CDM

MONITORING REPORT #10

Version 2

"N2O decomposition project of

PetroChina Company Limited Liaoyang Petrochemical Company"

UNFCCC 1238

From: December 1st, 2009
To: March 13th, 2010

Authorized Signatory **on behalf of the Project owner, who is in charge of this Monitoring Report**

杨 晓 林

Date: May 28th, 2010

Table of Contents

1. Introduction

2. Reference

3. Definition

4. General description of project

5. Baseline methodology

6. Applicability of the methodology

7. Monitored Parameters

8. Quality control (QC) and quality assurance (QA)

9. GHG Calculations

Appendices 1~15

1. Introduction

The purpose of this monitoring report is to calculate and clarify GHG emission reductions achieved by this project for periodic verification.

This monitoring report covers the activity from December 1st, 2009 to March 13th, 2010 as the 10th period, which is the last monitoring period of the second crediting year (14/03/2009 – 13/03/2010).

Duration of the project activity period
The starting date of the operation of the project as well as of the crediting period is defined as March 14th, 2008.
Note: In the PDD the original starting date of the operation of the project activity and of the first crediting period is 01/01/2008. A demand to the UNFCCC to change the start up of the crediting period to 14/03/2008 was made and approved. The new starting date has been updated on the UNFCCC website.

2. Reference

Approved Baseline methodology:
Baseline Methodology for decomposition of N_2O from existing adipic acid production plants (AM0021-Version 01, 25 February 2005)

Approved Monitoring methodology:
Monitoring Methodology for decomposition of N_2O from existing adipic acid production plants (AM0021-Version 01, 25 February 2005)

Project Design Document:
N_2O decomposition project of PetroChina Company Limited Liaoyang Petrochemical Company
Version number of the document: 3
Date: April 6th, 2007

CDM registration number:
"N_2O decomposition project of PetroChina Company Limited Liaoyang Petrochemical Company" – UNFCCC ref number 1238

3. Definition

y : Monitoring period (in this report, from December 1st, 2009 to March 13th, 2010)
PDD : Project Design Document of this project "N_2O decomposition project of PetroChina Company Limited Liaoyang Petrochemical Company" Version number of the document: 3, issued on April 6th, 2007

4. General description of project

Project activity

Nitrous oxide (N_2O) is a by-product of adipic acid production, and has been recognized as one of the six greenhouse gases ("GHGs") under the Kyoto Protocol. It is of low toxicity but is a greenhouse gas (GHG), whose GWP is large (GWP=310 in the IPCC 2nd Assessment Report). There are however no national or regional regulations or restrictions on the emission of N_2O in China.
In this project, PetroChina Company Limited Liaoyang Petrochemical Company ("LYPC") additionally installed a N_2O catalytic decomposition process equipment to the currently operating adipic acid manufacturing plant. This installation reduces the GHG emissions, which would otherwise be released to the atmosphere if the project was not implemented.

The decomposition facility was installed in the factory site of N_2O decomposition project of LYPC. The destruction of N_2O was started on March 14th, 2008. The starting date of the operation of the project as well as of the crediting period is 14/03/2008.

This project activity was registered at UNFCCC on November 30th, 2007 with the number 1238.

Technical description of the project

Location of the project activity
The decomposition facility was installed in the factory site of PetroChina Company Limited Liaoyang Petrochemical Company.

Technology employed by the project activity
The project activity installed a catalytic decomposition plant to decompose the N_2O emissions from the production of adipic acid.

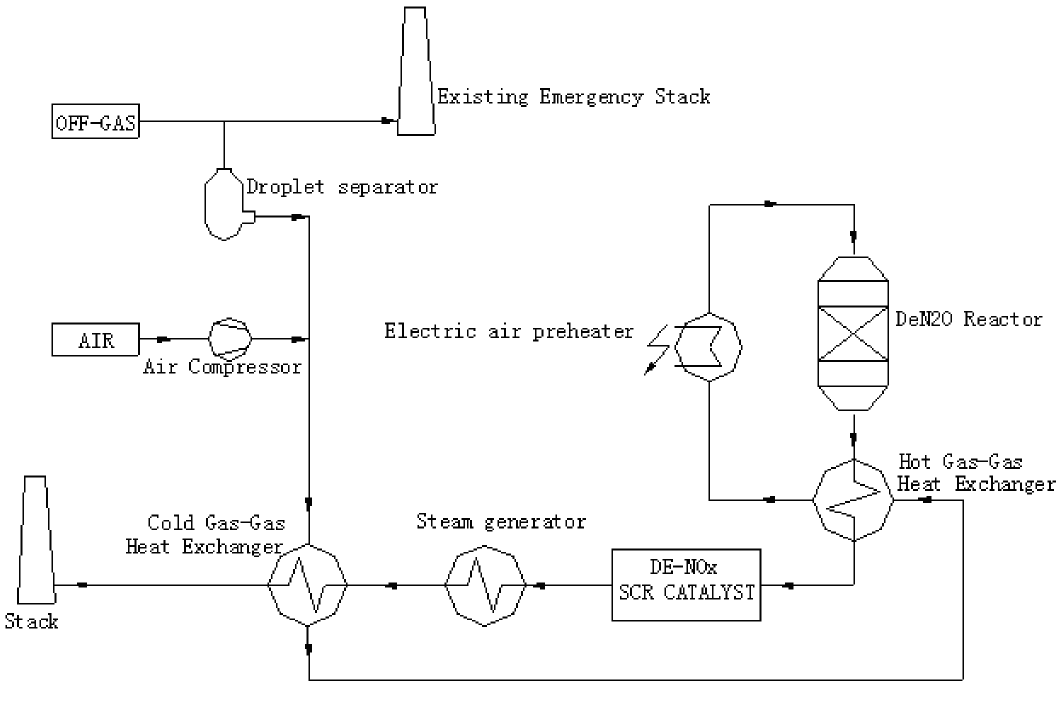


Figure: N_2O catalytic decomposition process

1. The main facilities in the process include the Air Compressor, the DeN_2O Reactor, the Cold Gas-Gas Heater Exchanger, the Hot Gas-Gas Heat Exchanger, the $DeNO_X$ Reactor, the Steam Generator, the Electric Air Pre-heater, the Droplet Separator and the Stack.

2. The description of the process is as follows:

The N_2O rich off-gas from the adipic acid plant is sent into the droplet separator in which the droplet and aerosols is separated, then the gas stream is diluted by compressed air coming from the air compressor, and the N_2O concentration shall be controlled at an appropriate range to avoid overheating the catalyst and debasing the activity of the catalyst since the reaction is highly exothermic. The mixed gas is preheated in the cold gas-gas heat exchanger to the temperature of 180~190 deg C around, then exchanges the heat with outlet gas of the reactor in the hot gas-gas exchanger, then sent into the electric air pre-heater, in which the gas is heated to a temperature about 480 deg C, and then the gas stream is sent into the DeN_2O reactor in which N_2O is converted into N_2 and O_2 over proprietary catalyst operated at mildly elevated pressure and temperature. The gas off the reactor is sent into the hot gas-gas exchanger and then into the $DeNO_X$ reactor, in which the NO_X is converted to N_2 and H_2O, and then the gas off the $DeNO_X$ reactor is sent into the steam generator and produce the 0.55~0.7 MPa (A) steam, then the off gas is fed into the cold gas-gas exchanger for further cooling, then the off-gas is emitted to the atmosphere through the final stack.

5. Baseline methodology

Approved baseline methodology AM 0021 - version 1: "Baseline methodology for decomposition of N_2O from existing adipic acid production plants" (AM0021), is applied to this project.

The project boundary related to the baseline methodology is shown below and this project boundary is used and explained in the PDD.

Description of the sources and gases included in the project boundary

<table>
<tr><th></th><th>Emission source</th><th>GHG types</th><th>Included or not?(Yes/No)</th><th>Reason / explanation</th></tr>
<tr><td rowspan="6">Baseline</td><td rowspan="3">Adipic acid production</td><td>CO_2</td><td>No</td><td></td></tr>
<tr><td>CH_4</td><td>No</td><td></td></tr>
<tr><td>N_2O</td><td>Yes</td><td>Off gas of the production of Adipic Acid.</td></tr>
<tr><td rowspan="3">Steam produced during the decomposition</td><td>CO_2</td><td>Yes</td><td>The steam generated from the project activity will partly substitute the steam which is bought.</td></tr>
<tr><td>CH_4</td><td>No</td><td></td></tr>
<tr><td>N_2O</td><td>No</td><td></td></tr>
<tr><td rowspan="6">Project activity</td><td rowspan="3">The off gas passing the decomposition facility but not 100% decomposed</td><td>CO_2</td><td>No</td><td></td></tr>
<tr><td>CH_4</td><td>No</td><td></td></tr>
<tr><td>N_2O</td><td>Yes</td><td>The actual decomposition efficiency of the decomposition facility.</td></tr>
<tr><td rowspan="3">Off gas by-passing the decomposition facility</td><td>CO_2</td><td>No</td><td></td></tr>
<tr><td>CH_4</td><td>No</td><td></td></tr>
<tr><td>N_2O</td><td>Yes</td><td>The gas by-passing the decomposition facility.</td></tr>
</table>

Leakage	Electricity consumed during the decomposition process	CO_2	Yes	According to the latest data provided by the Chinese DNA of CDM, NDRC, and the power consummated by the project activity.
		CH_4	No	
		N_2O	No	

6. Applicability of the methodology

Approved monitoring methodology AM0021 - version 1 is applied to this project.
This methodology is applicable to projects which decomposes N_2O from an adipic acid production plant under the following conditions:

- Either catalytic or thermal decomposition of the N_2O by-product of adipic acid production at existing production plants
- The methodology is spatially generic, being applicable across regions where the data (both related and project activity as well) exist to undertake the assessment
- The methodology is applicable only for installed capacity (measured in tonnes of adipic acid per year) that exists by the end of the year 2004.

The present project satisfies these conditions.

7. Monitored Parameters

According to the methodology AM0021 and the Monitoring Plan, the data being collected to monitor the GHG reduction are given in the table below:

ID	Data variable	Source of data	Data unit	Recording frequency	Reference
Q_GE	Volume of effluent gas	Flow meter	Nm^3	Monthly	Appendix 1
N_2O_GE	Concentration of N_2O in the effluent gas	Online Gas Chromatography	ppm[1]	Monthly	Appendix 2
%_on-line	% of production time the position switch on the bypass valve is closed	Position switch on bypass valve	% of production time	Monthly	Appendix 4
P_AdOH	Amount of adipic acid production	The production record of adipic acid	t	Monthly	Appendix 6
HNO_3_consumption	Nitric acid consumption in the adipic acid production process	Excel workbook based on the raw material consumption	t	Monthly	Appendix 7
HNO_3_physical	Nitric acid physical losses in the adipic acid production	Excel workbook based on the monitoring data	t	Monthly	Appendix 8

[1] For calculation of the decomposition rate of N_2O will be transformed in kg/Nm^3according to the requirements of AM0021.

	process	and analysis			
Q _N_2Oreg	Per Chinese regulation allowed N_2O emissions	Chinese regulation	kg/yr	Date When relevant legislation is in place	Appendix 10
N_2Oreg/ AdOH	Per Chinese regulation allowed N_2O emissions per kg of adipic acid produced	Chinese regulation	kg/kg	Date When relevant legislation is in place	Appendix 10
r_y	Per Chinese regulation required share of N_2O emissions to be destroyed	Chinese regulation	%	Date When relevant legislation is in place	Appendix 10
P_N_2O	Market price of N_2O	Market Survey	$/t	Yearly	Appendix 11
Q_Steam_p	Amount of steam produced by the decomposition process	Steam meter	t	Monthly	Appendix 12
Steam supplier data	All data required for calculation of E_Steam	The steam supplier	-	Yearly	Appendix 13
Q_Power	Electric consumption of the decomposition facility	Electricity meter	kWh	Monthly	Appendix 14
Electricity grid data	All data required for calculation of E_Power	China Electric Almanac, and China Energy Statistical Yearbook	kg-CO_2/kWh	Yearly	Appendix 15

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

8.1. <u>Quality Management System</u>

The Catalytic decomposition plant is operated by LYPC operating personnel, and the personnel have been trained by LYPC engineers, and the engineers have been trained by the technology supplier, BASF.

LYPC was certified being compliance with the quality management system of GB/T 19001-2000 idt ISO 9001:2000 Standard on 12/01/2009, the valid period will be expired on 11/01/2012 (Cer. No.: 01009Q10049R3L), the environmental management system of GB/T 24001-2004 idt ISO14001:2004 on 12/01/2009, the valid period will be expired on 11/01/2012 (Cer. No.: 01009E10010R3L) and the health and safety management system of GB/T28001-2001 on 12/01/2009, the valid period will be expired on 11/01/2012 (Cer. No.: 01009S10008R2L). All these management systems are incorporated into the internal systems and procedures regarding Quality, Health, Safety & Environment (QHSE). The operation, data transfer and reporting procedures of the project are incorporated into the quality management system.

8.2. <u>Quality control (QC) and quality assurance (QA) procedures that are being undertaken for data monitored</u>

LYPC conducts the QA & QC procedures to the project activity as required by the documentation of QHSE procedure.

The technology and analytical methods used in this project activity are provided by the technology supplier, BASF, and some of them are supplied by LYPC itself.

The QA & QC procedures are set and implemented in order to:

1. Secure a good consistency through planning to implementation of this CDM project,

2. Stipulate who has responsibility for what, and

3. Avoid any misunderstanding between individuals and organizations involved.

Data	Uncertainty level of data (High/Medium/ Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
Q_GE	Low	This flow is measured with an Averaging Pitot tube (the Annubar flow meter). This instrument is considered as a critical instrument in the QA/QC procedure.
N_2O_GE	Low	Is measured with an Online Gas Chromatograph, and existing procedures are applied to this analyzer for QA & QC.
P_AdOH	Low	Is obtained from production records of the adipic acid plant where the N_2O waste originates. A QA/QC procedure is implemented. Production quantity is measured by the counting mechanism during the production package of the adipic acid.
%_on-line	Low	Use high integrity performance bypass valve to limit leaks. Procedures to periodically check its tightness and assure its good operation. They have been added to the QA/QC existing procedures.
Q_Steam_p	Low	Steam meter is considered as a critical instrument in the QA/QC procedure.
Q_Power	Low	Electricity meter. Standard procedures are used. They have been added to the QA/QC existing procedures.

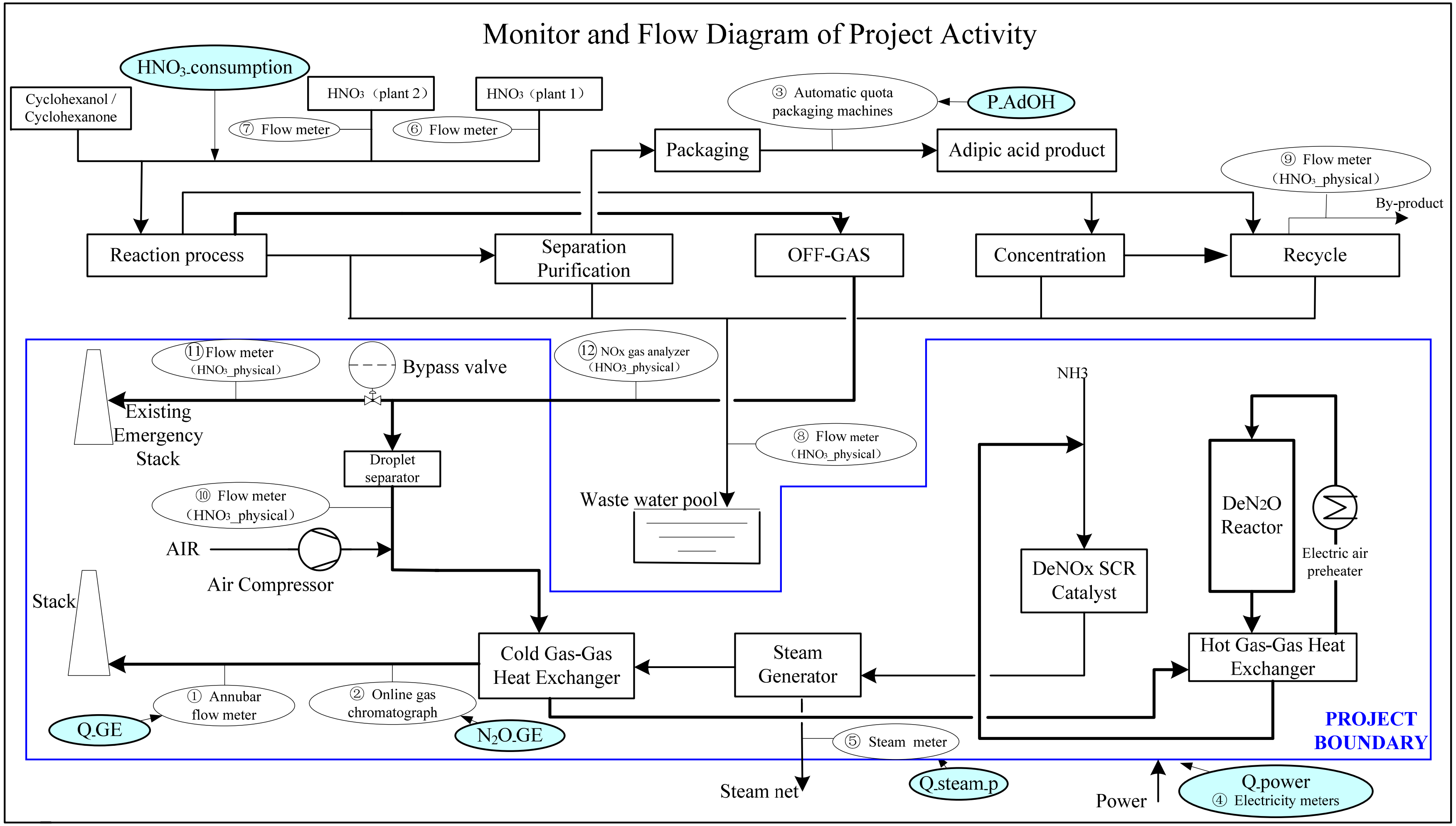
8.3. <u>Calibration/Maintenance of Measuring and Analytical Instruments</u>

All measuring and analytical instruments are being calibrated as per the applicable standards by the officially accredited & qualified entities.

The maintenance methods and procedures have been incorporated as part of the QHSE procedures and form an integral part of the systems and procedures for LYPC.

In this monitoring period, most of the measuring and analytical instruments were recalibrated or replaced due to the coming expiry of the previous calibrations, the details in the below table.

As required by the DOE, a line diagram of the project activity has been included into the monitoring report as below:



This is a line diagram of the project activity including project boundary and location of monitoring instruments. The serial numbers of the monitoring instruments are numbered only in the diagram due to the room limit, and they are detailed in the below table.

Parameter	Instrument	Serial number		Previous calibration			Calibration in this monitoring period		
				Calibration Date	**Valid Period (months)**	**Certificate No.**	**Calibration Date**	**Valid Period (months)**	**Certificate No.**
Q_GE	Annubar flow mete (stopped use from 08/01/2010)	①	4989886/0068713	19/01/2009	12	0068713	---	---	---
	Annubar flow meter (put into use from 08/01/2010)		4924020/0054303	---	---	---	15/12/2009	12	CE10406
	Temperature transmitter(stopped use from 08/01/2010)		0606/b842589937	19/01/2009	12	Liaoji 09011902502	---	---	---
	Temperature transmitter(put into use from 08/01/2010)		b427668837	---	---	---	29/12/2009	12	Liaoji 09122902513
	Pressure transmitter(stopped use from 08/01/2010)		CF610UR252135	13/01/2009	12	Liaoji 09011302713	---	---	---
	Pressure transmitter(put into use from 08/01/2010)		CzzB075453	---	---	---	28/12/2009	12	Liaoji 09122802709
N_2O_GE	Online gas chromatograph (stopped use from 21/01/2010)	②	5500120010 (AT-2307)	06/03/2009	12	Liaoji 09030606303	---	---	---
	Online gas chromatograph (put into use from 21/01/2010)		5500570010 (AT-2307)	---	---	---	21/01/2010	12	Liaoji 10030506601
P_AdOH	Automatic quota packaging machines (four)	③	04042001-U; 04042002-U ; U84Z404A; U84Z404B	10/07/2009	6	04200904320; 04200904319; 04200904321; 04200904322	06/01/2010	6	04201000014; 04201000015; 04201000012; 04201000013
Q_Power	Electricity meters	④	08010050001	16/01/2008	36	DC820005	---	---	---

	(three)		08020130041; 08020130040	03/03/2008	36	DC820013; DC820014	---	---	---
Q_Steam _p	Steam meter	⑤	HVS71025	23/02/2009	24	Liaoji 09022302101	---	---	---
HNO_3_ consumption	Flow meter (stopped use from 16/12/2009)	⑥	413105/3032717	24/12/2008	12	Liaoji 08122402202	---	---	---
	Flow meter (put into use from 16/12/2009)		413106/3032737	---	---	---	16/12/2009	12	Liaoji 09121602201
	Flow meter	⑦	C40E4C02000	20/11/2009	12	Liaoji 09112002201			
HNO_3_ physical	Flow meter	⑧	080306	06/03/2008	24	Liaoji 08030608106	04/03/2010	24	Liaoji 10030402122
	Flow meter (stopped use from 02/12/2009)	⑨	AE0605535	24/12/2008	12	Liaoji 08122402201	---	---	---
	Flow meter (put into use from 02/12/2009)		AE0404094	---	---	---	20/11/2009	12	Liaoji 09112002103
	Flow meter	⑩	0054302/4924022	20/01/2009	24	Liaoji 09012002112	---	---	---
	Flow meter (stopped use from 03/02/2010)	⑪	FE2564	10/03/2008	24	Liaoji 08031008103	---	---	---
	Flow meter (put into use from 03/02/2010)		FE2564A	---	---	---	01/02/2010	24	Liaoji 10020102104
	Gas analyzer	⑫	VD-887(AT-2306)	06/03/2009	12	Liaoji 09030606302	21/01/2010	12	Liaoji 10030506602
	Electronic balances (three)	D450000836; D432311092; D432311087		16/02/2009	12	01200900239; 01200900241; 01200900247	13/02/2010	12	01201000190; 01201000187; 01201000186
	Spectrophotometers (two)	A11024531130CS		06/01/2009	12	03200900085	05/01/2010	12	03201000269
		A11024130206CS		04/12/2008	12	HX810082	03/12/2009	12	03200907245

8.4. Environmental Impact

The catalytic decomposition plant has been installed with online analyzers to monitor constantly the concentration of NOx that are required by China legislation. Starting from 14/03/2008, the parameter will be transmitted to the local government environmental agency periodically---- Liaoyang Environmental Monitoring Station of Liaoyang Environmental Protection Bureau, who can check such parameter through sampling and analysis.

The monitored values were under the control specification limit of the China environmental regulation and the average value and the highest value of those results are shown in the table below.

Table showing analysis Gaseous Emission for catalytic decomposition plant

Parameter	**Unit**	**The Cap of the Integrated Air Pollutant Emission Standard (GB16297-1996)**	Average value in this monitoring period by Liaoyang Environmental Monitoring Station	Highest value in this monitoring period by Liaoyang Environmental Monitoring Station
NO_x	mg/m^3	240 Max	119	131

9. GHG Calculations

Statement of GHG emissions reduction in the tenth monitoring period.

As suggested by the methodology (AM0021 - Version 1), the GHG emissions reduction, (ER_y), achieved by the project activity for a given period y is

$ER_y = BE_y - PE_y - L_y$

9.1. Calculation of baseline emissions

The amount of baseline emissions in the given period y (measured in t CO_2 eq.) is calculated by

$BE_y = Q\_N_2O_y \times GWP\_N_2O + Q\_Steam\_p_y \times E\_Steam_y$

Calculation of $Q\_N_2O_y$

It has been checked that there is no Chinese regulation in place that would limit the quantity of N_2O emitted that can be taken into account for the calculation of the baseline emissions.

The quantity of N_2O actually produced, N_2O_produced, emitted over the period can then be calculated by:

$N_2O\_produced = P\_AdOH \times Actual\ N_2O\_/AdOH$

Where, Actual N_2O_/AdOH (kgN_2O/kg AdOH) is the actual N_2O emission factor for adipic acid production, calculated as:

$N_2O\_/AdOH = HNO_3\_chemical / P\_AdOH /63 /2 \times 0.96 \times 44$

HNO_3_chemical is obtained from the measured comsumption of HNO_3 (HNO_3_consumption) and the physical losses of HNO_3 (HNO_3_physical). The formula is:

$HNO_3\_chemical = HNO_3\_consumption - HNO_3\_physical$

The quantity of N_2O to be credited, Q_ N_2O_y, emitted over the period can then be calculated by:

Q_ N_2O_y = P_AdOH × N_2O_/AdOH

Where, N_2O_/AdOH (kgN_2O/kg AdOH) is the N_2O emission factor for adipic acid production, capped by the emission factor of 0.27 kgN_2O/kg AdOH, as specified by the IPCC Good Practice Guidance, i.e., should be the lower of Actual N_2O_/AdOH and 0.27 kgN_2O/kg AdOH. Over the tenth monitoring period, the actual emission factor, as shown in Appendix 9, from the adipic acid plant is above the capped value of 0.27 kg N_2O /kg AdOH. So the capped value of 0.27 kgN_2O/kg AdOH is being used according to AM0021.

As required by the Executive Board members on 29/08/2008, "The monitoring methodology requires monthly recording frequency of N_2O produced and N_2O emission factor for adipic acid production" (please refer to the website of http://cdm.unfccc.int/Projects/DB/DNV-CUK1184240745.87/iProcess/SGS-UKL1213087483.29/view), as response to the minor correction requested, the monthly monitored results of the two parameters have been recoreded in Appendix 9 to the monitoring reports since MR#2 version 2, dated August 19, 2008.

Parameter	Value	Reference
Q_ N_2O_y	12,093.840t	Appendix 9
P_AdOH	44,792.000t	Appendix 6
N_2O_/AdOH	0.27 kgN_2O/kg AdOH	Appendix 9
Q_N_2Oreg	No limit	Appendix 10
N_2O_reg/AdOH	No limit	Appendix 10
r_y	0	Appendix 10

The methodology AM0021 version 1 and the registered PDD and validation report of this project did not identify the cap of the adipic acid production. SGS submitted a request for clarification to secure guidance on the cap (AM_CLA_0148). The Board clarified at EB48 that the cap on adipic acid production of the facilities shall be the validated maximum daily production of adipic acid multiplied by 365 days multiplied by the operational rate. The validated maximum daily production of adipic acid shall be achieved by the end of year 2004 (For detailed information, please refer to http://cdm.unfccc.int/EB/048/eb48rep.pdf). As follow formula：

Cap = validated maximum daily production of adipic acid × 365 × operational rate

The cap on the adipic acid production is determined as blow as per the EB48's guidance:

The validated maximum daily production of adipic acid that achieved by the end of year 2004 is 477 t/d, as shown in the registered PDD (Page 5), DNV's validation report of the project (Page 14, 53) and DNV's response to the request for review at registration (available on the website of http://cdm.unfccc.int/Projects/DB/DNV-CUK1184240745.87/history), the production log in December 2004 has been provided to DOE and UN for cross checking the validation outcome.

The adipic acid plant's operational rate is a result of the total operational hours divided by the total hours, as per the industrial common practice. Considering the daily production of 477 t/d was achieved on 9 Dec 2004, the operational rate of 91.23% (= (8760-768.5) h /8760h × 100% =7991.5h/8760h × 100%)[2] from 2004 was adopted to determine the cap on adipic acid production as per the guidance provided by the Board in its 48th meeting to be consistent with the required year for determination of the maximum daily production achieved by the AdOH plant.

Although 2004 was a leap year and had 366 days, 365 days are used as the days in 2004 for the

[2] If the operational rate were to be calculated based on the actual 366 days, the actual operational rate would be calculated as: (366*24-768.5)/(366*24)×100% = 91.25%.

calculation to be conservative, i.e., total hours in the year 2004 for the calculation was 8760h (= 365d × 24h/d). As shown in the 2004 shutdown statistics of the adipic acid plant, the accumulated shutdown time of the adipic acid plant in 2004 was 768.5 hours, which includes the periodic repair and maintenance within the year and the unplanned shutdowns. The supporting documentation on the 2004 shutdown statistics of the adipic acid plant have been provided to DOE and UN.

By applying this operational rate following the guidance provided by the Board during its 48th meeting, the P_AdOH cap totals 158,835.992 t/y(=477t/d*365*91.23%). For detailed information, please refer to http://cdm.unfccc.int/Projects/DB/DNV-CUK1184240745.87/iProcess/SGS-UKL1248257972.07/view.

This is the last monitoring period in the second crediting year (14/03/2009 - 13/03/2010). By the end of this monitoring period, the accumulated P_AdOH in the second crediting year (14/03/2009 - 13/03/2010), 156,290.000t, is below the cap of adipic acid production, 158,835.992t, which is calculated according to the clarification made in EB48. Hence, the P_AdOH in this monitoring period can be fully credited.

Calculation of $Q\_Steam\_p_y \times E\_Steam_y$

The flow of the steam generated from this project activity is monitored constantly, and the emission factor E_Steam_y is provided by the steam supplier of LYPC's adipic acid plant.

Parameter	Value	Reference
$Q\_Steam\_p_y$	10,712.636t	Appendix 12
E_Steam_y	0.2624 kg-CO_2/kg-steam	Appendix 13

Calculation of baseline emissions

The amount of baseline emissions in the given period y (measured in t CO_2 eq.) is rounded down in t CO_2 eq. to get conservative consistency of final calculation of emission reductions formula.

Parameter	Value	Reference
BE_y	3,751,901t CO2 eq.	Calculated
$Q\_N_2O_y$	12,093.840t	Appendix 9
GWP_N_2O	310 kgCO2/kg N2O	Kyoto Protocol Decision 2/CP.3
$Q\_Steam\_P_y$	10,712.636t	Appendix 12
$E\_ Steam_y$	0.2624 kg-CO2/kg-steam	Appendix 13

9.2. Calculation of project emissions

The emissions due to the decomposition process PE_y are the sum of the emissions due to the N_2O that has not been sent to the decomposition process and the emissions due to the N_2O non destroyed by the decomposition process.

$$PE_y = Q\_ N_2O\_by\text{-}pass_y \times GWP\_ N_2O + ND\_ N_2O_y \times GWP\_ N_2O$$

$$PE_y = (Q\_ N_2O\_by\text{-}passy + ND\_ N_2O_y) \times GWP\_ N_2O$$

Calculation of $Q\_ N_2O\_by\text{-}pass_y$

The close time of the position switch on the bypass valve and the production time of the adipic acid

are monitored and the quantity of N_2O that by-pass the decomposition facility is registered daily:

$Q\_N_2O\_by\text{-}pass_d = (Q\_ N_2O \times (1\text{-}\%\_on\text{-}line))_d$

The quantity of N_2O that by-passed the decomposition facility over the period is:

$Q\_ N_2O\ \_by\text{-}pass_y = \sum Q\_N_2O\_by\text{-}pass_d$

The $\%\_on\text{-}line_y$ equivalent over the period is calculated as:

$\%\_on\text{-}line_y = 1\text{-} (Q\_ N_2O\ \_by\text{-}pass_y / Q\_N_2O_y)$

Parameter	Value	Reference
$Q\_N_2O\_by\text{-}pass_y$	67.501t	Appendix 5
$Q\_N_2O_y$	12,093.840t	Appendix 9
$\%\_on\text{-}line_y$	99.44%	Appendix 4

Calculation of $ND\_ N_2O_y\_$

The non-destroyed N_2O ($ND\_ N_2O_y$) is constantly monitored and obtained from the constant monitoring of the flow (Q_GE) and the concentration of N_2O (N_2O_GE) of the effluent gas:

$ND\_ N_2O_i = Q\_GE_i \times N_2O\ \_GE_i \times Specific\_gravity\_of\_ N_2O$

The quantity of N_2O that non-destroyed by the decomposition facility over the period is:

$ND\_ N_2O_y = \sum ND\_ N_2O_i$

The N_2O _GE equivalent over the period is calculated as:

$N_2O\ \_GE = ND\_ N_2O_y / Q\_GE / Specific\_gravity\_of\_ N_2O$[3]

Parameter	Value	Reference
Q_GE	60,140,905Nm^3	Appendix 1
N_2O_GE	289ppm	Appendix 2
$ND\_ N_2O$	34.142t	Appendix 3

Calculation of project emissions

The emissions due to the decomposition process PE_y is rounded up in t CO_2 eq. to get conservative consistency in final calculation of emission reductions formula.

Parameter	Value	Reference
PE_y	31,510t CO_2 eq.	Calculated
$Q\_N_2O\_ by\text{-}pass_y$	67.501 t	Appendix 5
$ND\_ N_2O$	34.142t	Appendix 3
GWP_N_2O	310 $kgCO_2/kg\ N_2O$	Kyoto Protocol Decision 2/CP.3

9.3. Calculation of leakage

[3] The $specific\_gravity\_of\_ N_2O = 44 / 22.414 \times 10^{-6}$ is used to transform ppm in kg/Nm^3.

Leak emissions comprise the emissions associated with electricity used by the decomposition plant.

Leakage amounts to:

L_y = Q_Power × E_Power

The Q_Power consumed by this project activity is monitored constantly, and the emission factor E_Power is obtained according to the latest data provided by the Chinese DNA of CDM, NDRC.

L_y is rounded up in tCO_2 eq. to get conservative consistency in final calculation of emission reductions formula.

Parameter	Value	Reference
L_y	1,982t CO_2 eq.	Calculated
Q_Power	1,577,577kWh	Appendix 14
E_Power	1.2561 kg-CO_2/kWh	Appendix 15

9.4. Calculation of emission reduction

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

$ER_y = BE_y – PE_y – L_y$

Or,

ER_y =**3,751,901** t CO_2 eq. –**31,510** tCO_2 eq. –**1,982** tCO_2 eq.

Or,

ER_y =**3,718,409** t CO_2 eq.

The above emission reduction covers the period from December 1st, 2009 to March 13th, 2010.

9.5. Compared with the ERs estimated in the registered PDD

The accumulated emission reductions achieved by this project in this second crediting year (14/03/2009- 13/03/2010) is recorded as:

Monitoring Periods	Emission reductions achieved in each monitoring period (t CO_2 eq.)	The accumulated emission reductions achieved in this crediting year (t CO_2 eq.)
March 14th, 2009–August 31st,2009	5,983,756	5,983,756
September 1st, 2009–November 30th, 2009	3,194,801	9,178,557
December 1st, 2009 –March 13th, 2010	3,718,409	12,896,966

As shown in the above table, the accumulated emission reductions achieved by this project in this crediting year (14/03/2009- 13/03/2010), 12,896,966t CO_2 eq., is above the annual estimation of emission reductions of 10,017,235 t CO_2 eq. as shown in section A.4.4 of the registered PDD.

It is because conservative values were applied to estimate the emission reductions in the registered PDD in " Section B.6.3 Ex-ante calculation of emission reductions", in particular the amount of adipic acid, %_on-line, and the destruction rate (performance efficiency) of the N_2O abatement unit.

(1) The accumulated P_AdOH in the second crediting year (14/03/2009-13/03/2010) is 156,290.000t, all of which are eligible to be credited, as stated in Section 9.1 and Appendix 6 of this monitoring report. The accumulated P_AdOH credited for the second project year is greater than the conservative value of 140,000 t applied in Section B.6.3 of the registered PDD while it is still within the cap determined as per the guidance provided by EB48 as stated in Section 9.1;

(2) The actual % on-line for the second crediting year (99.59%) and for this monitoring period (99.44%, see Appendix 4 to this monitoring report) are above the conservative value of 90% applied in Section B.6.3 of the registered PDD; and

(3) The actual average destruction rate achieved for the second crediting year (99.09%) and for this monitoring period (99. 75%) are above the conservative value of 95% applied in Section B.6.3 of the registered PDD.

Details as below:

Item	**Annual values applied in ex-ante calculation of Section B.6.3 of the registered PDD**	**Credited values in the second crediting year (14/03/2009-13/03/2010)**	**Comments**
P_AdOH (t)	140,000	156,290.000	Parameters associated with Baseline Emissions (BE)
Q_Steam (t)	31,152	37,131	
E_Steam (CO_2e/t-steam)	0.27	0.2641 (14/03/2009-31/08/2009) 0.2624 (01/09/2009-13/03/2010)	
%_on-line	90%	99.59%	Parameters associated with Project Emissions (PE)
Q_N_2O_by-pass (t)	3,780	174.453	
Destruction Rate (%)	95%	99.09%	
ND_N2O (t)	1,701	430.088	
Q_power (kwh)	8,400,000	5,467,357	Parameters associated with Leakage (L)
E_power (kgCO_2/kWh)	1.1983	1.2561	
Emission Reductions (t CO_2e)	10,017,235	12,896,966	

As stated in Section 9.1 of this monitoring report, this monitoring period is the last monitoring period in the second crediting year (14/03/2009-13/03/2010). The accumulated P_AdOH by the end of this monitoring period in the second crediting year, 156,290.000 t, is below the cap of adipic acid production, 158,835.992 t/y, which is calculated according to the clarification made in EB48 (see Section 9.1 and Appendix 6). Hence, both P_AdOH and emission reductions achieved in this monitoring period can be fully credited.

Appendix 1

Name of item	Q_GE
Description	Volume of effluent gas
Value in period	60,140,905Nm^3
Method of monitoring	Annubar flow meter
Recording frequency	Monthly
Background data	Data Acquisition System (DAS)/ Log sheet record / Annubar flow meter

This parameter is measured continuously by an Annubar flow meter, the readings of the Annubar flow meter is the flow under standard temperature and pressure (STP) (0℃ and 1 atm) after technological processing, temperature and pressure supplementary. The Distributed Control System (DCS) and DAS are recording every reading of the flow rate.

The DAS records the accumulated volume per second and the difference of the two adjacent accumulated volume as the actual volume in the same second is then multiplied with the corresponding N2O concentration (N2O_GE) and the specific gravity of N2O to get the ND_N2O in the said interval, the latter is then accumulated, giving the periodic ND_N2O.

Hence, the reporting of monthly total of Q_GE is only for information as it is the values of each second are actually used in the data processing for ND_N2O, the constant calculation of ND_N2O is more accurate.

Period	Q_GE (Nm^3)
December 1st –December 31st, 2009	17,067,930
January 1st–January 31st, 2010	19,052,563
February 1st–February 28th, 2010	16,136,840
March 1st–March 13th, 2010	7,883,572
December 1st, 2009 –March 13th, 2010	60,140,905

Appendix 2

Name of item	N_2O_GE
Description	Concentration of N_2O in the effluent gases
Value in period	289ppm
Method of monitoring	Online Gas Chromatography
Recording frequency	Monthly
Background data	DAS / Log sheet record
Calculation method	This parameter is measured continuously by an online gas chromatograph (GC). The DCS and DAS are recording every analysis of the online GC. The DAS records concentration per second, and the concentration (N_2O_GE) in the same second is then multiplied with the corresponding N_2O volume (Q_GE) and the specific gravity of N_2O to get the ND_N_2O in the said interval, i.e.:

$$ND\_N_2O_i = Q\_GE_i \times N_2O\_GE_i \times Specific\_gravity\_of\_N_2O$$

The analyzer has a detection limit of 10ppm, which is used as a default value when the measured is below the detection limit.

The specific_gravity_of_ N_2O = 44 / 22.414 × 10^{-6} is used to transform ppm in kg/Nm^3.

ND_ N_2O_i is then accumulated, giving the periodic ND_N_2O.

At the end of the month/period, based upon the flow Q_GE (see Appendix 1) and ND_ N_2O (see Appendix 3), the concentration of N_2O equivalent for the month/period is calculated.

Hence, the reporting of monthly total of monthly N_2O_GE is only for information as it is the values of each second interval are actually used in the data processing for ND_N_2O, the constant calculation of ND_N_2O is more accurate.

Period	**ND_N_2O (t)**	**Q_GE (Nm^3)**	**N_2O_GE in average (ppm)**
December 1st –December 31st, 2009	10.302	17,067,930	307
January 1st–January 31st, 2010	12.440	19,052,563	333
February 1st–February 28th, 2010	7.361	16,136,840	232
March 1st–March 13th, 2010	4.039	7,883,572	261
December 1st, 2009 –March 13th, 2010	34.142	60,140,905	289

Appendix 3

Name of item	ND_N_2O
Description	Quantity of non-destroyed N_2O emitted by the decomposition facility
Value in period	34.142t
Method of monitoring	calculation
Recording frequency	Monthly
Background data	DAS / Log sheet record
Calculation method	The DAS records the accumulated volume (as shown in Appendix 1) and the concentration (ppm) (as shown in Appendix 2) at an interval of one second, and the difference of the two adjacent accumulated volume as the actual volume (Q_GE) in this interval is then multiplied with the corresponding N_2O concentration (N_2O_GE) and the specific gravity of N_2O to get the ND_N_2O in the said interval, i.e.:

ND_ N_2O = Q_GE × N_2O _GE × Specific_gravity_of_ N_2O
The specific_gravity_of_ N_2O = $44 / 22.414 \times 10^{-6}$ is used to transform ppm in kg/Nm^3.

ND_ N_2O_i is then accumulated, giving the periodic ND_N_2O. The accumulated ND_N_2O is recorded.

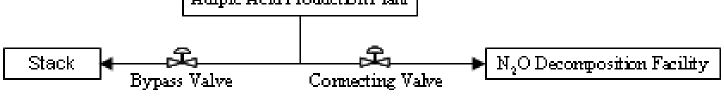
Period	**ND_ N_2O (t)**
December 1st –December 31st, 2009	10.302
January 1st–January 31st, 2010	12.440
February 1st–February 28th, 2010	7.361
March 1st–March 13th, 2010	4.039
December 1st, 2009 –March 13th, 2010	34.142

Appendix 4

Name of item	%_on-line
Description	% of production time the position switch on the bypass valve is closed
Value in period	99.44%
Method of monitoring	Position switch on bypass valve[4]
Recording frequency	Monthly
Background data	DAS / Log sheet record
Calculation method	Based upon the position of the position switch on the bypass valve of the decomposition facility, the % of time that the close time of the position switch (TIME002) in the production time of adipic acid (TIME001) is counted, TIME001 and TIME002 are counted and archived in the DAS. It is set in the DAS that the counting of TIME002 can only be active when the TIME001 is running. The daily %_on-line $_y$ is recorded and used to calculate daily Q_ N_2O _by-pass as Q_N_2O_by-pass$_d$ = (Q_ N_2O × (1-%_on-line))$_d$. Q_N_2O_by-pass$_d$ is then accumulated, giving the periodic Q_ N_2O _by-pass (See Appendix 5). At the end of the period, %_on-line for the period is calculated as: %_on-line $_y$ = 1- (Q_ N_2O _by-pass$_y$ / Q_N_2O_y) Hence the reporting of monthly equivalent %_on-line is only for information as it is the daily values which are actually used in the data processing for Q_N_2O_by-pass.

Period	**Q_N_2O_by-pass$_y$ (t)**	**P_AdOH$_y$ (t)**	**%_on-line $_y$ (%)**
December 1st –December 31st, 2009	67.501	12,943.000	98.07
January 1st–January 31st, 2010	0.000	13,665.000	100.00
February 1st–February 28th, 2010	0.000	12,321.500	100.00
March 1st–March 13th, 2010	0.000	5,862.500	100.00
December 1st, 2009 –March 13th, 2010	67.501	44,792.000	99.44

[4] There is only one flow connecting to the N_2O decomposition facility and one flow by-passing the decomposition facility (as shown in the below figure), during certain situation of the operation of the project activity, the connecting valve and the bypass valve may be opened together; on the other hand, it is interlocked set that when the connecting valve is closed, the bypass valve is open, which means the close time of the bypass valve is shorter than or equal to the open time of the connecting valve. Therefore, it gives a less %_on-line through monitoring the close time of the bypass valve as the operation time of the decomposition facility, therefore, it is more appropriate to monitor the close time of the position switch on the bypass valve.



Appendix 5

Name of item	Q_N_2O_by-pass
Description	N_2O by-passing the decomposition facility
Value in period	67.501t
Method of monitoring	Production record and %_on-line DCS monitoring
Recording frequency	Monthly
Background data	Production & %_on-line log sheet record
Calculation method	The close time of the position switch on the bypass valve and the production time of the adipic acid are monitored by Distributed Control System (DCS), and are recorded daily in DAS, and the quantity of N_2O that by-pass the decomposition facility, see Appendix 4, is registered daily: $Q\_N_2O\_by\text{-}pass_d = (Q\_ N_2O \times (1\text{-}\%\_on\text{-}line))_d$ The quantity of N_2O that by-passed the decomposition facility over the period is: $Q\_ N_2O\ \_by\text{-}pass_y = \sum Q\_N_2O\_by\text{-}pass_d$

Period	Q_N_2O_by-pass$_y$ (t)
December 1st –December 31st, 2009	67.501
January 1st–January 31st, 2010	0.000
February 1st–February 28th, 2010	0.000
March 1st–March 13th, 2010	0.000
December 1st, 2009 –March 13th, 2010	67.501

Appendix 6

Name of item	P_AdOH
Description	Adipic acid production
Value in period	44,792.000t
Method of monitoring	The production record of adipic acid
Recording frequency	Monthly
Background data	log sheet record The production of adipic acid is measured by the Automatic quota packaging machine.

Period	P_AdOH (t)
December 1st –December 31st, 2009	12,943.000
January 1st–January 31st, 2010	13,665.000
February 1st–February 28th, 2010	12,321.500
March 1st–March 13th, 2010	5,862.500
December 1st, 2009 –March 13th, 2010	44,792.000

The accumulated adipic acid produced in this second crediting year (14/03/2009–13/03/2010) is recorded as:

Monitoring Period	P_AdOH in each monitoring period (t)	Accumulated P_AdOH in this crediting year (t)
March 14th, 2009–August 31st,2009	73,046.000	73,046.000
September 1st, 2009—November 30th, 2009	38,452.000	111,498.000
December 1st, 2009 –March 13th, 2010	44,792.000	156,290.000

This monitoring period is the last monitoring period in the second crediting year (14/03/2009-13/03/2010). By the end of this monitoring period, the accumulated P_AdOH in the second crediting year, 156,290.000 t, is below the cap of adipic acid production, 158,835.992 t/y, which is calculated according to the clarification made in EB48. Hence, P_AdOH achieved in this monitoring period can be fully credited.

Appendix 7

Name of item	HNO_3_consumption
Description	Nitric acid consumption in the adipic acid production process
Value in period	41,496.483t
Method of monitoring	Using measuring equipment to measure the amount of HNO_3 consumed during the production.
Recording frequency	Monthly
Background data	DAS / Log sheet record

The HNO_3 consumed in the AdOH production process is supplied by two separate HNO_3 plants of LYPC (Plant 1 and Plant 2 in following text).

Aiming at better monitor, the monitoring method of HNO3 from plant 2 became the same with the monitoring method of HNO3 from plant 1 from the very beginning of eighth monitoring period.

HNO_3 from Plant 1 and Plant 2 are both measured through flow meter for the gross mass and through standard titration instruments for the concentration. The daily flow data of HNO_3 (t) is recorded in DAS, it is then multiplied with the corresponding daily concentration to get the daily pure HNO_3_consumption (t).

The daily quantity of the two plants is summed up and aggregate monthly. Cumulated value for HNO_3_consumption is recorded.

Period	**HNO_3_consumption(t)**
December 1st –December 31st, 2009	12,114.859
January 1st–January 31st, 2010	12,452.025
February 1st–February 28th, 2010	11,533.591
March 1st–March 13th, 2010	5,396.008
December 1st, 2009 –March 13th, 2010	41,496.483

Appendix 8

Name of item	HNO_3_physical
Description	Nitric acid physical losses in the adipic acid production process
Value in period	1,275.478t
Method of monitoring	Excel workbook based on the monitoring data and analysis
Recording frequency	Monthly
Background data	DAS /Log sheet record

HNO_3_physical is the sum of the following losses:
• nitrates contained in the aqueous waste (monitored for waste water regulation);
• nitrates in the by-products (glutaric acid, succinic acid) (monitored for quality);
• nitrates in the adipic acid production (monitored for quality control);
• NOx in the reaction off gases (monitored for air regulation)

The flow of the aqueous waste, the production of the by-products and the flow of the reaction off gases are measured by the flow meters; The production of the adipic acid is measured by the counting mechanism during the production package of the adipic acid; the concentration of the nitrates contained in the aqueous waste, the concentration of the nitrates in the by-products and the concentration of the nitrates in the adipic acid production are analyzed in lab daily; The concentration of the NOx in the reaction off gases is analyzed by infra-red online analyzer.
The daily flow data is recorded in DAS, it is then multiplied with the corresponding daily concentration data and converted to the daily HNO_3 loss equivalent to calculate the HNO_3_physical daily.
Cumulated value for HNO_3_physical is recorded.

Period	HNO_3_physical (t)
December 1st –December 31st, 2009	290.479
January 1st–January 31st, 2010	422.094
February 1st–February 28th, 2010	389.014
March 1st–March 13th, 2010	173.891
December 1st, 2009 –March 13th, 2010	1,275.478

Appendix 9

Name of item	N_2O _/AdOH
Description	N_2O emission factor for adipic acid production
Value in period	0.27 kg N_2O / kg AdOH
Method of monitoring	Adipic acid production, nitric acid consumption and physical losses
Recording frequency	Monthly
Background data	log sheet record
Calculation method	Nitric acid physical losses (HNO_3_physical) in the aqueous waste, the off gases, the adipic acid and the by-product are monitored. Those losses are deducted from the nitric acid consumption (HNO_3_consumption) to get the chemical consumption (HNO_3_chemical). The actual N_2O emission factor is then calculated over the period: N_2O_/AdOH = HNO_3_chemical / P_AdOH / 63 /2 × 0.96 × 44 This value is capped by a value of KE_N_2O = 0.27, as specified in the PDD table B.6.1 and required by the methodology AM0021.

Period	HNO_3_consumption (t)	HNO_3_physical (t)	N_2O_produced[5] (t)	P_AdOH (t)	Actual N_2O_/AdOH (kg N_2O/ kg AdOH)	KE_N_2O (kg N2O/kg AdOH)	N_2O_/AdOH (kg N_2O/kg AdOH)	Q_N_2O[6] (t)
December 1st –December 31st, 2009	12,114.859	290.479	3,963.983	12,943.000	0.306	0.27	0.27	3,494.610
January 1st–January 31st, 2010	12,452.025	422.094	4,032.891	13,665.000	0.295	0.27	0.27	3,689.550
February 1st–February 28th, 2010	11,533.591	389.014	3,736.087	12,321.500	0.303	0.27	0.27	3,326.805
March 1st–March 13th, 2010	5,396.008	173.891	1,750.652	5,862.500	0.299	0.27	0.27	1,582.875
December 1st, 2009 –March 13th, 2010	41,496.483	1,275.478	13,483.613	44,792.000	0.301	0.27	0.27	12,093.840

5 N_2O_produced = P_AdOH× Actual N_2O_/AdOH = P_AdOH × (HNO_3_chemical / P_AdOH /63 /2 × 0.96 × 44).
6 The quantity of N_2O to be credited, Q_N_2O = P_AdOH × N_2O_/AdOH

Appendix 10

Name of item	Q_N_2O reg , N_2O_reg / AdOH and r_y
Description	Evolution of Chinese legislation that may require limitation of N_2O emissions using one of the following criteria: - Q_N_2O reg : allowed N_2O emissions - N_2O_reg / AdOH : allowed N_2O emissions per kg of adipic acid produced - r_y : share of N_2O emissions required to be destroyed
Value in period	not applicable
Method of monitoring	Survey
Recording frequency	When relevant
Background data	Chinese legislation The department of LYPC, which governing the environmental protection, consults the local government departments in charge of the environment periodically, and surveys the official websites of National Development and Reform Commission, Ministry of Environmental Protection of People's Republic of China and the other authorities, it is found that no evolution of legislation since PDD issued.

Period	Q_N_2O reg (kg)	N_2O_reg / AdOH (kg)	r_y (%)
December 1st, 2009 –March 13th, 2010	No limit	No limit	0

Appendix 11

Name of item	P_N_2O
Description	Market price of N_2O in waste gas
Value in period	0 $/t
Method of monitoring	Market Survey
Recording frequency	Yearly
Background data	It needs a very high investment cost in a purification-concentration-liquefaction unit to extract the N_2O from the exhaust flow of the adipic acid plant, and neither the process nor the product will get the necessary certifications for pharmaceutical and food markets, there is no economic feasibility to do so. And there is no market for this low level of N_2O concentration. Therefore, it can be concluded that there is no N_2O market for the N_2O produced as by-product of adipic acid.

Period	P_N_2O ($/t)
2009	0
2010	0

Appendix 12

Name of item	Q_Steam_p
Description	Amount of steam produced by the decomposition facility
Value in period	10,712.636t
Method of monitoring	Flowmeter
Recording frequency	Monthly
Background data	DAS / Log sheet record The parameter is measured continuously by steam meter and accumulated data is recorded in the DAS.

Period	Q_Steam_p (t)
December 1st –December 31st, 2009	2,952.548
January 1st–January 31st, 2010	3,128.416
February 1st–February 28th, 2010	3,028.400
March 1st–March 13th, 2010	1,603.272
December 1st, 2009 –March 13th, 2010	10,712.636

Appendix 13

Name of item	E_Steam
Description	CO_2 emission factor for steam produced by the facility
Value in period	0.2624 kg-CO_2/kg-steam
Method of monitoring	Supplier data
Recording frequency	Yearly
Background data	the data of Liaoyang Petrochemical Company Thermal Power Plant
Calculation method	Calculated according to the PDD. The standard coal consumption in 2009 according to the data of Liaoyang Petrochemical Company Thermal Power Plant is: 0.0911kg-ce/kg-steam; Coal equivalent (standard coal): 29.3 MJ (The national standard of the people's republic of China—General principles for calculation of total production energy consumption (GB2589-90)); GHG Emission Factor: 0.0983 kg-CO_2/MJ (IPCC default, IPCC publication 1997). Thus, E_Steam_y = 0.0911 ×29.3× 0.0983= 0.2624 (kg-CO_2/ kg-steam) The yearly value of E_Steam is calculated with the latest data provided by the steam supplier.

Period	Standard coal consumption (kg-ce/kg-steam)	Coal equivalent (standard coal) (MJ)	GHG Emission Factor (kg-CO_2/MJ)	E_Steam_y (kg-CO_2/kg-steam)
2009	0.0911	29.3	0.0983	0.2624

Appendix 14

Name of item	Q_Power
Description	Electricity consumption by the decomposition facility
Value in period	1,577,577kWh
Method of monitoring	Electricity meter
Recording frequency	Monthly
Background data	Log sheet record/ counter This parameter is measured continuously by electricity meters and accumulated data is recorded in the DAS.

Period	Q_Power (kWh)
December 1st –December 31st, 2009	459,378
January 1st–January 31st, 2010	475,322
February 1st–February 28th, 2010	436,177
March 1st–March 13th, 2010	206,700
December 1st, 2009 –March 13th, 2010	1,577,577

Appendix 15

Name of item	E_ Power
Description	CO_2 intensity for electric generation
Value in period	1.2561 kg-CO_2/kWh
Method of monitoring	Survey of data publication
Recording frequency	Yearly
Background data	Chinese Electric Almanac and Chinese Energy Statistical Yearbook.
Calculation method	The Chinese DNA of CDM, NDRC (National Development and Reform Commission), has calculated the operating margin (OM) and the build margin (BM) according to ACM0002 for all the grids in China, and published the data. NDRC updated the emissions factors for the Grids in China on 02/07/2009, which is shown on the website of http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2333.pdf. For North East China Grid, OM=1.1293 kg-CO_2/kWh, BM=0.7242 kg-CO_2/kWh. OM is applied as E_Power for this project out of conservative. Nevertheless, the previous value of E_ Power is still applied for this project out of conservative due to the new value is lower than the previous one, which is 1.2561 kg-CO_2/kWh.

Period	**E_Power (kg-CO_2/kWh)**
December 1st, 2009 –March 13th, 2010	1.2561