SECTION D. Application of a monitoring methodology and plan

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

The monitoring methodology employed for the decomposition of HFC23 waste at Changshu Zhonghao's HCFC22 production facility is the Approved Monitoring Methodology AM0001/Version 03 ("Incineration of HFC23 waste stream").
The methodology is available on the UNFCCC 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/Version 03 is applicable to CDM projects that can satisfy the following conditions:

a) The project occurs at an existing HCFC22 production facility;
b) The HCFC22 production facility has at least three years of operating history between the beginning of 2000 and the end of 2004; and
c) No regulation requires the destruction of the total amount of HFC23 in the host country.

The proposed project can meet all the three requirements above:

a) The proposed project will decompose the HFC23 generated from the existing HCFC22 production facility at 3F Zhonghao.
b) The HCFC22 production facility at 3F Zhonghao started operations in 2001 and has been in operation for more than three years. The facility has two production lines. The production of HCFC 22 was increased at the plant between 2001 and 2003 in response to increasing demand for HCFC22. As a result, the total annual production was 14,375.963 tons in 2002, 19,974.024 tons in 2003 and 30,979 tons in 2004.
c) There is no regulation in China restricting HFC23 emissions at this moment or in the near future.

Therefore, AM0001/Version 03 monitoring methodology is fully applicable to the proposed project.

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 3F Zhonghao in order to ensure the accuracy and conservativeness of the HFC23 measured. The flow meters will be calibrated every six months by an officially accredited entity. The zero check on the flow meters will be conducted every week. 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.

During the thermal oxidation process of the project, N_2O is also generated, which is also a representative GHG with GWP value of 310 (refer to IPCC Second Assessment Report). However, the quantity of N_2O is very small and thus can be neglected during emission reduction estimation.

Additionally, 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.

During the HFC23 thermal destruction process, hydrofluoric acid (HF) with the concentration of 30% - 40% is produced. These HF by-products will be stored in barrels. During the life time of the project, HF by-product will be transported and sold to another company. The annual CO_2 emission due to the transport of HF is around 0.3 tCO_2e. This amount is very small and therefore estimated to be negligible.

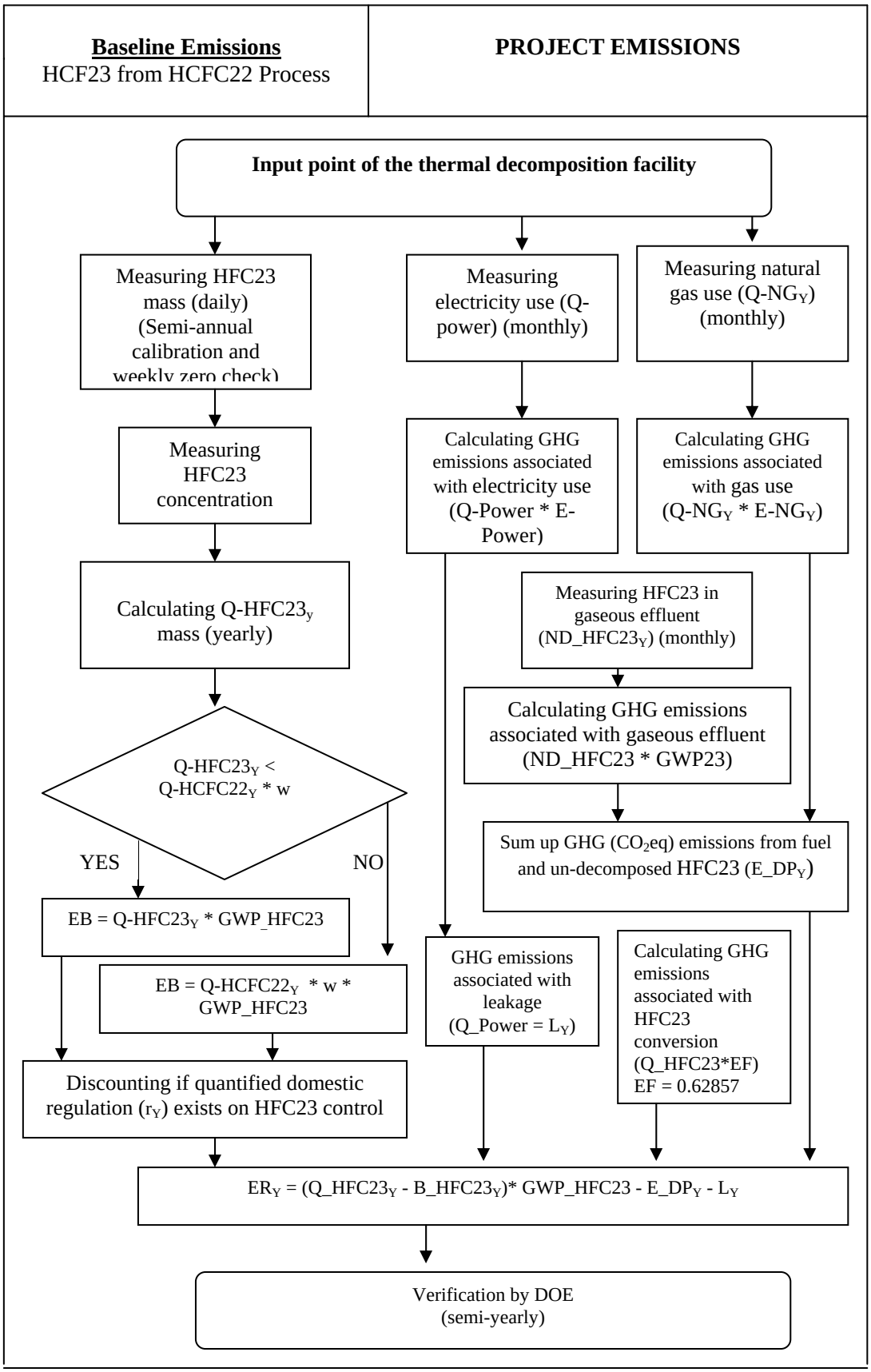
The monitoring plan for the proposed project also includes the following process for quality control:

- Purity of HFC23: It will be checked monthly by sampling and using gas chromatography. This value will be combined with the flow meter value (measuring the quantity of HFC23) to determine the actual quantity of HFC23 fed to the thermal oxidizer.
- Amount of HFC23 waste generated: The output of HFC23 from the HCFC22 plant will be checked at least yearly by comparing the amount of HCFC22 manufactured to the sum of the HFC23 produced ("produced" in lieu of "recovered for sale and HFC23 decomposed").

3F Zhonghao plans to store HFC23 in containers prior to the operation of incineration facility, as well as the storage of HFC23 during the breakdown of the decomposition facility. The amount of HFC23 stored in the containers will be monitored and recorded separately. These collected data will be available for DOE during verification process. Emission credits are only generated for the HFC23 actually destroyed. Any HFC23 stored but not destroyed will not be counted.

Furthermore, the quantities of gaseous effluents (CO, HCl, HF, dioxin and NO_X) and liquid effluents (PH, COD, BOD, SS, fluoride and metals) are measured every six months to ensure compliance with environmental regulations.

Figure 7.Outline of Monitoring and Evaluation Procedures of Emissions



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)	Comment
D.2.1.1. -1 q_HFC23_y	Quantity of HFC23 supplied to the destruction process	Flow meter	ton-HFC	Measured	Monthly	100%	Electronic	Measured by two flow meters in parallel. The flow meters will be calibrated every six months. Zero check will be done weekly The amount of stored HFC23 prior to the operation of incineration facility will also be measured by the two flow meters
D.2.1.1. -2 P_HFC23_y	Purity of HFC23 supplied to the destruction process	chromatography	%	Measured	Monthly		Electronic	Measured by sampling and using gas chromatography
D.2.1.1. -3 Q_HFC23_y	Estimated quantity of HFC23 supplied to the destruction process	Calculated from q_HFC23y and P_HFC23y	ton-HFC23	Calculated	Monthly	100%	Electronic	Q_HFC23y=q_HFC23*P_HFC23
D.2.1.1. -4 Q_NGy	Quantity of NG used in the destruction process	Fuel meter	ton	Measured	Monthly	100%	Electronic	Measured by using a fuel meter
D.2.1.1. -5 E_NG_y	Emission factor of fuel (NG)	Calculated from the molecular weight of NG	tCO_2e / t	Measured	Monthly	100%	Electronic	E_NGy=molecular weight of CO_2(44)*number of C in 1 molecular of NG / molecular weight of NG

		and CO_2						
D.2.1.1. -6 $q\_HFC23_{y\_}$ storage	Quantity of HFC23 stored in containers	Weight meter	ton	Measured	Monthly	100%	Electronic	The quantity of stored HFC23 for each container will be monitored; Each container will be identified with the number and the date stored

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

$E\_DP_y = ND\_HFC23_y * GWP\_HFC23 + Q\_NG_y * E\_NG_y + Q\_HFC23_y * EF$
$= ND\_HFC23_y * 11700 + Q\_NG_y * E\_NG_y + Q\_HFC23_y * EF$
EF=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)	Comment
D.2.1.3. -1 Q_HCFC22_y	The quantity of HCFC-22 produced	Weight meter	ton-HCFC22	Measured	Monthly	100%	Electronic	This value will be checked against the restriction conditions (cut-off rate, w) The amount of HCFC22 will also be monitored since the start of the HFC23 storage activity prior to the operation of the incineration facility
D.2.1.3 -2 HFC23y_sold	The quantity of HFC23 sold	Weight meter	ton HFC23	Measured	Monthly	100%	Electronic	This value is zero, as no HFC23 is sold by the company. However, the impact of this indicator will be considered during the life span of the project

D.2.1.3 -3 r_y	Local regulation on HFC23 emission control	Governmental laws and regulations	ton HFC23	Estimated	Monthly	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.)

$B\_HFC23_y = Q\_HFC23_y * r_y$

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

This section is not applicable to the proposed project.

D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

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

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
D.2.3.1. -1 ND_HFC23_y	Quantity of HFC23 in gaseous effluent	chromatography	ton-HFC23	Measured	Monthly	100%	Electronic	When the thermal oxidizer stops, analysis of the effluent gas is done to check leaked HFC23 by sampling
D.2.3.1. -2 Q_Power_y	Electricity consumption by the destruction process	Electricity meter	kWh	Measured	Monthly	100%	Electronic	Metered
D.2.3.1. -3 E_Power	Emission factor of power	Calculated from data of East China Grid	tCO_2e/ kWh	Calculated	Annually	100%	Electronic	E_power = coal consumption * heating value of coal * CO_2 emission factor (IPCC value)
D.2.3.1.-4 Q_Steam	Consumption of Steam	Steam meter	ton	Measured	Monthly	100%	Electronic	Metered

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

$Ly = Q\_Power_y * E\_Power_y + ET_y$

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.)

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

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)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
Q_HFC23_y	Low	The output of HFC23 from the HCFC22 plant will be checked yearly by comparing the amount of HCFC22 manufactured to the sum of the HFC23 produced
ND_HFC23_y	Low	Will be measured from the gas effluent of the destruction process
P_HFC23_y	Low	Will be measured using gas chromatography
Q_NG_y	Low	Will be metered using NG meter
Q_Power_y	Low	Will be metered using electricity meter
Q_HCFC22_y	Low	Will be obtained from production records of HCFC22 production line A and line B
HFC23_sold	Low	Will be obtained from production records of HCFC22 production line A and line B
q_HFC23_storage	Low	Will be monitored by using weight meter

All the measurement equipment will be recalibrated according to international rules and standards for measurement. The flow meters measuring HFC23 waste gas will be calibrated every six months by an officially accredited entity. The zero check on HFC23 flow meters will be conducted weekly in order to reduce measurement error.

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

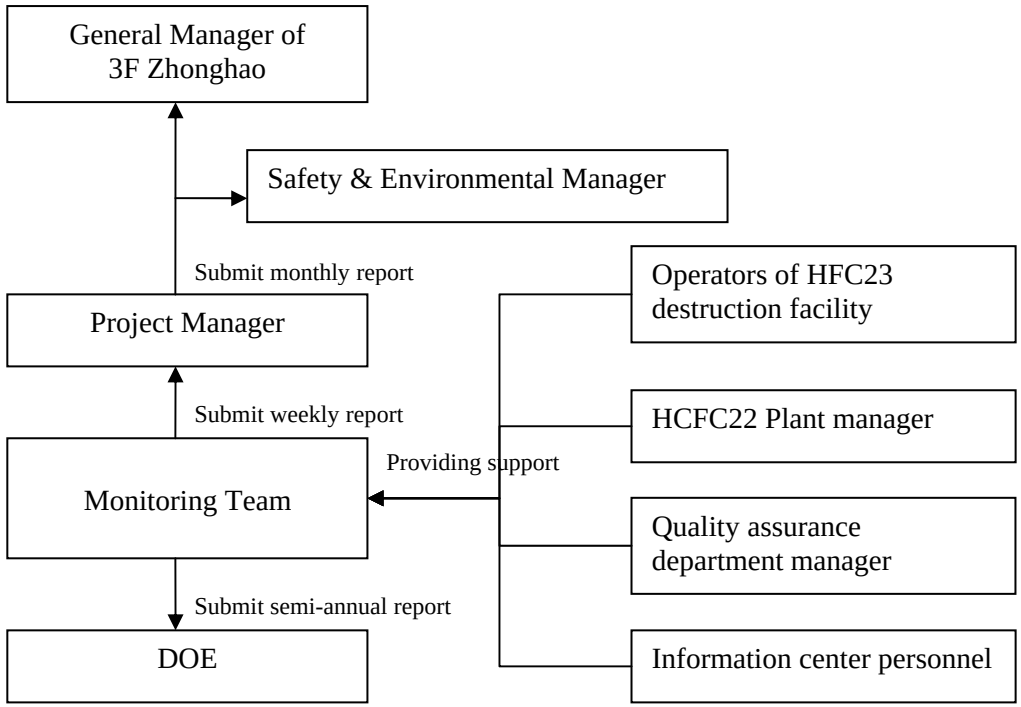
3F Zhonghao has an integrated management system in place. The company has obtained ISO14001 and ISO9001 certifications. Based on its certified environmental management system and quality management system, 3F Zhonghao is committed to make continuous improvement both in business and environmental protection. After the proposed project is implemented, 3F Zhonghao will enlarge its ISO9001 and ISO14001 applicable scope to cover the project activity.

Management structure:

The management structure for the proposed CDM project at 3F Zhonghao is shown in figure 8. A project manager will be designated to be in charge of the overall management and implementation of this proposed project. He is also the head of the monitoring team. The monitoring team consists of professional monitoring personnel who will perform all the monitoring activities according to the monitoring plan described in this project design document. At the same time, the project manager will also be responsible for coordinating relevant departments, such as the operators of HFC23 destruction facility, the HCFC22 plant manager, quality assurance department manager and information center personnel to provide support to the project operation and monitoring. A monthly

report will be sent to the general manager and safety & environmental manager of 3F Zhonghao by the project manager. The monitoring team will not only submit weekly report to the project manager but also prepare semi-annual report for DOE verification. Before implementation of this project, the personnel relevant with thermal destruction facility operation and monitoring will be trained to acquire comprehensive knowledge with regards to general and technical aspects of this CDM project. The technology supplier will also provide instruction on installation, operation, maintenance and calibration of all the new equipments.

Figure 8. Management structure for the proposed project



Emergency preparedness:

Emergency preparedness plan is part of 3F Zhonghao's safety and environmental management system. The existing plan has combined inventory of hazardous substances, identification of potential accidents, and steps to respond to the potential accidents. The detailed procedures in the existing emergency preparedness plan will be regularly checked and revised for improvement. Beyond this plan, the technology provider of the proposed project also provided detailed technical solutions for emergency preparedness. In case the thermal destruction facility encounters emergency shut-down, all equipment will immediately switched to a safe mode. Finally, monitoring instruments will be regularly checked. If any faults or problems are identified, they will be immediately fixed or the equipment will be replaced.

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

The monitoring study is completed on October 19, 2005

Contact information:
Ms. Fan Yue
Foreign Economic Cooperation Center of Environmental Protection, China
No.277, Zhaodengyu Road, Xicheng District, Beijing, 100034
Tel: 86-10-6653-2352
Email: fan.yue@sepafeco.org.cn

Annex 4

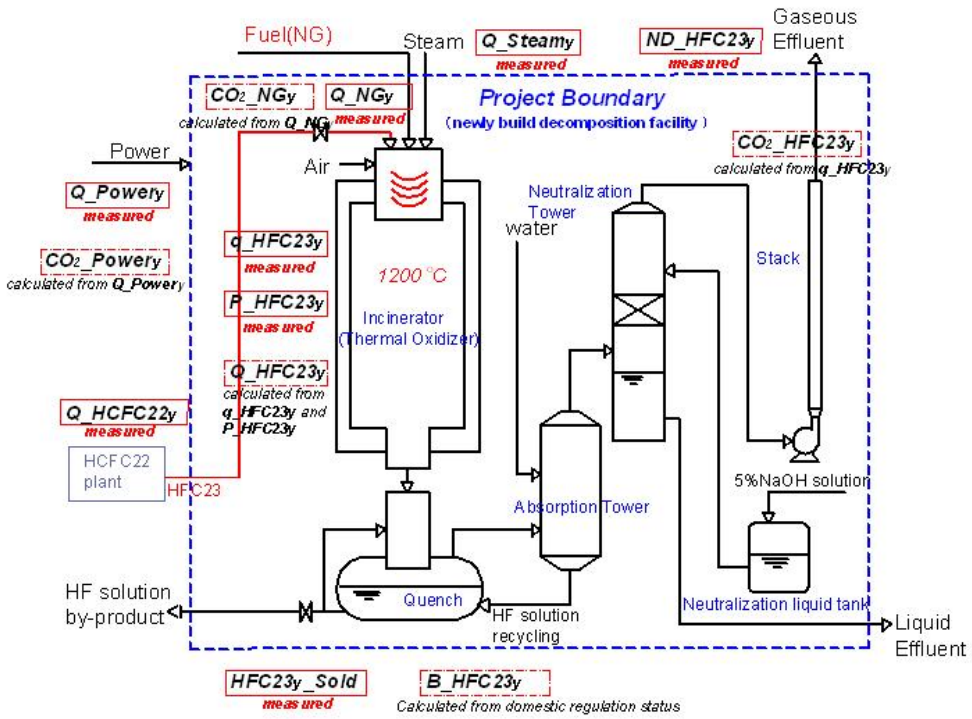
MONITORING PLAN

The monitoring plan (MP) defines a standard against which the project performance in terms of its greenhouse gas (GHG) reductions and conformance with all relevant Clean Development Mechanism criteria will be monitored and verified. It is therefore a tool to help coordinate all the monitoring requirements for generating certified emission reductions from the project.

The information included in this MP will be available at the project site. The implementation of the MP will ensure that the management at 3F Zhonghao can track emission reductions generated by the project.

New employees will also benefit from the existence of an MP since they can quickly be made aware of the importance of keeping emission reduction data. In addition, the MP will be useful in efficiently communicating with the Designated Operational Entity (DOE) during audits and saving valuable time.

Monitoring parameters:



According to AM0001/Version 03 methodology, the following parameters will be monitored.

1. The quantity of HFC23 supplied to the destruction process (**q_HFC23**) will be directly and continuously measured by using two flow meters. In order to have more accurate data, the flow meters will be calibrated every six months by an officially accredited entity. Zero check on the flow meters will be conducted every week. When one flow meter is recalibrated, the other flow meter will

continue measuring the quantity of HFC23 fed to the destruction process.
2. The purity of HFC23 supplied to the destruction process (**p_HFC23**) will be checked monthly by sampling and using gas chromatography.
3. The quantity of HCFC22 produced (**Q_HCFC22**) will be measured by weighing. The amount of HFC23 generated from the HCFC22 plant will be checked yearly against the Q_HCFC22.
4. The electricity consumption (**Q_power**) will be measured by a meter.
5. The fuel consumption (**Q_NG**) will be measured by using a fuel meter.
6. The quantity of leaked HFC23 in gaseous effluent (**ND_HFC23**) will be measured by sampling.
7. The quantities of gaseous effluents (CO, HCl, HF, dioxin and NOx) will be measured 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,).
8. The quantities of liquid effluents (PH, COD, BOD, SS, fluoride and metals) will be measured twice a year and checked against the relevant environmental standard in China (GB8978-1996: National Integrated Wastewater Discharge Standard).

Monitoring structure:

During the project implementation, operators of each shift will record the monitoring data both electronic and paper-based, and the shift heads should check the records to ensure their accuracy. One professional monitoring personnel will be assigned to collect the monitoring data and other supporting data to make a weekly report to the manager of HFC23 decomposition facility. The manager will not only give a report to the General Manager every month, but also prepare the semi-annual monitoring report to DOE for emission reduction verification with the assistance of the monitoring personnel.
Personnel from other departments will support the monitoring work of the HFC23 decomposition. Plant manager of HCFC22 production, quality assurance department manager and information center personnel will provide monitoring personnel information he/she needed, such as data about HCFC22 production, sample analysis results and computer system maintenance.
The personnel relevant with monitoring work will be trained to acquire comprehensive knowledge with regards to general and technical aspects of CDM project. And the monitoring equipments supplier will provide instruction on installation, operation, maintenance and calibration of their equipments.
Furthermore, 3F Zhonghao will enlarge its ISO9001 and ISO14001 applicable scope to cover the proposed project activity within one year after commissioning.