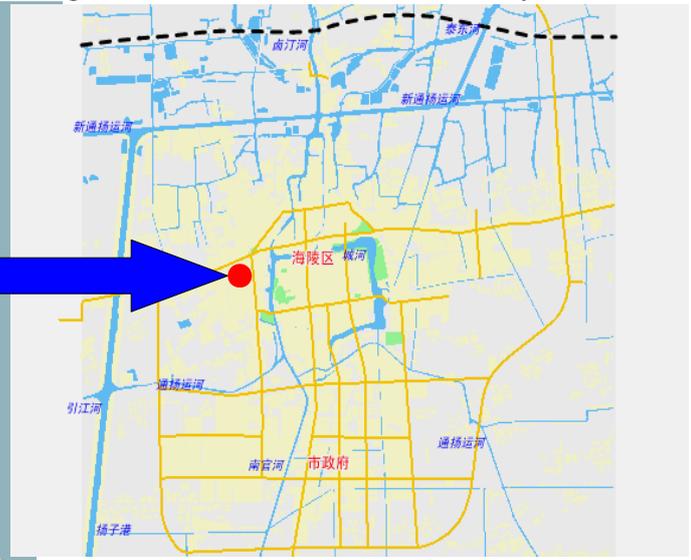

Figure 3 Location of JMC in Taizhou City with neighbouring community shown

JMC's production facilities are on a 667,000 square km of land (1,000 mu) of land in the Northwest Chemical Industrial Park, 6 km northwest of Taizhou City's downtown area. Besides JMC, the industrial park houses nine other companies, including a large petrochemical company (Lingguang Group-Petroleum Fine Chemical Company) and small chemical companies. JMC's surroundings are: north: immediate boundary of Tongyang Canal for barge transportation, followed by a 2 km vacant land and a petrochemical company (Lingguang Group-Petroleum Fine Chemical Company);west: Yinjiang River after a 1.5 km vacant land; south: Residences for company employees is 500 meters away, then a vacant land bordered by the Yangzhou Road is approximately 1 km away, and an air conditioning company at the other side of this road; east: Taizhou Fluoro Material Company, which also belongs to the Jiangsu Meilan Group.

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 <u>project activity</u>:

JMC's HCFC 22 production unit A and unit B were both installed and put in operation in 2001. Total annual HCFC 22 production capacity at the facility is 30,000 tonnes a year. The HCFC 22 production process is similar to the one described in methodology AM0001: the crude products are introduced into the reactor and subsequent processing of this vapor involves various separation processes to remove/recover by-products and to purify the HCFC 22 product. HCl is recovered as a useful by-product. The HFC 23 is separated as a vapor from the HCFC 22 and generally is vented to the atmosphere as an unwanted by-product before the operation of this project.

The main reaction in the HCFC 22 Plant is:
$2HF + CHCL3 \rightarrow CHCLF2$ (HCFC 22) + 2HCL

The chemical reaction of H3 generated as by-product in JMC's HCFC 22 production is:
$3HF + CHCl3 \rightarrow CHF3$ (HFC23) + 3HCl

The decomposition technology to be applied to this project is from a French company VICHEM. (refer to Figure 4 process). Vichem started its business since 1948 in technologies for the protection of the environment and specialized in the treatment of hazardous, very hazardous and halogenated waste. VICHEM's thermal decomposition technologies have been successfully applied in Rhodia, UK (2003), Solvay, France (1991), Adisseo, France (2003) and Arkema, France (1992). Its reliability and high destruction efficiency have been well approved. So far, there are no domestic technologies that are advanced, well approved and specialized for HFC23 destruction in China. Through transferring VICHEM's technology to the proposed project, not only the performance of HFC23 destruction process can be guaranteed, but also the relevant technical know-how can be transferred to China. Moreover, choosing an advanced technology for HFC23 destruction is also important in the sense that the technology employed by the project will not be substituted within the project period.

The detailed VICHEM technology description is as follows:

Combustion Section：
A 2-stage incineration system is implemented. The first stage is a burner and the second stage is a furnace. The combustion reaction will take place in the burner, while the flame will not exist in the furnace. In the first stage, the HFC23 vent, fuel gas and the combustion air is introduced to generate a high-speed volute to form a very turbulent zone, in which the gases is mixed thoroughly. The combustion air is coming from a combustion air fan. In the burner, the high-speed volute generates a strong force of section to introduce the vent tangentially. In the very turbulent zone in the burner, the waste gas and the fuel gas are mixed with the combustion air, generating very stable flame in a very short volume and finishing the combustion reaction in very short time (<0.001 second). By this means, it can reach the best combustion efficiency. (The destruction efficiency for organic is 99.999 %, as evidenced by the existing HCFC22 and HFC23 decomposition facility installed and operated in Rhodia company in UK in 2003.) Hot fumes from the burner flow through the vertical stable furnace by means of volute, to meet the requirement for residence time (>2 second). The furnace is not a flame zone but is designed only for a sufficient residence time and to reach all kinetics to finish off the last reactions, and to facilitate the cleaning out and maintenance. The outlet temperature of the fumes is at 1200°C, with an oxygen excess between 3 and 6% (6% most of the time, falling down to 3 or 4% during a very short period, when peaks of vent are introduced). This will smooth all the unit control.

Fumes Quenching and Absorption Section:
Hot fumes from incineration section are quenched and absorbed in a graphite quencher. This quencher can generate a water film, by using a loop of HF/HCl solution. By this single step, the fumes are cooled

from 1200°C to 50°C in less than 0.001 second, avoiding the formation of dioxins. To remove the remained acid in the fumes, HF and HCl are absorbed, while the acid solution recycles to the quencher and generate a HF solution by-product for reuse.

Exhaust Section:
After the neutralization column, fumes are extracted by an exhaust fan fitted with a speed controller in order to keep the entire unit under a slightly controlled vacuum. Fumes are then blown into the atmosphere through the stack.
Above technology has been successfully operated in France, UK etc. since 1991.

Figure 4 – HFC 23 Thermal Destruction Process Flow Diagram
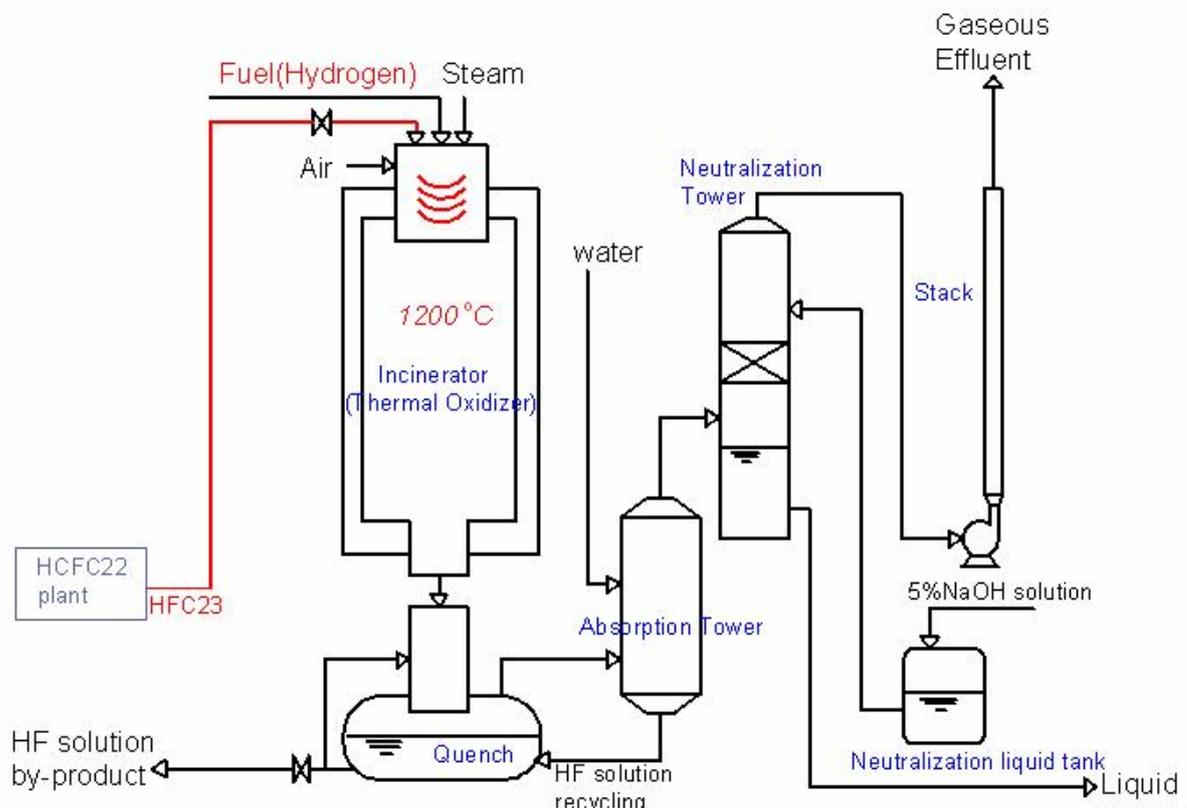
A.4.4. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed CDM project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances:

HFC 23 as GHG has the GWP of 11,700. Now the HFC 23 generated in JMC is vented to atmosphere directly. Without the proposed thermal destruction of HFC 23 in JMC, this case will still exist due to following reasons:

(a) There is no compulsory restriction about HFC 23 production or emission, it is unlikely that any such limits on emissions would be imposed in the near future;

(b) There are no commercial incentives for JMC to set up the decomposition facilities mentioned in this project at present or in the future and there is no HFC 23 market in China.

Therefore, GHG emission reductions would not occur in the absence of the proposed project activity. However HFC 23 can be almost completely decomposed with the proposed project activities and thus GHG emission reduction can be realized by this project. Therefore the GHG reduction in the proposed project activity is additional.

This project will reduce annually 8,411,432 tCO2e and in the first 7-year crediting period will reduce a total of 58,880,024 tCO2e. The estimated amount of emission reductions is listed in Figure A.4.4.1 and Section E.

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

Years	Annual estimation of emission reductions in tonnes of CO2 e
2006	5,607,621
2007	8,411,432
2008	8,411,432
2009	8,411,432
2010	8,411,432
2011	8,411,432
2012	8,411,432
2013	8,411,432
2014	8,411,432
2015	8,411,432
2016	8,411,432
2017	8,411,432
2018	8,411,432
2019	8,411,432
2020	8,411,432
2021	8,411,432
2022	8,411,432
2023	8,411,432
2024	8,411,432
2025	8,411,432
2026	8,411,432
2027	2,803,811
Total estimated reductions (tonnes of CO2e)	176,640,072
Total number of crediting years	21
Annual average over the crediting period of estimated reductions (tonnes of CO2e)	8,411,432

A.4.5. Public funding of the project activity:

The public funds involved in this project exclude existing ODA[1].

The sovereign participants of the First Tranche of the UCF confirm that any public funding used to participate in the First Tranche of the Umbrella Carbon Facility does not result in a diversion of official

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[1] ODA-Official Development Assistance.

development assistance and is separate from and is not counted towards its financial obligations as a Party included in Annex I.

SECTION B. Application of a baseline methodology

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

AM0001 "Incineration of HFC 23 Waste Streams" (Version 03).
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

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

The approved AM0001 baseline methodology is applicable to projects where:
(1) The HFC 23 waste streams are from an existing HCFC 22 production facility;
(2) At least three years of operating history between beginning of the year 2000 and the end of the year 2004 where the project activity occurs and;
(3) No regulation requires the destruction of the total amount of HFC 23 waste.

This project complies with AM0001, given the following reasons:
(1) This project will decompose the HFC23 generated from JMC's existing two HCFC 22 production lines. HFC23 is an inevitable by-product. All HFC 23 is vented directly to atmosphere now in JMC;
(2) JMC's two HCFC 22 production lines were put into operation in July and October, 2001. Installation and operation time complies with requirement stipulated in AM0001 (Version 03);
(3) There is no compulsory restriction about HFC 23 production or emission; it is unlikely that any such limits on emissions would be imposed in the near future.

Therefore, the approved AM0001 baseline methodology is applicable to this project.

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

Calculation of GHG emission reduction measured in tonnes of CO_2 equivalents (tonnes CO2e) is according to methodology AM0001:

The greenhouse gas emission reduction achieved by the project activity is the quantity of waste HFC 23 actually destroyed less the greenhouse gas emissions generated by the destruction process less leakage due to the destruction process. Specifically, the greenhouse gas emission reduction (ER_y) achieved by the project activity during a given year (y) is equal to the quantity of HFC 23 waste from HCFC production facility (Q_HFC23_y) destroyed by the project activity less the baseline HFC 23 destruction (B_HFC23_y) during that year multiplied by the approved Global Warming Potential value for HFC23 (GWP_HFC23) less the greenhouse gas emissions generated by the destruction process (E_DP_y) less greenhouse gas leakage (L_y) due to the destruction process.

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

Where ER_y is the greenhouse gas emission reduction measured in tonnes of CO_2 equivalents (tonnes CO2e), Q_HFC23_y is the quantity of waste HFC 23 destroyed during the year measured in metric tonnes, and B_HFC23_y is the baseline quantity of HFC 23 destroyed during the year measured in metric tonnes. The Global Warming Potential converts 1 tonne of HFC 23 to tonnes of CO_2 equivalent (tonnes CO2e/tonnes HFC 23). The approved Global Warming Potential value for HFC 23 is 11,700 tonnes CO2e/tonne HFC 23. The emissions due to the destruction process (E_DP_y) and GHG emission

due to leakage (Ly) are both measured in tonnes of CO2 equivalent.

The quantity of waste HFC 23 destroyed (Q_HFC23y) is calculated as the product of the quantity of waste HFC 23 supplied to the destruction process (q_HFC23y) measured in metric tonnes and the purity of the waste HFC 23 (P_HFC23y) supplied to the destruction process expressed as the fraction of HFC 23 in the waste [Q_HFC23y = q_HFC23y * P_HFC23y].

Emission on decomposition process:
Currently one NaOH plant in JMC is on operation and generates large volume of H_2 as the tail gas of which majority has not been collected for reuse due to additional high cost of depressurizing. However, as an ideal clean energy, H_2 has advantages of 0 GHG emission. Therefore, the destruction process of this project is to use the collected and recovered H_2 as energy power. For the other power that is needed by destruction process,. steam will be supplied by Meilan Thermal Power Plant and electricity power is purchased from China Easter Electricity Network. Thus:

E_DPy = ND_HFC23y * GWP_HFC23 + Q_HFC23y * EF[2]

The quantity of HFC 23 not destroyed during the year (ND_HFC23y) is typically small (<0.001% of amount of HFC 23). The monitoring plan provides for its periodic on site measurement.

EF is the emission factor with the value of 0.62857.

Since H_2 was adopted as fuel energy, the thermal destruction process does not produce any GHG e.g. N2O or CO_2 resulted from fuel energy consumption, however GHG (N2O or CO_2) emissions associated with the production of purchased energy (steam and electricity) produces a small quantity of N2O emissions, on a CO2 equivalent basis, are a small fraction of the CO2e emissions and so are neglected.

Baseline
The baseline quantity of HFC 23 destroyed is the quantity of the HFC 23 waste stream required to be destroyed by the applicable regulations. Thus:

B_HFC23y = Q_HFC23y * ry

Where ry is the fraction of the waste stream required to be destroyed by the regulations that apply during year y. In China, no such regulation is present or planned to date. In the absence of regulations requiring the destruction of HFC 23 waste, ry = 0.
To exclude the possibility of manipulating the production process of HCFC 22 to increase the quantity of waste, the quantity of HFC 23 waste (B_HFC23y) is limited to a fraction (*w*) of the actual HCFC production during the year at the originating plant (Q_HCFCy). Thus:

Q_HFC23y $\leq$ Q_HCFCy * w

Where Q_HCFCy is the actual production of HCFC 22 during the year at the plant where the HFC 23 waste originates measured in metric tones. Q_HCFCy is limited to the maximum historical annual production level at this plant (in tonnes of HCFC 22) during any of the last three (3) years between beginning of the year 2000 and the end of the year 2004. JMC's annual HCFC22 production output was 12,371 ton in 2002, 17,806 ton in 2003 and 25,149 ton in 2004. Therefore, Q_HCFCy is set in this project

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[2] In AM0001 it is "E_DPy = ND_HFC23y * GWP_HFC23 + Q_NGy * E_NGy + Q_HFC23y * EF"

as HCFC 22 yield in 2004 which is 25,149 ton (refer to following table).

	Year of 2002 (MT)	Year of 2003 (MT)	Year of 2004 (MT)
HCFC22 production in JMC	12,371	17,806	25,149

According to the AM0001 methodology there are three options for calculating the variable w*:*

1. "Direct measurement of HFC23 release is to be used where data are available, otherwise
2. Mass balance or other methods based on actual data7 are to be used. Uncertainty in emission rate estimates shall be quantified and conservative emission rate estimates shall be used when calculating expected emission reductions.
3. If insufficient data is available for calculating HFC23 emissions for all three most recent years up to 2004, then w is set at the default value of 1.5%.

Regardless of which option is followed it is stated that "The value of w is set at the lowest of the three historical annual values estimated as specified above and is not to exceed 3% (0.03 tonnes of HFC 23 produced per tonne of HCFC 22 manufactured)".
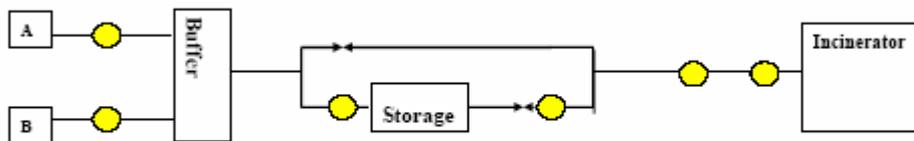
In this project a mass balance based on actual data has been used to calculate the value of w. The emission rates (HFC23/HCFC22) at JMC in 2002-2004 using carbon efficiency, fluorine efficiency, mass balance and other calculation are listed in following table:

w in 2002-2004 calculated by carbon efficiency, fluorine efficiency and mass balance (yearly basis)

	Year of 2002 (%)	Year of 2003 year (%)	Year of 2004 (%)
carbon efficiency	3.03	2.86	2.95
fluorine efficiency	3.36	2.9	3.04

To avoid an unreasonable operation to generate CERs against normal business practice, the w value in this project is set as the lowest value calculated, which is considerably conservative. In addition, any possible HFC23 which is generated from JMC's HCFC22 production and exceeds 2.86%, of HCFC22, even it is not included in current CERs calculation in this project, will also be decomposed additionally. Factors affecting uncertainty were taken into consideration as to opening of the vessel in the inspection, change of catalyst, sampling procedures, product shipping, etc. When calculating w, to be conservative, the total estimation of uncertainty was calculated as 1.20% which is bigger than the 1.15%.

During the first few years of the project implementation, the quantity of HFC23 decomposed in the incineration facility might be more than the quantity of HFC23 destroyed in an ordinary year, since this project intends to store HFC23 prior to the start of incineration operation and decompose them after the operation. In this case, the quantity and quality of HFC23 stored in the container will be monitored and documented independently and will be provided to DoE for checking the validity of the claimed HFC23. Following figure show how the HFC23 to be decomposed by incinerator, including either from storage as mentioned or directly from regular HCFC22 production is to be measured. The yellow circles stand for flow meter to be equipped on the pipeline of transportation. All data shown on flow meters will be monitored, documented for future verification purpose.

Leakage

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:
-GHG (CO_2 and N_2O) emission associated with the production of electricity and associated with steam used

-GHG emissions due to transport of sludge to landfill
GHG emissions due to transport of sludge to landfill is zero given that the sludge generated from the project will be treated in treatment plant within JMC and will be reused for construction in JMC.

-GHG (CO_2 and N_2O) emission associated with transporting recycled dilute HF solution from the system and selling to nearby buyers.

Thus:
$$Ly = \sum_i (Q\_F_{i,y} * E\_F_{i,y}) + ETy = Q\_Power_y * E\_Power_y + Q\_Steam_y * E\_Steam_y + ETy$$

Where Q_Power_y is the quantity of power for the destruction process during year y, E_Power_y is the greenhouse gas emissions factor for power during year y, shown in E.2.
Q_Steam_y is the quantity of steam for the destruction process during year y, E_Steam_y is the greenhouse gas emission factor for steam during year y in tCO_2e/t-steam; ETy is the GHG emissions due to transport of sludge to nearby treatment plant and in this case transport of dilute HF solution to nearby market.

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**:

China has no regulations limiting HFC 23 emission and will not adopt such regulation in the expected future. HFC23 destruction facilities, as well as the storage facilities, require significant capital and operating costs and the host entity has no direct economic incentive to incur these costs. Therefore, the baseline scenario is that HFC23 will be directly released to the atmosphere.

At present, as B_HFC23y is zero, Q_HFC23y, the quantity of HFC 23 destroyed is much greater than the baseline quantity destroyed (B_HFC23y) plus minor GHG emissions in the project scenario (see section E.5 for calculation), the project activity concludes to be additional.

Therefore, the project is assured to result in additional emission reductions to the baseline scenario.

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

The project boundary is defined as the facility to decompose and store the HFC 23 in the baseline methodology as shown in Figure 5. These facilities include incinerator, neutralization system, stack etc., but do not include the solid waste treatment facility, nor the transportation of sludge.

Figure 5. Project Boundary

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

The date of completion of the baseline study: 18/10/2005
The contract information of the person who determines the baseline:

Ms. Zhang Jie
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FECO is not project participant

SECTION C.   Duration of the project activity / Crediting period

C.1   Duration of the project activity:

C.1.1.   Starting date of the project activity:

The storage of HFC23 prior to the operation of incineration facility is expected to start on 01/05/2006. The operational/commissioning date for the incineration system is expected to start on 01/01/2007. Accordingly the starting date of the project activity is set as 01/05/2006

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

21 years

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:

The storage of HFC23 prior to the operation of incineration facility is expected to start on 01/05/2006. The operational/commissioning date for the incineration system is expected to start on 01/01/2007. Accordingly the starting date of the first crediting period is set as 01/05/2006

C.2.1.2.Length of the first crediting period:

7 years and 0 month

C.2.2.   Fixed crediting period:

C.2.2.1.Starting date:

Not applicable.

C.2.2.2.Length:

Not applicable.

SECTION D. Application of a monitoring methodology and plan

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

AM0001 "Incineration of HFC 23 Waste Streams" (Version 03).
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:

The approved AM0001 baseline methodology is applicable to:
(1) The HFC 23 waste streams are from an existing HCFC 22 production facility;
(2) At least three years of operating history between beginning of the year 2000 and the end of the year 2004 where the project activity occurs and;
(3) No regulation requires the destruction of the total amount of HFC 23 waste.

This project complies with AM0001, given the following reasons:
(1) This project will decompose the HFC23 generated from JMC's existing two HCFC 22 production lines. HFC23 is an inevitable by-product. Almost all HFC 23 is vented directly to atmosphere;
(2) JMC's two HCFC 22 production lines were put into operation in July and October, 2001. Installation and operation time complies with requirement stipulated in AM0001 (Version 03);
(3) There is no compulsory restriction about HFC 23 production or emission; it is unlikely that any such limits on emissions would be imposed in the near future.

Therefore, the approved AM0001 baseline methodology is applicable to this project.

Besides, HCFC22 is a type of GHG with GWP of 1700 (refer to IPCC Second Assessment Report). Since the project activity does not cause any changes to the existing HCFC22 plant, there is no leakage effect associated with HCFC22 emission within the project boundary.

A small quantity of N2O emissions are also produced during thermal destruction process while the N2O emissions, on a CO2 equivalent basis, are a small fraction of the CO2e emissions and so are ignored.

The HFC23 stored in the containers prior to incineration system operation and commissioning, and during period of operation suspension of the incineration system due to emergency accidence or overhaul will be monitored, recorded and documented separately for DOE verification, certification purpose. The quantity of the HFC23 stored prior to decomposition and subsequently decomposed would be counted as a part of the project. The emission reductions to be credited are based on the *ex-post* measurement of the quantity of actually decomposed HFC23, i.e. emission credits are only generated for HFC23 actually destroyed so any HFC23 stored but not decomposed will not be counted. Without the destruction facility, the stored HFC 23 could not be destroyed, with future release possible.

During the HFC23 thermal destruction process, hydrofluoric acid (HF) with the concentration of 40% is produced. These HF by-products will be stored in barrels. During the life time of the project, HF by-product may be transported and sold to other companies.

	D.2. 1. Option 1: Monitoring of the emissions in the project scenario and the <u>baseline scenario</u>

D.2.1.1. Data to be collected in order to monitor emissions from the <u>project activity</u>, 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)	Comment
D 2.1.1-1. q_HFC23_y	Quantity of HFC23 supplied to the destruction process	monitoring	t-HFC23	m	monthly	100%	electronic	Amount of HFC23 supplied to the destruction process will measured by two flow meters in series but read simultaneously. The amount of HFC23 that is supplied to decomposition process from storage container, rather than from regular HCFC22 production otherwise will be measured by a flow meter installed right after outlet of storage container. The amount of HFC23 generated from HCFC22 production Unit A and Unit B will be measured by two flow meters installed respectively on the two pipelines between Unit A to the buffer and Unit B to the buffer. Calibration will be done weekly
D 2.1.1-2. P_HFC23_y	Purity of HFC23 supplied to the	Gas chromatography analysis	%	m	monthly	sampling	electronic	Measured using gas chromatography .

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	destruction process							
D 2.1.1-3 Q_H_y	energy	monitoring	m3	m	monthly	100%	electronic	Meter Measured
D2.1.1-4 TEMP	Temperature of incinerator	thermometer	degree	m	continuously	100%	electronic	To ensure the operation stability of incinerator
D.2.1.1-5 HFC23y_ storage	Quantity of HFC23 stored in container	monitoring	t-HFC23	m	monthly	100%	electronic	The amount of HFC23 stored in container prior to the operation of incineration facility will be measured by a flow meter installed right before access to storage container.

In addition the quantities of gaseous effluents (CO, HCl, HF, Cl_2, dioxin and NO_X) 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 decomposition process is calculated as follows:

$E\_DP_y = ND\_HFC23_y * GWP\_HFC23 + Q\_H_y * E\_H_y + Q\_HFC23_y * EF$ 1

The quantity of HFC 23 not destroyed (ND_HFC23y) is typically small; the monitoring plan provides for its periodic on site measurement. E_H_y is the quantity of H_2 used by the destruction process during the year measured in cubic-metres (m3), since H_2 is not GHG, so E_H_y, which is the GHG emission coefficient for is 0. The quantity of CO2 produced by the destruction process is the 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

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	Data variable	Source of data	Data unit	Measured (m), calculated	Recording frequency	Proportion of data to be	How will the data be archived? (electronic/ paper)	Comment

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[1] AM0001 specifies this formula as $E\_DP_y = ND\_HFC23_y * GWP\_HFC23 + Q\_NG_y * E\_NG_y + Q\_HFC23_y * EF$

ease cross-referencing to table D.3)				(c), estimated (e),		monitored			
D2.1.3-4. Q_HCFC22 y	Mass	The quantity of HCFC 22 produced in the plant generating the HFC 23 waste	t-HCFC22	M	Monthly	100%	electronic	Reference data to check cut off condition and rough estimation of Q_HFC23 y The amount of stored HFC23 prior to the operation of incineration facility will also be measured by the two flow meters The amount of HCFC22 will be also monitored since the start of the HFC23 storing prior to the operation of the incineration facility.	
D2.1.3-5. HFC23_sold y	Mass	HFC 23 sold by the facility generating the HFC 23 waste tonnes	t-HFC23	M	annually	100%	electronic	Reference data to check cut off condition and rough estimation of Q_HFC23 y	
D2.1.3-6 r y	Amount of HFC23 subject to regulation	Governmental authority	t HFC23	C	Yearly	100%	electronic	Estimated in consideration of governmental laws and regulations on HFC23 control	

D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO$_2$ equ.)

The baseline quantity of HFC 23 destroyed is the quantity of the HFC 23 waste stream required to be destroyed by the applicable regulations. Thus:
B_HFC23y = Q_HFC23y * ry

Where r_y is the fraction of the waste stream required to be destroyed by the regulations that apply during year y. In China, no such regulation is present or planned to date. In the absence of regulations requiring the destruction of HFC 23 waste, r_y = 0. If there is any new regulation on the HFC23 emission, r_y

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should 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)	Comment

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO2 equ.):

Not applicable

D.2.3. Treatment of leakage in the monitoring plan

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

ID number (Please use numbers to ease cross-referencing to table D.3)	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
D2.3.1-6. ND_HFC23$_y$	mass	Quantity of HFC 23 in gaseous effluent	t-HFC23	m	monthly	100%	electronic	When the thermal oxidizer stops, analysis of the effluent gas is done to check leaked HFC 23 by sampling.
D2.3.1-7. Q_Power$_y$	energy	Electricity consumption during decomposition in year y	kWh	m	monthly	100%	electronic	Meter Measured
D2.3.1-8 Q_Steam$_y$	energy	Steam consumption during deposition	t-steam	m	monthly	100%	electronic	Meter Measured and calculate
D2.3.1-9 E_Steam$_y$	energy	greenhouse gas emissions factor for steam during year y	tCO2e/ t-steam	m, c	monthly	100%	electronic	Meter Measured and calculate
D2.3.1-10 E _Power$_y$	energy	greenhouse gas emissions factor for electricity during year y	tCO2e/ kWh	c	monthly	100%	electronic	Calculated

D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO$_2$ equ.)

Leakage in this project is the CO2 emissions associated with the production of steam and electricity

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$Ly = \sum i \, (Q\_Fi, y * E\_Fi \, y) + ET_y = Q\_Power \, y * E\_Power_y + Q\_Steam_y * E\_Steam_y + ET_y$

Where $Q\_Power \, y$ is the quantity of electricity purchased for the destruction process during year y, E_Power_y is the greenhouse gas emissions factor of electricity purchased during year y, Q_Steam_y is the quantity of steam purchased for the destruction process during year y, E_Steam_y is the greenhouse gas emissions factor of steam purchased during year y and ET_y is the greenhouse gas emissions associated with sludge transport during year y or as in the case of JMC, dilute HF to nearby markets. Electricity of this project is purchased from China Eastern Electricity Network and steam is purchased from Meilan Thermal Power Plant. Leakage due to transportation of sludge is 0.

D.2.4. Description of formulae used to estimate emission reductions for the <u>project activity</u> (for each gas, source, formulae/algorithm, emissions units of CO$_2$ equ.)

The greenhouse gas emission reduction achieved by the project activity is the quantity of waste HFC 23 actually destroyed less the greenhouse gas emissions generated by the destruction process less leakage due to the destruction process. Specifically, the greenhouse gas emission reduction (ERy) achieved by the project activity during a given year (y) is equal to the quantity of HFC 23 waste from HCFC production facility (Q_HFC23y) destroyed by the project activity less the baseline HFC 23 destruction (B_HFC23y) during that year multiplied by the approved Global Warming Potential value for HFC23 (GWP_HFC23) less the greenhouse gas emissions generated by the destruction process (E_DPy) less greenhouse gas leakage (Ly) due to the destruction process.

$ERy = (Q\_HFC23y - B\_HFC23y) * GWP\_HFC23 - E\_DPy - Ly$

Where ERy is the greenhouse gas emission reduction measured in tonnes of CO2 equivalents (tones CO2e), Q_HFC23y is the quantity of waste HFC 23 destroyed during the year measured in metric tonnes, and B_HFC23y is the baseline quantity of HFC 23 destroyed during the year measured in metric tonnes. The Global Warming Potential converts 1 tonne of HFC 23 to tonnes of CO2 equivalents (tonnes CO2e/tonnes HFC 23). The approved Global Warming Potential value for HFC 23 is 11,700 tonnes CO2e/tonne HFC 23. The emissions due to the destruction process (E_DPy) and leakage (Ly) are both measured in tonnes of CO2 equivalent. The quantity of waste HFC 23 destroyed (Q_HFC23y) is calculated as the product of the quantity of waste HFC 23 supplied to the destruction process (q_HFC23y) measured in metric tonnes and the purity of the waste HFC 23 (P_HFC23y) supplied to the destruction process expressed as the fraction of HFC 23 in the waste

$Q\_HFC23y = q\_HFC23y * P\_HFC23y$

D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored		
Data (Indicate table and ID number e.g. 3.-1.; 3.2.)	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
D2.1.1-1 q_HFC23$_y$	Low	Yes. A QA & QC organization will be formed. We plan to measure by two flow meters in series but read simultaneously with weekly calibration.
D2.1.1-2 P_HFC23$_y$	Low	Will be measured by gas chromatography.

D2.1.1-3 Q_H_y	Low	Will be measured by meter.
D2.3.1-6 ND_HFC23_y	Low	Will be measured from the gas effluent of the decomposition process
D2.3.1-9 E_Steam_y	Low	Will be measured by steam meter and calculated
D2.3.1-10 E_Power_y	Low	Will be measured by electricity meter and calculated
D2.3.1-7 Q_Power_y	Low	Will be measured by electricity meter
D2.3.1-8 Q_Steam_y	Low	Will be measured by steam meter
D3-7 Q_HCFC22_y	Low	Will be obtained from production records.
D2.1.1-4 TEMP	Low	Will be measured by thermometer on the exit of the combustion chamber
D.2.1.1-5 $HFC23y\_$ storage	Low	Will be measured by flow meters on access of HFC23 storage container
D2.1.3-5 $HFC23\_sold$	Low	Will be obtained from production records of HCFC22 in JMC

In this project, HFC23 shall be decomposed and the power, steam, and fuel to be consumed by the thermal oxidizer will be measured directly and continuously. Since the quantity of HFC23 fed to the thermal oxidizer is crucial to the total emission reduction generated from the project activity, two flow meters will be installed for the project at JMC in order to ensure the accuracy and conservativeness of the HFC23 measured. Each flow meter will be recalibrated weekly. Most of the time, both flow meters measure the same amount of HFC23 flows simultaneously. When one flow meter is being recalibrated, the other will keep measuring. If HFC23 quantities measured by the two flow meters are different and the difference is smaller than the two times of the flow meter precision value, then the lower HFC23 quantity will be adopted. However, if the difference is larger than the two times of the flow meter precision value, we will immediately assign monitoring staff to identify the problem and resolve the problem.

In order to secure the safety of operation, operator staff will be conducted relevant training regarding production process, emergency response, equipment maintenance before starting operation.

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

JMC has acquired the certificates of ISO 14001 and ISO 9001 and is following management according to the above both certificates (Certificate No.CNCA-

R-2003-112 for ISO 14001 issued in April 2004 and Certificate No.CNAB029-Q for ISO 9001 issued in January 2005). Therefore, the management of operating the project activity, monitoring emission and any leakage shall be in line with ISO standard or the monitoring plan described in project design document.

A project implementation team will be set up to manage and implement this proposed project at the operational level. The team consists of management staff, technical professional and safety and environmental protection staff. The monitoring activities shall be in line with the monitoring plan described in this project design document. Composition of the team is temporarily planned as follows:

Programme Management   2 persons

Gas chromatography analysis   3 persons x 4 shifts = 12 persons
Incinerator and apparatus operation, maintenance 3 persons x 4 shifts = 12 persons
Safety and environmental protection   1 person

At higher management and environment management level, the organizational structure for the HFC-23 Emissions Reduction Project at JMC is shown in Figure 6.

```
                        ┌─────────────────┐
                        │ General Manager │
                        └────────┬────────┘
                                 │
                    ┌────────────┴───┐   ┌──────────────────────┐
                    │  Plant Manager │───│   Safety and          │
                    └────────┬───────┘   │ Environment Manager   │
                             │           └──────────────────────┘
         ┌───────────────────┼───────────────────────┐
┌────────────────┐   ┌──────────────────┐   ┌──────────────────────┐
│ Chlor-Alkali   │   │ Refrigeration    │   │ Chloromethanes Plant │
│ Plant Manager  │   │ Plant Manager    │   │ Manager              │
└────────────────┘   └────────┬─────────┘   └──────────────────────┘
                     ┌─────────┴──────────────────┐
             ┌────────────────┐         ┌─────────────────────────┐
             │ HCFC-22 Plant  │         │ HFC-23 Emissions        │
             │ Supervisor     │         │ Reduction Process       │
             │                │         │ Supervisor              │
             └────────────────┘         └────────────┬────────────┘
                                         ┌────────────────────────┐
                                         │ Environment Management │
                                         │ Unit                   │
                                         └────────────────────────┘
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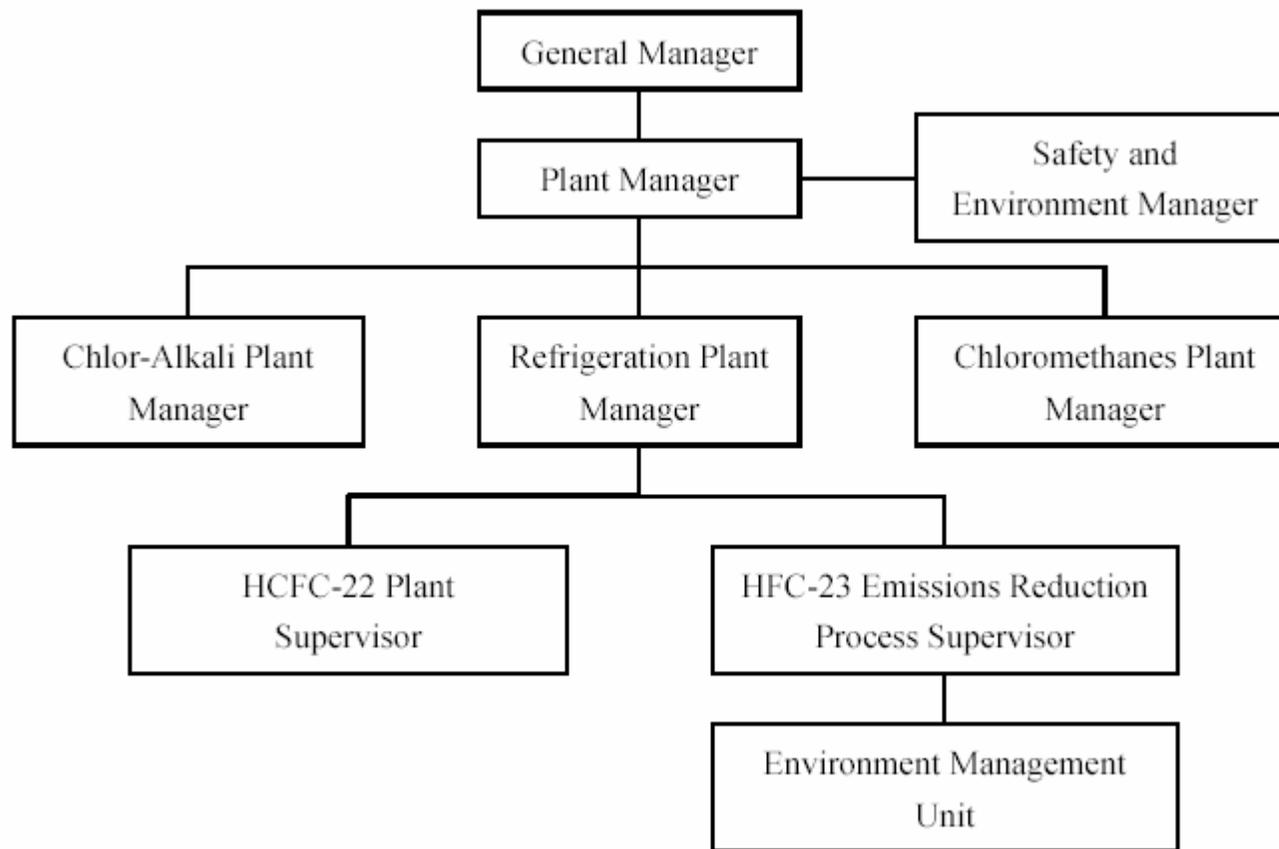
The Environment Management Unit under the HFC-23 Emissions Reduction Process Supervisor will be responsible for planning and carrying out the environmental activities both during the construction and operational phases of the project.

Emergency preparedness:
The HFC-23 Emissions Reduction Process will be operated strictly within the technical parameters of the process to avoid any emergencies. The system design, employee training, and coordination with the relevant institutions (such as the nearest firehouse and hospital) will be key in preventing or counter measuring emergencies. JMC's emergency response plan for the HCFC-22 Plant will include:

Company introduction
Identification, characteristics and impacts of hazardous materials
Safety, firefighting, and personal protection equipment distribution
Emergency response organization staff and responsibilities
Alarm and communication
Inspection of high risk areas and responsibilities
Emergency response for accidents
Personnel evacuation
Levels of emergency response and termination
Training and drills
Emergency response plan management

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

Ms. Zhang Jie
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FECO is not project participant

SECTION E.   Estimation of GHG emissions by sources

E.1.   Estimate of GHG emissions by sources:

Emission in decomposition process in year y:

$E\_DP_y = ND\_HFC23_y * GWP\_HFC23 + Q\_H_y * E\_H_y + Q\_HFC23_y * EF$ [1]

$= ND\_HFC23_y * 11,700 + Q\_H_y * 0 + Q\_HFC23_y * 44/70$

$= 0.00719 * 11,700 + 0 + 719 * 0.62857$

$= 84.12 + 451.94$

$= 536$ tCO2 e/year

$Q\_HFC23_y = Q\_HCFC22_y * w$

As stated in section B，Q_HCFC22_y and w are set as 25,149 ton and 2.86% respectively. Therefore:

$Q\_HFC23_y = 25149 \times 0.0286$

$= 719$ t-HFC23/year

The decomposition efficiency of the decomposition facility of this project is 99.999%, so ND_HFC23_y is set as 0.001% of Q_HFC23_y. Therefore: $ND\_HFC23_y = Q\_HFC23_y * 0.00001$

$= 0.00719$ t-HFC23/year

The GHG emission factor of H2 is zero.

E.2.   Estimated leakage:

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 GHG emissions associated with the electricity and steam consumed. As of the GHG emission due to transport of sludge to nearby treatment plant, since there will be no sludge generated in decomposition process, therefore it is 0.

The thermal destruction process also produces a small quantity of N2O emissions. The N2O emissions, on a CO2 equivalent basis, are a small fraction of the CO2e emissions and so are ignored.

Thus:

$L_y = Q\_Power_y * E\_Power_y + Q\_Steam_y * E\_Steam_y + ET_y$

$= 311,327 * 0.001 + 19 * 0.4 + 13$

$= 311.327 + 7.6 + 13$

$= 332$ tCO2e

where,

Q_Power_y is the electricity consumption during deposition in year y which is 0.433 kwh/kg HFC 23 （data provided by JMC）

$= 0.433$ kwh/kg HFC23 * Q_HFC23_y

$= 0.433 \times 719,000$ kg HFC23

$= 311,327$ kWh.

E_Power_y is the greenhouse gas emissions factor for electricity during year y with unit of tCO2e /kWh. In this project, the electricity power is purchased from China Eastern Electricity Network which covers 5

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[1] The equation in AM00001 is "$E\_DP_y = ND\_HFC23_y * GWP\_HFC23 + Q\_NG_y * E\_NG_y + Q\_HFC23_y * EF$"

cities and provinces including Shanghai, Jiangsu, Zhejiang, Anhui and Fujian . According to "2004 China Electricity Annual Book"[2], the E_Power_y is calculated as follows:

The standard coal consumption (power supply) and power generation volume of 5 cities and provinces within China Eastern Electricity Network in 2003 is listed in following figure

Coal Consumption of Electricity Generation by

China Eastern Electricity Network in 2003

Area	Electricity Generation Volume (100,000,000 kwh)	Standard Coal Consumption (g/kwh)-power supply
Shanghai Municipality	694.44	331
Jiangsu Province	1,336.77	348
Zhejiang Province	1,092.2	325
Anhui Province	557.15	362
Fujian Province	610.71	332
Total	4,291.27	1,758

As shown in the above, the provinces and city covered by China Eastern Electricity Network have different power generation volume. Therefore the weighted average value of the standard coal consumption within China Eastern Electricity Network power supply is calculated as follows:

The weighted average value of coal consumption (WACC) is expressed as

$$WACC = \{ \sum_{i=1}^{5} \text{(The electricity power generation volume of each province or city covered by China}$$

Eastern Electricity Network * its coal consumption by above individual city or province}/
total electricity power generation of China Eastern Electricity Network

= 354 g/kWh = 0.354 kg-ce/kWh

According to "National Electricity Power Industries Statistics Data in 2003", electricity power of China Eastern Electricity Network is 0.03412 kg standard coal/MJ, therefore the heat value of its electricity is 1/0.03412 kg standard coal/MJ = 29.3 MJl.

In all，E_Power $_y$ in this project is calculated as follows:
Coal consumption of China Eastern Electricity Network power supply: 0.354 kg-ce/kWh （data resource: "2004 China Eastern Electric Power Annual Book"）
Coal Heat: 29.3 MJ（data resource: "National Electricity Power Industries Statistics Data in 2003"）
GHG Emission Factor: 0.0983 kg-CO2/MJ (IPCC default, IPCC publication 1997)

Therefore, E_Power $_y$ = 0.354 * 29.3 * 0.0983 = 1(kgCO2e/kWh) = 0.001 (tCO2e/kWh)

2The official domestic data is not available, so IPCC value is applied here. The data in "2004 China Electric Power Annual Book" reflects the statistics data in year of 2003.

Q_Steam $_y$ is the steam consumption in decomposition process in year y, which is 0.026 kg/kg HFC23
(3.9kg steam/hour)（data provided by JMC）= 0.000026 t-steam/kg HFC23 * Q_HFC23y
= 0.000026 t-steam/kg HFC23 * 719,000 kg HFC23
= 19t-steam/kg HFC23

Calculation of E_Steam $_y$:
The steam needed for this project is provided by JMC, the related parameters are shown in the Table below:

Parameter	Value	Data source
Coal consumption of unit steam generation	0.139 kgce/kg-steam	Jiangsu Meilan Chemical CO.Ltd
The calorific power of coal	29.3 MJ	Jiangsu Meilan Chemical CO.Ltd
The GHG emission factor	0.0983 kg-CO_2/MJ	IPCC default value

Therefore, E_Steam $_y$ = 0.139*29.3*0.0983
= 0.4 tCO2e/ t-steam

Calculation of ET $_y$:
Emission on account of transport of dilute HF:
Basing on the calculation on estimated annual output of dilute HF solution as recycled by-product generated by the system will be 2,820 MT/year. The dilute HF solution will be transported by ship. Average distance from potential customer to JMC is 100 km. Standard load of ship is 150 MT. Standard diesel (in line with national standard GB#0) consumption is 1.1kg diesel/km. Therefore, annual diesel consumption on transportation of dilute HF is 2,820 MT/150 MT * 100km * 2 (round trip) * 1.1 kg/km = 4.2 MT. According to GB#0, carbon weight as percentage of the diesel oil is estimated to be 86.2%. Therefore, total annual CO2 emission out of diesel consumption is = 4.2 MT * 0.862 * 44/12 [t-CO2/t-diesel oil] = 4.2 MT * 3.2 [t-CO2/t-diesel oil] = 13 t-CO2. The amount is comparatively small and thus is negligible.

Since there is no sludge to be transported out of JMC for treatment in this project, therefore
Emission on account of transport of sludge is zero.

ET $_y$ =13

E.3.	**The sum of E.1 and E.2 representing the <u>project activity</u> emissions:**

The project activity emissions:
EPy = E_DPy + Ly
= ND_HFC23y * 11,700 + Q_H $_y$ * E_H $_y$ + Q_HFC23 $_y$ * 44/70 + L $_y$
= 0.00719 * 11,700 + 0 + 719 * 0.62857 + 332
= 84+ 451.94 + 332
= 868 t-CO2e/y

E.4.	**Estimated anthropogenic emissions by sources of greenhouse gases of the <u>baseline</u>:**

Estimated anthropogenic emissions by sources of greenhouse gases of the baseline in year y is:
BE$_y$ = (Q_HFC23$_y$ – B_ HFC23$_y$) * GWP_HFC23
= Q_HFC23 $_y$ * 11,700
= 719 * 11,700
= 8,412,300 t-CO2e/year

B_ HFC23 $_y$ is the quantity of the HFC 23 waste stream required to be destroyed by the applicable regulations:

$B\_HFC23_y = Q\_HFC23_y * ry$ Where ry is the fraction of the waste stream required to be destroyed by the regulations that apply during year y. In China, no such regulation is present or planned to date. In the absence of regulations requiring the destruction of HFC 23 waste, ry = 0.

E.5.	**Difference between E.4 and E.3 representing the emission reductions of the <u>project activity</u>:**

The emission reductions of the project activity:

$\mathbf{ERy} = \mathbf{BE_y} - \mathbf{EPy} = (Q\_HFC23y - B\_HFC23y) * GWP\_HFC23 - (ND\_HFC23y * GWP\_HFC23 + Q\_HFC23y * EF + Q\_H_y * E\_H_y + L_Y)$
= 8,412,300 - 868
= 8,411,432 t-CO2e/y

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

Year	Estimation of Project activity Emission reductions (tonnes of CO2e)	Estimation of baseline emission reductions (tonnes of CO2 e)	Estimation of leakage (tonnes of CO2e)	Estimation of Emission reductions (tonnes of CO2 e)
Year 2006	5,607,842	0	221	5,607,621
Year 2007	8,411,764	0	332	8,411,432
Year 2008	8,411,764	0	332	8,411,432
Year 2009	8,411,764	0	332	8,411,432
Year 2010	8,411,764	0	332	8,411,432
Year 2011	8,411,764	0	332	8,411,432
Year 2012	8,411,764	0	332	8,411,432
Year 2013	2,803,922	0	111	2,803,811
Total (t CO2e)	58,882,348	0	2,324	58,880,024

SECTION F.	**Environmental impacts**

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

As required by "Environmental Impact Assessment Law of China" and "Ordinance of Environmental Management for Construction Projects", the proposed project shall go through an Environmental Impact Assessment (EIA) and the project entity shall submit an EIA Report to local Environmental Protection Bureau for approval. JMC has gone through the EIA procedure according to the law and ordinance above and got EIA report cleared by local EPB authority.

In general environmental impacts from this project are low because the project is an environmental protection project. The gaseous emission and water effluent monitoring are conducted by JMC to avoid secondary pollution as described below:

Gaseous effluent:
The main sources of waste gas in the project are non-fugitive emission of waste gas which is produced in production and contains hydrogen chloride, hydrogen fluoride and fugitive sedimentation emission

produced in storage of raw materials and by-product, etc. The main sources of waste gas in the project are non-fugitive emission of waste gas which is produced in production and contains hydrogen chloride, hydrogen fluoride and fugitive. The waste gas produced from is treated by fixed tube membrane-type absorber +waste gas absorption tower + waste gas absorption tank. The compliance status of waste gas emission is given in Table below.

Compliance status of decomposition waste gas emission vs. Hazardous Waste Emission Limit (GB18484-2001)

Item	Decomposition Process Waste Gas Emission Concentration	Emission Concentration Limit under different Incineration Volume（mg/m3）		
		<300kg/h	300~2500kg/h	>2500kg/h
CO	50	100	80	80
HF	1	9.0	7.0	5.0
Dust	100	100	80	65
HCL	10	100	70	60
NOx	200	500		
Dioxins	0.1 TEQng/m3	0.5（TEQng/m3）		

From above table we can see that the gaseous emission levels of the destruction system are much lower than the emission levels required by China's environmental standard on air pollution control (Pollution Control Standard for Hazardous Wastes Incineration, GB18484-2001). So the proposed project can fully comply with local regulations for gaseous emission control.

Waste Water:
The liquid effluent from neutralization section will be treated at the on-site waste water treatment facility of JMC. After treatment, the liquid effluent to be discharged can be fully in compliance with China's National Integrated Wastewater Discharge Standard (GB8978-1996). The PH, SS, COD and the Fluoride content of the wastewater are listed in Table 6.

Decomposition Waste Water Discharge vs. Waste Water Comprehensive Discharge Limit （GB8978-1996）

Item No.	Item	Estimated Value of the Project system	Standard（mg/l）
1	Fluoride	10	10
2	COD	100	100
3	PH	6～9	6～9
4	SS	70	70

Noise and Vibration:
The results of noise levels at JMC by the HFC-23 Emissions Reduction Project are presented in following table:

Pollution Mitigation Measures and Their Effectiveness

Series No.	Source of noise	dB(A)	Mitigation Measures	Sound Level at JMC's Boundary after the Mitigation	Standard reference (GB 12348-90)
1	Air blower of the incinerator	95	Damping of vibration to foundation, sound insulation with soundproof room, furnishing muffler	26	daytime:65 nighttime:55
2	Draft fan of waste gas treatment	90	Sound insulation with soundproof room, damping of vibration to foundation , furnishing muffler		
3	Water pumps	80	Damping of vibration to foundation, sound insulation with soundproof cover		

The noise level of the project can be fully in compliance with the relevant national standard (National Standard of Noise at the Boundary of Industrial Enterprises, GB12348-90).

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 Environmental Impact Assessment Report for the HFC 23 Decomposition Project at Jiangsu Meilan Chemical Co., Ltd, the environmental impact of the proposed project is low. [3]

SECTION G.   Stakeholders' comments

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

Comments by local stakeholders have been collected in form of two public hearing meetings.

Two public hearing meetings were held on August 26, 2005 and September 16, 2005 respectively. Residence and surrounding factories including Trade and Industry Commission of Taizhou City, Xi Jiao Hospital, Haiguang Primary School and Dianhua Residence Committee were invited to the meetings. The participants were presented the origin, impact of the project and they were requested to comment on JMC's CDM project. After 1st meeting, an EIA report was drafted incorporating the comments collected.

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[3] Quote from EIA report dated November 2005: "Generally speaking, Jiangsu Meilan Stockholding Co., Ltd. F23 discharge reducing project accords with the general plan of Tai Zhou. The location of the project and techniques is reasonable. The project has obvious social and environmental benefits. Some unfavorable influence to environment exists in construction period and operation period. But after treatment by some environmental protection measures, the influence is acceptable. From the point view of environmental protection, the construction of this project is feasible."

The 2ⁿᵈ meeting presented the progress and the environment impact of the project including the general information, composition of engineering, waste water, gas, solid treatment, pollution discharge analysis and the pollution control measures. Minutes of both meetings have been drafted, signed and filed.

G.2.	Summary of the comments received:

After participants were presented the origin, impact, content of EIA report, they reviewed the EIA draft and concluded that the project would not bring adverse impact to surrounding environment, but on the contrary, the project would alleviate global warming and improve the environment and weather of China and the world, therefore and thus the project was supported by the representatives. Some key comments of participants are quoted as follows:

- EIA report is comprehensive in contents and reliable in conclusions, and the project would benefit the improvement of local environment. Therefore, the project is supported. However, it is hoped that JMC can conduct strict regular monitoring in terms of waste gas, wastewater, solid wastes, and noise as required by EIA Report to ensure compliance with associated standards and responsibility for residents nearby.

- The accident and risk analysis section in EIA is better and comprehensive. Therefore, it is hoped that JMC could organize employees to learn emergency response measures which should be taken in case of accidents, improve self- guarding consciousness, avoid accidents and ensure the safety of employees and residents nearby.

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

1. Following measures have been adopted by JMC echoing the major comments collected from public:Decomposition process selection has been emphasized on considering preventing potential negative impact to surrounding environment, e.g. JMC has chosen H2-the clean energy as fuel.
2. The gaseous, water, and sludge emission will fully comply with national standard, and for the dioxin, JMC has committed to comply with a stricter EU standard as limited to 0.1TEQ ng/m3.
3. A detailed monitoring plan has been formulated and supported by various necessary monitoring appliances.
4. A monitoring team was set up and trained for the particular purpose.
5. During the operation of this project, parameters as waste water, waste gas, solid waste, noise will not only be monitored continuously or periodically monitored but also disclosed to the public on JMC's official website, as to be supervised by public and local government.
6. Emergency prepare plan has been initiated which has also been reflected in details in D4 of this document.
7. Operator staff will be conducted relevant training regarding production process, emergency response, equipment maintenance.

Annex 1

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The public funds involved in this project exclude existing ODA[4].

The sovereign participants of the First Tranche of the UCF confirm that any public funding used to participate in the First Tranche of the Umbrella Carbon Facility does not result in a diversion of official development assistance and is separate from and is not counted towards its financial obligations as a Party included in Annex I.

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[4] ODA-Official Development Assistance.

Annex 3

BASELINE INFORMATION

List of Baseline Key factor Data

Variable	Definition	Value	Data Source
Q_HFC23y	Quantity of HFC23 waste destroyed during year y	719 ton	Calculated from q_HFC23y and P_HFC23y = 25,149 * 2.86%
q_HFC23 y	Quantity of HFC23 supplied to the destruction process shown by flow meters		Monitoring
P_HFC23 y	Purity of HFC23 supplied to the destruction process		Gas chromatograph
B _HFC23 y	Amount of HFC23 subject to regulation	0	calculated in accordance with local regulation
Q_HCFC22 y	maximum historical annual production level during any of the last 3 years between beginning of the year 2000 and the end of the year 2004	25,149 ton	Historical records, provided by JMC
w	Waste generation rate of HFC23/HCFC22 for the original plant	2.86%	Measured and calculated
EF	Emission Factor of HFC23	0.62857(tCO2e/tHFC23)	IPCC Default
GWP_HFC23	HFC Global Warming Potential	11,700	IPCC Default
E_Power$_y$	GHG Emission Factor for electricity during year y	0.001	Calculated basing on data in "2004 China Electric Power Annual Book"
Q_Power$_y$	Electricity consumption during year y	311,327 kwh	0.433 kwh/kg HFC23 * Q_HFC23y = 0.433 x 719,000 = 311,327 kWh
ND_HFC23$_y$	Quantity of HFC23 not destroyed in gaseous effluent	0.00719 ton HFC23	25,149*2.86 %*0.001%
E_H$_y$		0	

Please refer to the detailed calculation in section E.

Annex 4

MONITORING PLAN
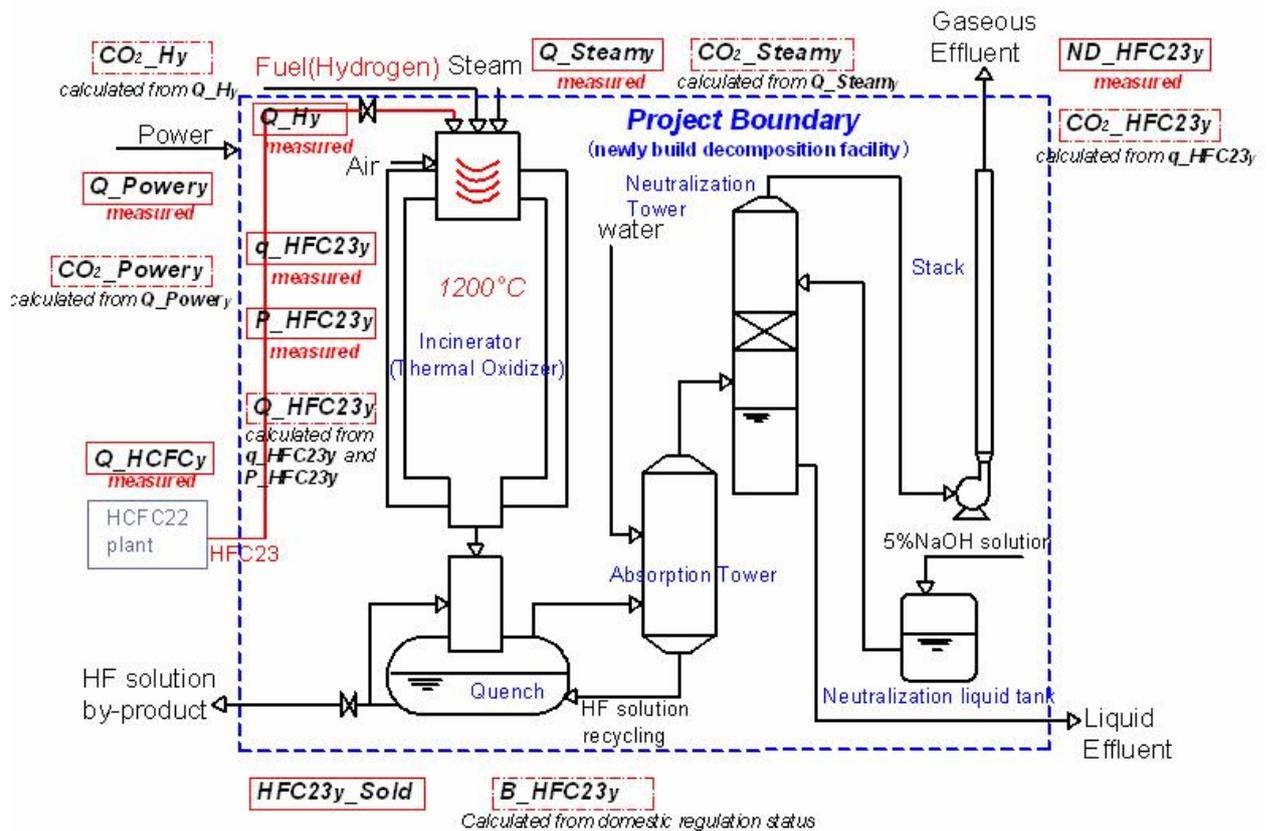
Following parameters will be monitored:
1. q_HFC23: Quantity of HFC 23 waste stream in gaseous effluent will be measured by two flow meters. To ensure data accuracy, the meters will be calibrated weekly.
2. p_HFC23: Purity of the HFC 23 effluent will be analyzed by chromatograph monthly.
3. Q_HCFC22: measure the annual production of HCFC22 and check the rate of HFC23/HCFC22.
4. Q_power: Measured by electricity meter
5. Q_Hy：H2 as power will be measured by meter continuously.
6. ND_HFC23: during the thermal oxidizer operation, analysis of the effluent gas is done to check leaked HFC 23 by sampling.
7. Gaseous effluents: the quantities of gaseous effluents (CO, HCl, HF, dioxin and NOx) will be monitored twice a year to ensure that the project is in compliance with the relevant environmental standard in China (GB18484-2001: National Pollution Control Standard for Hazardous Wastes Incineration,).Liquid effluents: (PH, COD, BOD, suspended solid, fluoride and metals (Cu, Zn, Mn and Cr)) will be measured twice a year and checked against the relevant environmental standard in China (GB8978-1996: National Integrated Wastewater Discharge Standard).