VERIFICATION / CERTIFICATION REPORT

"CHUANHUA N2O ABATEMENT PROJECT" IN CHINA

UNFCCC Registration Ref. No. 1781

Monitoring and Reporting Period:
24 October 2008 to 15 November 2009

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DET NORSKE VERITAS

VERIFICATION/CERTIFICATION REPORT

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Client: EcoSecurities Group PLC	Client ref.: Jose Castro

DET NORSKE VERITAS CERTIFICATION AS

Climate Change Services

Veritasveien 1,
1322 HØVIK, Norway
Tel: +47 67 57 99 00
Fax: +47 67 57 99 11
http://www.dnv.com
Org. No: NO 945 748 931 MVA

Summary:

Det Norske Veritas Certification AS (DNV) has been contracted by EcoSecurities Group PLC (Ecosecurities) to carry out verification and certification of emission reductions generated by the "Chuanhua N_2O Abatement Project" in China for the period 24 October 2008 to 15 November 2009.

In our opinion, the GHG emission reductions reported for the period of 24 October 2008 to 15 November 2009 in the Monitoring Report of 25 May 2010 for the "Chuanhua N2O Abatement Project" in China are fairly stated. The verification report was revised to incorporate clarifications as requested in the request for review received 08 November 2010.

The GHG emission reductions were calculated correctly on the basis of the approved monitoring methodology (AM0034, version 02) and the monitoring plan and formulae given in the registered Project Design Document. The emission factors for the baseline campaign and project campaign are correctly applied. As a consequence, DNV is able to certify that the emission reductions from the "Chuanhua N2O Abatement Project" during the period of 24 October 2008 to 15 November 2009 amount to 173 130 tCO_2 equivalents.

Report No.: 2010-0137	Subject Group: Environment	
Report title: Periodic Verification of Chuanhua N2O Abatement Project in China		
Work carried out by: Cuiping Deng, Lin Wu, Wang Guolian		
Work verified by: Rafi-ud-Din Khawaja		
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Abbreviations

AMS	Automated Measuring System
AST	Annual Surveillance Test
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction(s)
CL	Campaign Length
CO_2	Carbon dioxide
CO_{2e}	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
NCSG	N_2O Concentration in the Stack Gas
N_2O	Nitrous oxide
NO_X	Nitrogen-oxide
PDD	Project Design Document
QAL	Quality Assurance Level
QMS	Quality Management System
SRM	Standard Reference Method
UNFCCC	United Nations Framework Convention for Climate Change
VSG	Volume flow rate of the Stack Gas

1 INTRODUCTION

1.1 Objective

EcoSecurities Group PLC (Ecosecurities) has commissioned Det Norske Veritas Certification AS (DNV) to carry out the verification and certification of emission reductions reported for the "Chuanhua N2O Abatement Project" for the period of 24 October 2008 to 15 November 2009. However, the period of claimed emission reductions is from 18 March 2009 to 15 November 2009 since the period from 24 October 2008 to 17 March 2009 was included in the baseline campaign. The baseline monitoring operated from 23 August 2008 to 17 March 2009 (for further details see section 1.3 below). This report contains the findings from the verification and a certification statement for the certified emission reductions.

Verification is the periodic independent review and ex-post determination by the Designated Operation Entity (DOE) of the monitored reductions in the GHG emissions that have occurred as a result of the registered CDM project activity during a defined verification period.

Certification is the written assurance by a DOE that, during a specific period in time, a project activity achieved the emission reductions as verified.

1.2 Scope

The scope of the verification is:

- To verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan.
- To evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement.
- To verify that the reported GHG emission data is sufficiently supported by evidence, i.e. monitoring records.

The verification shall ensure that the reported emission reductions are complete and that sufficient evidence is provided in order to give reasonable assurance that the amount of calculated GHG emission reductions is fairly stated.

1.3 Description of the Project Activity

Project Parties:	*China (host), the United Kingdom of Great Britain and Northern Ireland*
Title of project activity:	*Chuanhua N2O Abatement Project*
UNFCCC registration No:	*1781*
Crediting period:	*24 October 2008 - 23 October 2015 (Renewable)*
Project entity:	*Sichuan Chemical Co. Ltd.* *Tuanjie Road 311, Dawai, Chengdu City, Sichuan Province, P.R China. Mr. Zhang Yu (scwdizy@163.com), Tel: +86-28-89300058*

Location of the project activity: Tuanjie Road 311, *Dawai, Chengdu City, Sichuan Province, P.R China*

The project involves the installation of a secondary N_2O catalyst inside the ammonia oxidation reactor (one burner) just beneath the precious metal catalyst gauze catalyst. The De-N_2O catalyst is selective and promotes the decomposition of N_2O to nitrogen and oxygen.

The supplier of the secondary catalyst is Johnson Matthey PLC and the abatement efficiency for the second catalyst was expected to be 80% according to an agreement between the supplier and EcoSecurities Group PLC that was signed on 26 February 2007 /3/.

The baseline campaign operated from 23 August 2008 to 17 March 2009. The project proponent experienced some problems with the operation of the AMS after the installation, however these problems were solved prior to the start of the baseline campaign.

The project campaign operated from 18 March 2009 to 15 November 2009. However, the abatement secondary catalyst was installed on 17 May 2009 later than the date of the primary catalyst installation on 18 March 2009. This was confirmed to be due to market supply reason of the catalyst during site visit /34/ /35/.

The project started operation (start of project campaign) on 18 March 2009 and the date of registration of the CDM project activity is 24 October 2008. The monitoring period is from 24 October 2008 to 15 November 2009. The emission reductions for this monitoring period equate to 173 130 tonne CO_2 equivalents.

2 METHODOLOGY

The verification of the emission reductions has assessed all factors and issues that constitute the basis for emission reductions from the project. As the CDM Executive Board has not yet formally endorsed the application of any materiality principle for verification of emission reductions from CDM projects - implying that emphasis should be on the significant contributors to emission reductions - DNV checked all factors and issues with the same emphasis. In addition, other areas that can have an impact on reported emission reductions have also undergone detailed audit testing. All relevant records of data from the De-N_2O system and records from the production logs of the nitric acid production have been examined and verified for the reporting period.

To perform the verification of the reported emissions reductions from the “Chuanhua N2O Abatement Project”, the following activities were performed:

- Review of project documentation;
- On-site inspections, including the review of performance records, interviews with project participants, observation of collection of measurements, established practices and testing of the accuracy of monitoring equipment;
- Review of monitoring results and verification of the correct application of the monitoring plan;
- Determination of the emissions reductions.

Data from other sources, such as

- the calibration certificates and QAL1/QAL2 reports issued by supplier and qualified third-parties respectively according to EN 14181 and EN ISO 14956,
- National regulation on N_2O/ NOx emissions,

- the guaranteed composition analysis report of production gauze used, and
- the original design and operational criteria for the nitric acid plant has also been assessed.

Verification team

				Type of involvement					
Role/Qualification	***Last Name***	***First Name***	***Country***	Desk review	Site visit	Reporting	Supervision of work	Technical review	Expert input
Project manager/CDM verifier/sector expert	Deng	Cuiping	China	✓	✓	✓	✓		✓
GHG auditor	Lin	Wu	China	✓	✓				
GHG auditor (applicant)	Wang	Guolian	China	✓	✓				
Technical reviewer	Khawaja	Rafi-ud-Din	Norway					✓	

Duration of verification

Preparations: *28 -29 December 2009*

On-site verification: *From 30 December 2009 to 31 December 2009*

Reporting, resolution of CARs and QA/QC: *From 4 January 2010 to 20 May 2010*

2.1 Review of Documentation

The basis for the verification has been the monitoring report version 1 dated 16 December 2009 and version 2 dated 25 May 2010 /1/ for the period from 24 October 2008 to 15 November 2009, and the registered project design document (PDD) /25/ and validation report /26/, the approved baseline and monitoring methodology applied by the project, AM0034 /24/ version 2. The project operator has in addition supplied the verification team with procedures from its management system as well as other documentation and spreadsheets with all data necessary for verification of the emission reductions /2/ - /22/ and /27/-/32/.

2.2 Site Visits

A site visit was carried out from 30 December 2009 to 31 December 2009. The following key personnel were interviewed or assisted the verification team:

Name	**Department/Company**	**Position**
Mr. Zheng Shuping	Sichuan Chemical Co. Ltd.	General engineer
Mr. Huang Yi	Sichuan Chemical Co. Ltd.	director (nitric acid workshop)
Mr. Lian Tong	Sichuan Chemical Co. Ltd.	meter workshop
Mr Ran Yiqiang	Sichuan Chemical Co. Ltd.	nitric acid workshop
Mr Yang Zhongxian	Sichuan Chemical Co. Ltd.	nitric acid workshop

Mr Liu Jian	Sichuan Chemical Co. Ltd.	nitric acid workshop
Ms. Mou Yurong	EcoSecurities Group PLC	project manager
Mr. Steven Liu	EcoSecurities Group PLC	Head of CDM Project
Mr Li Yang	EcoSecurities Group PLC	Monitoring team
Mr Long Yi	EcoSecurities Group PLC	Monitoring team

Various other project operators were also interviewed during on site visit /34/ /35/. The interview topics were:

- Implementation of this project;
- Technical equipment and operation;
- Monitoring system management;
- Monitored method, monitoring data and devices;
- Data uncertainty;
- ER calculations; and
- Environmental Impacts.

During the site visit, the assessment team has also reviewed and inspected procedures, equipments, and meters at the plant.

2.3 Assessment

The data presented in the monitoring report was assessed by review of the detailed project documentation and production records, as well as by interviews with personnel of Sichuan Chemical Co. Ltd. And Ecosecurities, by observation of established monitoring and reporting practices and assessment of the reliability of monitoring equipment. This has enabled the verification team to assess the accuracy and completeness of the reported monitoring results; to verify the correct application of the approved monitoring methodology and the determination of the reductions in N_2O emissions.

In addition all parameters required by the monitoring methodology AM0034, version 02, and the management system were assessed during the site visit /34/ /35/.

2.4 Reporting of Findings

Findings established during the verification may be as follows:

A corrective action request (CAR) is issued, where:

i. Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
ii. Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
iii. Issues identified in as a FAR during validation have not been resolved by the project participants.

A clarification request (CL) shall be raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

A forward action request (FAR) is issued for actions if the monitoring and reporting require attention and/or adjustment for the next verification period.

Three CLs were raised at this first verification. The project participants adequately addressed the CLs raised.

3 VERIFICATION FINDINGS

This section summarises the findings from the verification of the emission reductions reported for the project "Chuanhua N_2O Abatement Project" for the period 24 October 2008 to 15 November 2009. The verification findings relate to the project implementation as documented and described in the monitoring report of 25 May 2010.

3.1 Remaining Issues, CARs, FARs from Validation or Initial Verification

This is the first periodic verification and there are no remaining issue from validation.

3.2 Project Implementation

The nitric acid production facilities at the site were originally designed by the No. 8 Design Engineering Institute of the Chinese Ministry of Chemical Industry (later Chengda Engineering Co. Ltd.) for the Sichuan Chemical Factory (later Sichuan Chemical Co. Ltd.) in 1979 and installed and operated since 1980 /32/. A new oxidation reactor was designed by the Design Engineering Institute of the Sichuan Chemical Co. Ltd. In 1996 and was installed in 2000. The design capacity is 270 metric tonnes of HNO_3 (100%) per day which corresponds to 98 550 metric tonnes of HNO_3 (100%) per year (365 days) 27/.
The existing production unit at Sichuan Chemical Co. Ltd.'s nitric acid plant is a single pressure (medium reaction pressure) plant which began commercial operations in 2000 with the new reactor.

The primary catalyst installed for ammonia oxidation in the project campaign is composed of Platinum (Pt) 93% and Rhodium (Rh) 7% supplied by ChinachemTaiyuan Precious Metal Co.,Ltd /2/. Prior to implementation of the project activity, the N_2O being the by-product generated during ammonia oxidization was released to the atmosphere from the tail gas.

As part of the CDM project activity, a secondary catalyst has been installed beneath the primary catalyst for selective abatement of N_2O to nitrogen and oxygen. The supplier of the secondary catalyst is Johnson Matthey PLC and the abatement efficiency of the secondary catalyst was expected to be 80% according to the agreement between the supplier and EcoSecurities Group PLC that was signed on 26 February 2007 /3/. However, in this project campaign, the abatement efficiency of the secondary catalyst was approximately 50% (see chapter 3.4 below for further details).

The monitoring system includes ammonia oxidation reactor process data monitoring, stack data monitoring and nitric acid data monitoring. There is no different method for process data and nitric acid data monitoring and the monitoring equipments before and after the implementation of the project activity. However, the stack data monitoring system was installed for the CDM project activity. The monitoring system installed is an Automated Measuring System (AMS), which continuously measures and records the N_2O concentration and volume flow rate in the stack gas. The AMS was supplied and installed by ADC Gas Analysis Ltd in September 2006 /4/ which was gas analyzer MGA 3000 with measurement range 0-3000 ppm and was put in normal operation on 24 July 2007. Another analyzer with a measurement range of 0-5000 ppm was installed on 27 December 2007 /4/. During this baseline campaign, it was found that the N_2O concentration in the stack was closer to 5000 ppm towards the end, which was confirmed from the monitoring records during the baseline campaign /6/. Therefore, another analyzer with a measurement range of 0-6000 ppm was installed on 6 February 2009 /4/. The project campaign was started on 18 March 2009, which

is the date when the primary catalyst was installed; however, the secondary catalyst was installed on 17 May 2009 due to market reasons. Thus, considering the reduced N_2O concentration and accuracy of monitoring system, the analyzer with a measurement range of 0-3000 ppm was installed on 5 May 2009 /4/ which was based on the expected abatement efficiency of 80%.

On-site training for operation, maintenance and calibration of the N_2O analyzer was provided by the equipment supplier /5/ on 23 June 2007. Two QAL2 tests and one AST were performed for the analyzers with measurement ranges 0-5000 ppm, 0-6000 ppm and 0-3000 ppm applied for the baseline campaign and this project campaign. The QAL 2 tests and AST were conducted by a certified laboratory (i.e. SGS Environmental Services) /11/. QAL 3 procedure including zero point and periodical span testing has been performed /15/ and verified by DNV during this verification. The CDM related procedures, which include monitoring, recording and reporting, were provided by EcoSecurities Group PLC and their implementation was verified by DNV on site.

3.3 Completeness of Monitoring

All parameters required by the monitoring methodology AM0034 version 02/24/, and the management system were assessed during the site visit /34/ /35/. DNV confirms that the monitoring of the project is complete and in accordance with the approved monitoring methodology and the monitoring plan as contained in the registered PDD for this monitoring period.

According to the clarification by EB 31 meeting, either validating or verifying DOE could undertake the task of determination of the permitted operating conditions for project activities using approved methodology AM0034. The determination of the permitted operating conditions, if done at verification, should be as per the approved methodology. Based on the validation report which was issued by SGS /26/, the determination of normal operating conditions and calculation of baseline emissions was not covered. Therefore, this task was covered in this verification activity.

Historical data and permitted operating conditions

The existing production unit at Sichuan Chemical Co. Ltd.'s nitric acid plant is a single pressure (medium reaction pressure) plant which began commercial operations in 2000 with the new reactor. So the previous five historical campaigns were selected to determine the permitted operating conditions. This is in line with AM0034 /24/ as follows:

Historic campaign 1: from 5 August 2005 to 1 March 2006;
Historic campaign 2: from 2 March 2006 to 26 August 2006;
Historic campaign 3: from 27 August 2006 to 28 March 2007;
Historic campaign 4: from 29 March 2007 to 22 November 2007;
Historic campaign 5: from 23 November 2007 to 22 August 2008.

During site visit, the production logs with five historical campaigns which are from 5 August 2005 to 22 August 2008 was provided and DNV verified the data transferred to spreadsheet with the production logs. There is no error during data transferred.

The parameters for determining the permitted operating condition includes Oxidation Temperature (OT), Oxidation Pressure (OP), and Ammonia gas Flow Rate (AFR) as well as Ammonia to air ratio (AIFR). They were determined as per AM0034 version 02 /24/.

The permitted range for temperature and pressure is determined through a statistical analysis of the historical data from five historical campaigns which was indicated in the spreadsheet /6/. All data that falls within the upper and lower 2.5% percentiles of the sample distribution was defined as abnormal and was eliminated. The permitted range of operating temperature and pressure is then assigned as the historical minimum (value of parameter below which 2.5% of the observation lie) and maximum operating conditions (value of parameter exceeded by 2.5% of observations).

The upper limits for ammonia flow and ammonia to air ratio was determined by historical maximum operating data for hourly ammonia gas and ammonia to air ratio for the previous five campaigns

The permitted operating conditions were determined as follows:

OT_{normal}	OP_{normal}	$AIFR_{max}$	AFR_{max}
837-847 ℃	0.27-0.33MPa	12.35%	4660 m^3/h

The designed parameters for operating condition were /27/:

OT	OP	AIFR	AFR
800-850 ℃	0.25-0.35 MPa	≤ 13.6%	2500-5000 m^3/h

The determined permitted operation conditions were within the specification of the facility.
The average historic campaign length (CL_{normal}) has been determined to be 43 955t HNO_3/campaign which has been confirmed from production logs /7/ during site visit /34/ /35/.

The primary catalyst for the five campaigns was supplied by Chinachem Taiyuan Precious Metals Co., Ltd. The composition of the primary catalyst in the five campaigns was verified from certificates for primary catalyst from the supplier. The primary catalyst installed in all five campaigns has a composition of 97% Pt and 3% Rh /2/.

Monitored data for baseline emissions

The baseline campaign was operated from 23 August 2008 to 17 March 2009. There were 98.5% data within permitted operating ranges in the baseline campaign.

The monitoring system provides the hourly average readings for the N_2O concentration and gas volume flow, the recording frequency for NCSG (N_2O concentration) and VSG (Volume flow rate) in the stack gas was every 2 seconds and in accordance with AM0034 /24/. The flow meter is a multi point pitot tube that measure temperature, static and dynamic pressure. The temperature and static pressure are fed into the flow meter transmitter where the flow meter does the calculation of volumetric flow at standard conditions (Nm^3/hr). This is then transmitted down the signal line (4-20 mA) to the data logger. The normalisation was checked as a part of the QAL 2 test performed by SGS (any error introduced by the T and P is covered in the QAL2 flow correction factor). The error readings and extreme values were

automatically eliminated from the output data series by this system.

The statistical evaluation has been done according to the procedure in AM0034 /24/. The process of evaluation has been documented in a spreadsheet /6/ which was verified by DNV during site visit /34/. During the baseline campaign, two gas analyzers were applied with a measurement range 0-5000 ppm and 0-6000 ppm respectively. Two QAL2 reports were carried out by SGS Environmental Services /11 The detailed information is provided in the following table and has been verified by DNV by review of the QAL 2 reports /11/:

Analyzer with a measurement range 0-5000 ppm (installed 27 December 2007)	Analyzer with a measurement range 0-6000 ppm (installed 6 February 2009)
From 27 December 2007 to 6 February 2009	From 7 February 2009 to 17 March 2009
Correction factor for NCSG: 0.969	Correction factor for NCSG: 0.997
Correction factor for VSG: 1.166	Correction factor VSG:1.129
The overall uncertainty of the used measurement system: ±4.76%*	The overall uncertainty of the used measurement system: ±4.41%

*) For simplification and conservativeness, the overall uncertainty of 4.76% was applied through out the baseline campaign to calculate $EF_{BL.}$

After applying the correction factors by QAL2, the average values of NCSG and VSG are 6 083 mgN_2O/Nm^3 and 34 360 Nm^3/h, respectively. After applying the statistics according to AM0034 V2 /24/, the mean value of N_2O concentration and gas volume flow have been calculated to be 6174 mgN_2O/Nm^3 and 34 553 Nm^3/h, respectively.
As mentioned in the monitoring report, more than 98.5% of the measured values during the baseline campaign were within permitted operating ranges which have been verified by DNV. According to AM0034 /24/, at least 50% of the data should be within the normal operating ranges in order to accept the baseline campaign. Hence, the baseline campaign is valid and can be used for determining the baseline emission factor.
The primary catalyst applied in the baseline campaign was supplied by Chinachem Taiyuan Precious Metals Co., Ltd which is the same as in the previous five historical campaigns, and the composition of the primary catalyst in the baseline campaign is also the same as the composition used in the historical campaigns as follows: 93% Pt and 7 % Rh /2/.

The nitric acid production is measured by a volume flow meter. According to AM0034, version 2, the total operation hours and total nitric acid production within this campaign was used for baseline emission factor calculation. The total nitric acid production within the baseline campaign is 45 217 t 100% HNO_3 which is higher than the CL_{normal} (43 955 t HNO_3), thus N_2O concentration values (NCSG) that were measured beyond the length of CL_{normal} during the production of the quantity of nitric acid (i.e. the final ones produced) were eliminated from the calculation of EF_{BL} (however all VSG values monitored during the campaign were used) which is in accordance to the clarification provided in EB51 Annex 12 /29/. The nitric acid produced was also checked based on the monitored flow rate and concentration records in the production logs /7/ during site visit /34/ /35/.
The production hours in the baseline campaign was 4723 hours which were confirmed from production logs /7/.
There are no N_2O emission regulations in China that apply to nitric acid plants that were

issued during the baseline campaign. Only, there is a relevant standard /8/ called "integrated emission standard of air pollutants" (GB16297-1996) which is applicable to the NO_x emissions. For this project, the NO_x emissions have been monitored quartly. The reports on NOx emissions have been provided to DNV /9/ and the NOx emission were in conformity with GB16297-1996.

Monitored data for project emissions

The project campaign was from 18 March 2009 to 15 November 2009. The parameters that were monitored according to AM0034 and recorded hourly include: Oxidation Temperature (OT), Oxidation Pressure (OP), and Ammonia gas Flow Rate (AFR) as well as Ammonia to air ratio (AIFR) and nitric acid produced (recorded every 8 hours).

In addition, the monitored parameters are the N_2O concentration and gas volume flow. As for the baseline campaign, the Automatic Monitoring System installed for baseline campaign was also used for project campaign using the European Norm 14181(2004). Considering that the N_2O concentration of the stack gas would decrease due to installation of the abatement catalyst on 17 May 2009, the analyzer with N_2O measurement range 0-6000 ppm was replaced by another with N_2O measurement range 0-3000 ppm on 5 May 2009/12/.

This monitoring system provides hourly readings; from 2 seconds measurement interval for N_2O concentration and gas volume flow. The flow meter is a multi point pitot tube that measure temperature, static and dynamic pressure (see description above for baseline emissions). The error readings and extreme values are automatically eliminated from the output data series by this system.

The statistical evaluation has been done according to the procedure in AM0034 /24/. The process of evaluation was documented in a spreadsheet which was verified by DNV during site visit /34/ /35/. During the project campaign, two measurement range analyzer with 0-6000 ppm and 0-3000 ppm were applied. The correction factor for NCSG and VSG is the same value for the two analyzers, as confirmed by QAL 2 and AST /11/. Considering the effect of correction (based on the reference measurement from QAL 2: correction factor for NCSG= 0.997 and for VSG=1.129) the value of N_2O concentration and gas volume flow were corrected and the average value is 2937mgN_2O/Nm^3 and 32 780Nm^3/h, respectively. After applying the statistics according to AM0034 v2 /24/, the mean value of N_2O concentration and gas volume flow have been calculated to be 3 119 mg N_2O/Nm^3 and 32 659 Nm^3/h, respectively.

The primary catalyst supplier was Chinachem Taiyuan Precious Metals Co., Ltd which is the same as in the previous five historical campaigns and the baseline campaign. The composition of the primary catalyst /2/ is 93 % Pt and 7 % Rh.

The nitric acid production is measured by a volume flow meter and the measured value is 54 816 t 100% HNO_3 which is higher than the CL_{normal} (43 955 t HNO_3). Hence according to AM0034 /24/, all N_2O values measured during the baseline campaign upto the production level of 43 955 t 100% HNO_3 can be used for the calculation of EFn. The NAP value was also checked based on the monitored flow rate and concentration in production logs /7/ during site visit /34/ /35/.

Further the NAP production in the project campaign which is the part of the monitoring period (243 days) is 54 816 t 100% HNO_3. The design capacity is 270 metric tons per day and

this corresponds to yearly capacity of 98 550 t 100% HNO_3 (270* 365 days per year). As per AM0034 /24/, the maximum value of NAP shall not exceed the design capacity. The nameplate (design) implies the total yearly capacity (considering 365 days of operational time per year). The production of 54 816 t 100% HNO_3 in 243 days corresponds to an average production of 225.6 tonnes per day or 82 337 t 100% HNO_3 in 365 days. Hence, the production is below the design capacity. The manual transpositions were checked by the verification team during the site visit./34/ /35/.

Emissions outside the project boundary and leakages
There are no additional emissions to be recorded outside the project boundary or any leakages related to the project activity.

It is concluded that the monitoring system is appropriate and complete.

3.4 Accuracy of Emission Reduction Calculations

According to the AM0034 /24/, the emission reduction for the project activity over a specific campaign are determined by deducting the campaign-specific emission factor from the baseline emission factor and multiplying the result by the production output of 100% concentrated nitric acid in the period from 18 March 2009 to 15 November 2009 which is the project campaign and the GWP of N_2O.

Baseline emission factor:
As mentioned before, during the baseline campaign, two gas analyzers were applied one with a measurement range 0-5000 ppm and other 0-6000 ppm. Two QAL2 reports were carried out by SGS Environmental Services /11/ and two QAL 2 test the correction factors of the calibration line for the N_2O analyzer was selected for EF_{BL} calculation from the date of the installation of the analyzers. /4/ The detailed information from QAL2 reports for the two analyzers was previously listed above in section 3.3. For simplification and conservativeness, the overall uncertainty of the measurement system was taken to be 4.76% which is higher of the two values and was applied to calculate EF_{BL} throughout the baseline campaign. This resulted in an overall uncertainty of 4.79% (which also includes uncertainty determined for the nitric acid parameter of 0.50%).
When the monitoring system was temporarily down and the process was within permitted operating range, the conservative IPCC default emission factor for N_2O of 4.5 kg $N_2O/tHNO_3$ was used as per AM0034 /24/. For the baseline campaign, the operating time is 4 723 hours and the collective downtime of the monitoring system was 160 hours.
When the nitric acid production process started-up again after failure or maintenance, there was weak acid production. In order to be conservative, this weak nitric acid produced during start-up was not deducted when calculating the baseline emission factor. According to historical data /21/, it takes about 60-90 minutes from start-up to normal condition which is indicated by analyzing the nitric acid concentration. The designed hourly nitric acid production (100%) is 11.25 tonnes. Because the concentration of nitric acid was analyzed once every two hours, 22.5 tones were selected for deduction in each start-up. However, to be conservative, this value was deducted in historical campaigns. The number of start-up in historic campaigns and project campaign was checked in production log /7/ and the same in spreadsheet /6/. DNV considered this approach reasonable.

The baseline emission factor was determined to 21.21 kg N_2O/t HNO_3 prior to adjusting for the downtime period. After applying 4.5 kg N_2O/tHNO_3 during the downtime period the baseline emission factor was calculated to 20.65 kg N_2O/t HNO_3. The calculation was checked by DNV and found correct.

Project emission factor:

The project campaign was from 18 March 2009 to 15 November 2009, however the secondary catalyst was installed on 17 May 2009. The monitored NCSG and VSG data for the whole campaign was applied for EF_p calculation. As per the approved methodology AM0034 version 02 in the equation for PE_n calculation, OH is defined as the number of hours of operation in the project campaign (h). The project campaign itself is from 18 March 2009[1] to 15 November 2009, the numbers of hours of operation OH were thus also including the part of the campaign when the secondary catalyst was not installed yet (18/03/2009 to 17/05/2009). Equally, the campaign specific emissions factor (EF_n) was calculated by dividing PE_n to the total production of 100% concentrated nitric acid during that same campaign. Further explanation of this approach is given in Appendix B following a Request for review.

During this project campaign, two analyzers with a measurement range 0-6000 ppm which was installed in baseline campaign and 0-3000 ppm was installed on 5 May 2009 /4/. According to the QAL2 and AST reports /11/, the correction factors for NCSG and VSG for the two analyzers is the same which are 0.997 and 1.129, respectively.
When the monitoring system was temporarily down and the process was within permitted operating range, as per AM0034 /24/, the highest value measured during the project campaign was used which is 17.44 kg N_2O/tHNO_3. For this project campaign, the operation time is 5604 hours and the collective downtime was 38 hours.
When the nitric acid production process started-up again after failure or maintenance, there was weak acid production. According to historical data /21/, it takes about 60-90 minutes from start-up to normal condition which is indicated by analyzing the nitric acid concentration. The designed hourly nitric acid production (100%) is 11.25 tonnes. To be conservative, 22.5 tones were selected for deduction for the project campaign. In this project campaign, two start-up happened in accordance with the production log /7/, so 45 tonnes nitric acid was deducted which was indicated in spreadsheet /6/. DNV considered this reasonable.

The project emission factor in this project campaign is 10.41 kg N_2O/t HNO_3 prior to adjusting for the downtime period. After applying 17.44 kg N_2O/tHNO_3 during the downtime period, the project emission factor was calculated to 10.46 kg N_2O/t HNO_3.
The calculation was checked by DNV and found correct.

Emission reduction

The nitric acid production included in the emission reduction calculations in this monitoring period is 54 816 t HNO_3 which is the nitric acid produced in the period from 18 March 2009 to 15 November 2009. This nitric acid production was verified by DNV during the on site visit by reviewing production records /6/. Therefore, the emission reduction is 173 130t CO_2e.

[1] The time of installation of primary catalyst (ammonia oxidation catalyst) and hence the start of the project campaign. According to AM0034 the period of time beginning from the installation of a new gauze pack until subsequent plant shut down is defined as a campaign

The calculations of the emission reduction were verified by DNV and were found correct. It has been showed in spreadsheet which shows transparently the calculations.
The emission reduction in this monitoring period is 173 130 tonnes of CO_2 equivalents in the period from 24 October 2008 to 15 November 2009 (i.e. 243 days). This corresponds to a yearly (considering 330 operational days) emission reduction of 235 115 tonnes of CO_2 equivalents and 260 051 tonnes of CO_2 equivalents corresponding to 365 operation days. This is lower than the estimated emission reductions estimated in the registered PDD (372 612 tonnes of CO_2 equivalents per year 330 days and 412 131 tonnes of CO_2 equivalents per year 365 days). The emissions reduction presented in the PDD was based on available data at the time of validation and was based on an abatement efficiency of 80%. The achieved abatement efficiency was only approximately 50% due to the fact that the project campaign was operated approx. 2 months without secondary catalyst installed.

3.5 Quality of Evidence to Determine Emission Reductions

In order to ensure accurate monitoring, all required monitoring devices and systems have been calibrated periodically.

The monitoring devices for ammonia oxidization process

The thermocouples and pressure transmitter for oxidation temperature and pressure respectively, and ammonia flow rate and air flow rate was calibrated by the project owner which has been authorized to do so by Sichuan Bureau of Quality and Technical Supervision, /13/. The annual calibration records have been verified by DNV /14/.

The automated measurement system

The VSG and NCSG were measured by the automated measurement system. The installation and calibration of these systems was done in accordance with the Standard Reference Measurement Method (SRM). The maintenance and regular controls /19/ have been carried out in accordance with EN 14181.

The monitoring devices for nitric acid production

The volume flow meter was used for measuring nitric acid production. The concentration of nitric acid was analysed by titration in the laboratory. The flow meter was calibrated annually /16/ by the qualified third party who is National Institute of Measurement and Testing Technology /17/. The burette were calibrated by the project owner which was authorized by Sichuan Bureau of Quality and Technical Supervision /13/.

The information on the monitoring parameters and equipments provided in the following table has been verified by DNV:

Equipment	Parameter	Type Tag.no	Monitoring /Recording frequency	Accuracy %	Range
Air flow meter	AIFR	EJA110A DMS4A-95EA	Hourly	0.5	0-50000 m^3/h
Ammonium flow meter	AFR	EJA110DMS2B-90EA	Hourly	0.5	0~6400 m^3/h

Ammonia Oxidation thermocouples	OT	K	Hourly	Class II (JJG351-1996)	0-1000 ^{o}C
Oxide pressure transmitter	OP	YA-150	Hourly	1.6	0~0.6 MPa
Nitric acid flow meter	NAP	AE206MG	Every shift	0.5	0~40m^3/h
Tail gas flow meter	VSG	IMV30	Every 2 seconds	0.5	0~38 000 Nm^3/h
Tail gas thermometers	TSG	Pt100	Every 2 seconds	Class B (JJG229-1998)	-50 ~ 300 ^{o}C
Tail gas pressure	PSG	Pressure measurement as part of differential pressure cell of volume flow meter.	Every 2 seconds	0.5	0.7 – 5.0 bar
N_2O analyzer	NCSG	ADC MGA3000	Every 2 seconds	QAL 2/AST tests: ±4.76% ±4.41 % ±4.41%	 0-5000 ppm (baseline campaign) 0-6000ppm (baseline campaign and project campaign) 0-3000 ppm (project campaign)

The transfer to the emission reduction spreadsheet of all data for determining the permitted operating conditions, baseline emission factor and project emission factor has been verified and the reported data was cross-checked with raw data from production logs and meters installed in the control room /7/ during the site visit /34/ /35/.
All relevant documents and records are stored both electronically and on paper and to be kept for two years after the crediting period.
DNV concludes that during this monitoring period, the evidences for determination of ER are sufficient and reasonable. DNV was able to confirm that the result of ER calculation is reliable.

3.6 Management System and Quality Assurance

Sichuan Chemical Co. Ltd. is responsible for operation and routine maintenance of production and monitoring equipment and data collection, and EcoSecurities Group PLC is responsible for monitoring and reporting of data under the CDM activity. The quality assurance and

quality control procedures /18/ include monitoring equipment operation and maintenance. Data reporting is covered by project operator's management system.

There are two data streams: one coming from *Sichuan Chemical Co. Ltd.* (nitric acid production data) which has the ISO certificates 9001, and 14001; and OHSAS 18001/31/ and the second stream is from the installed stack gas monitoring system (N_2O concentration and stack gas volume flow). The data is compiled by EcoSecurities and is used in the emission reduction calculations and monitoring report preparation.

The stack gas monitoring system is designed as an automatic process, so the involvement of the personnel during normal operation is minimal. In case of any deficiency, appropriate procedures are in place.

For this monitoring system, the quality assurance and control procedure is also according to EN14181 which stipulates three levels:

- QAL1: the evaluation according to EN ISO 14956 has been carried out before installation of AMS by supplier /12/.
- QAL2: it is for the installation and calibration of AMS according to the SRM. This has been carried out by SGS in February 2008, March 2009 /11/.
- AST was carried out in July 2009 /11/.
- QAL3: it is carried out by local operator/Ecosecurities on weekly basis /15/.

In order to operate and maintain the monitoring system, local operators and instrumentation engineers of the system have been trained by EcoSecurities and the equipment supplier /5/. The competence of the staff for regular controls was demonstrated by the weekly zero and span calibration done during site visit /34/ /35/, the demonstration was compared with procedure of weekly zero and span calibration /15/. Furthermore DNV also confirmed their competence from training records /5/. The calibration and maintenance records /15/ have been verified by DNV during site visit /34/ /35/. In addition, the records for calibration and maintenance of this system /15/ have been continuously carried out (QAL3) and all drift values are within the range as defined in QAL 1 for expanded uncertainty (with a 95% confidence interval).

All monitoring devices have been calibrated and maintained periodically to ensure the accuracy of measurement.

All data have been archived electronically and/or in hard copy and was accessible during verification site visit /34/ /35/.

4 CERTIFICATION STATEMENT

Det Norske Veritas Certification AS (DNV) has been engaged by EcoSecurities Group PLC (Ecosecurities) to verify the greenhouse gas (GHG) emission reductions reported for the "Chuanhua N2O Abatement Project" for the period 24 October 2008 to 15 November 2009. However, the period of claimed emission reductions is from 18 March 2009 to 15 November 2009 since the period from 24 October 2008 to 17 March 2009 was included in the baseline campaign. The reported emission reductions are 173 130 tonnes of CO_2 equivalents.

Our opinion relates to the project's GHG emissions and resulting GHG emissions reductions reported for the period of 24 October 2008 to 15 November 2009. DNV does not express any opinion on the application of the baseline methodology neither on the Project Design Document nor on any projections regarding GHG emission performance.

Responsibilities of the project participants and DNV

The management of the project is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the Monitoring Report for the "Chuanhua N2O Abatement Project". The development and maintenance of records and reporting procedures in accordance with the approved monitoring methodology AM0034, version 02, including the calculation and determination of GHG emission reductions from the project, is the responsibility of the management of the project.

It is DNV's responsibility to express an independent verification statement on the reported GHG emission reductions from the project for the monitoring period from 24 October 2008 to 15 November 2009 based on the verified emissions for the same period and the project's compliance with the approved baseline and monitoring methodology AM0034, version 02. However, the period of claimed emission reductions is from 18 March 2009 to 15 November 2009 since the period from 24 October 2008 to 17 March 2009 was included in the baseline campaign.

DNV's verification approach was based on the requirements as defined by the CDM modalities and procedures, as well as those defined by the CDM Executive Board and by the baseline and monitoring methodology AM0034, version 02.

DNV's verification approach draws on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these. DNV's examination includes assessment of evidence relevant to the amounts and disclosures in relation to the project's GHG emission reductions for the period from 24 October 2008 to 15 November 2009. However, the period of claimed emission reductions is from 18 March 2009 to 15 November 2009 since the period from 24 October 2008 to 17 March 2009 was included in the baseline campaign.

DNV planned and performed the work to obtain the information and explanations that DNV considered necessary to provide sufficient evidence to give reasonable assurance that the reported amount of GHG emission reductions for the period from 24 October 2008 to 15 November 2009 are fairly stated. However, the period of claimed emission reductions is from 18 March 2009 to 15 November 2009 since the period from 24 October 2008 to 17 March 2009 was included in the baseline campaign.

DNV conducted the verification on the basis of the monitoring methodology AM0034, version

02 and the monitoring plan included in the PDD of the project. The verification included:

- *collection of evidence supporting the reported data*
- *checking whether the provisions of the monitoring methodology AM0034, version 02 and the monitoring plan in the PDD were consistently and appropriately applied*

DNV has verified whether the information included in the CDM Monitoring Report for the "Chuanhua N2O Abatement Project" is correct and that the emissions reductions achieved have been determined correctly.

Certification Statement

In our opinion, the GHG emission reductions stated in the Monitoring Report of 25 May 2010 for the "Chuanhua N2O Abatement Project" for the period from 24 October 2008 to 15 November 2009 are fairly stated. However, the period of claimed emission reductions is from 18 March 2009 to 15 November 2009 since the period from 24 October 2008 to 17 March 2009 was included in the baseline campaign.

The GHG emission reductions were calculated correctly on the basis of the approved Monitoring Methodology (AM0034, version 02) and the monitoring plan contained in the project's Project Design Document. Hence, Det Norske Veritas Certification AS is able to certify that the reported emission reductions from the project during period from 24 October 2008 to 15 November 2009, amount to 173 130tonnes of CO_2 equivalent. However, the period of claimed emission reductions is from 18 March 2009 to 15 November 2009 since the period from 24 October 2008 to 17 March 2009 was included in the baseline campaign.

Beijing, 12 June 2010

Cuiping Deng
CDM Verifier

Oslo, 06 December 2010

Trine Kopperud
Head of Section

5 REFERENCES

/1/ Monitoring report of Chuanhua N2O Abatement Project, version 1 dated 16 December 2009 and version 2 dated 25 May 2010

/2/ The certificate of primary catalyst from Chinachem. Taiyuan Precious Metal Co.,Ltd .

/3/ The contract for the purchase of secondary catalyst between Johnson Matthey PLC and EcoSecurities Group PLC dated 26 February 2007.

/4/ The equipment installation report of the Automatic Monitoring System from ADC gas analysis Ltd in September 2006 with a measurement range of 0-3000ppm.

The replacement records from the monitoring system maintenance record on 27 December 2007 with a measurement range of 0-5000ppm, 6 February 2009 with a measurement range of 0-6000ppm and on 5 May 2009 with a measurement range of 0-3000ppm

/5/ Training records for operation, maintenance and calibration of the N_2O analyzer by the equipment supplier on 23 June 2007

/6/ Spreadsheet for historical campaigns, baseline campaign and project campaign.

/7/ Production logs for nitric acid from 5 August 2005 to 15 November 2009.

/8/ GB16297-1996 “integrated emission standard of air pollutants”

/9/ Reports for NOx pollutants by Qingbaijiang District environmental monitoring station, Chengdu City on 27 August 2008, 2 December 2008, 16 April 2009,10 June 2009 and 10 August 2009

/10/ The primary catalyst instalments records on 5 August 2005, 2 March 2006, 27 August 2006, 29 March 2007, 23 November 2007, 23 August 2008 and 18 March 2009.

/11/ SGS Environmental Services:

QAL2 report for analyzer with 0-5000 ppm (EZ/07/2024-12) dated April 2008. Period investigation: February 2008.

QAL2 report for analyzer with 0-6000 ppm (EZ/09/2672-1) dated April 2009. Period investigation: March 2009.

AST report for analyzer with 0-3000 ppm (EZ/09/2672-5) dated September 2009. Period investigation: July 2009.

/12/ ADC statement of compliance EN14181 QAL 1 for MGA 3000 for 5000ppm, 6000ppm and 3000ppm

/13/ Authorization Letter by Sichuan Bureau of Quality and Technical Supervision, for the thermocouple and pressure transmitter as well as burette for nitric acid concentration measurement which is valid till 4 December 2013.

/14/ Calibration records for ammonia and air flow:

The thermocouple from 2005 to 2009, pressure transmitter from 2005 to 2009; all the latest calibration of thermocouple and pressure transmitter is valid till 16 March 2010.

/15/ QAL3, by local operator/Ecosecurities

/16/ Calibration report for nitric acid flow meter by National Institute of Measurement and Testing Technology from 2008-2009. The latest calibration of nitric acid flow meter is valid till 12 May 2011.

Calibration records for burette from 2005 to 2009. The latest calibration is valid till 12 November 2010.

/17/ Certification documentation for National Institute of Measurement and Testing Technology. Certificate No. (Guo) Faji(2007)01002.

/18/ The quality assurance and quality control procedures by EcoSecurities Group PLC including:
P002: daily inspection procedure
P005: Gas analyser system breakdown Procedure
P006: Gas analyser zero calibration
P008: Gas analyser N_2O and O_2 span calibration
P009: Calibration gas management
P010: Stack monitoring System- Power outage
P013: Process shut-down – analyser protection
P014: Procedure for data recording

/19/ The maintenance and regular controls records of analyzer by EcoSecurities and project owner

/20/ The monitoring system description by EcoSecurities Group PLC for N_2O abatement system

/21/ The notification on the deduction of weak acid amount for each start-up by the project owner of 30 December 2009

/22/ The stack monitoring data record from 30 November 2007 to 15 August 2008

/23/ CDM Executive Board, Validation and Verification Manual. Version 01.1

/24/ "Catalytic reduction of N2O inside the ammonia burner of nitric acid plants" AM0034, Version 02

/25/ Registered Project Design Document, version 02 date of 1 November 2007.

/26/ Project's Validation Report by SGS, 7 April 2008.

/27/ The design and operation manual of nitric acid production plant in April 2001

/28/ The major equipment failure diagnosis and summary on 22 December 2007

/29/ Clarification to AM0034 (version 02). Annex 12 of EB51 meeting report. http://cdm.unfccc.int/EB/051/eb51_repan12.pdf

/30/ Chinachem Taiyuan Precious Metals Co., Ltd.: The specification about the estimated gauze campaign length.

/31/ The ISO certificates 9001, and 14001; and OHSAS 18001 all valid until 21 December 2009

/32/ Burner backout and scrap report of 24 October 1994

Persons interviewed:

/33/	Sichuan Chemical Co. Ltd.	Sichuan Chemical Co. Ltd.	General engineer
		Mr. Zheng Shuping	
		Mr. Huang Yi	Director (nitric acid workshop)
		Mr. Lian Tong	meter workshop
		Mr Ran Yiqiang	nitric acid workshop
		Mr Yang Zhongxian	nitric acid workshop
		Mr Liu Jian	nitric acid workshop
		Ms. Li Chunmei	Analyzer operator
		Ms. Wang Ping	Acid analyzer
		Ms. Mou Qingrong	Director (meter work shop)
/34/	EcoSecurities Group PLC	Ms. Mou Yurong	project manager
		Mr. Steven Liu	Head of CDM Project
		Mr Li Yang	Monitoring team
		Mr Long Yi	Monitoring team
		Ms. Dong Lei	Monitoring team
		Ms Zeng Qiang	Monitoring team

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APPENDIX A

Corrective action requests (CARs) and forward action requests (FARs)

The Correction Action Request in the initial verification:

CAR #	*Description of the CAR*	*Comments*	*Conclusions*
N/A	N/A	N/A	N/A

The Forward Action Request in the previous verification:

FAR #	*Description of the FAR*	*Comments*	*Conclusions*
	N/A	***N/A***	***N/A***

The Clarification Request in this verification:

CL #	*Description of the CL*	*Comments*	*Conclusions*
CL1	The starting date of the historical-, baseline- and project campaigns needs to be clarified.	The starting date of campaigns was defined as the date of primary catalyst installation in the revised monitoring report. Please see the revised monitoring report and workbook.	OK. The starting date of campaigns was update in the monitoring report and spreadsheet. This CL closed.
CL2	A clarification is needed regarding the fifth campaign since it is longer than the other 4 historical campaigns.	The operation time of the fifth campaign was 9.1 months; however the actual operational time was 7. 8 months, due to a shutdown period during the campaign. The operation time is within the normal gauze operation time recommended by the gauze supplier (6-8 months). In addition, the average daily nitric acid production during the fifth campaign was 232 t HNO_3/day, which is below the design capacity (270 $HNO_{3\ tons}$ /day) and similar to the average production during the previous four historical campaigns (233 tons HNO3/day). Furthermore, the operating conditions of all historical campaigns, including the fifth historical campaign, are within the specifications of the plant. Finally, 86% of the operating conditions of the fifth	OK. According to the specifications from the primary catalyst supplier /30/, the normal gauze operation time is 6-8 months. The fifth campaign has been in operation for 7.8 months. Hence DNV consider this reasonable." In addition, the average daily nitric acid production and the operation parameters of the fifth historical campaign are

		campaign were within the permitted operating conditions calculated based on the previous four historical campaigns. Thus, the campaign duration is within normal specifications of the gauze and it was operated within normal operating conditions.	within the operating ranges of the rest of historical campaigns and the plant design. In addition, the daily nitric acid was close to the data in other campaigns. Hence DNV considers this campaign to be a normal campaign. This CL is closed.
CL3	To update the monitoring report and spreadsheet according to the clarification of Annex 12 in EB51# meeting	The monitoring report and spreadsheet were updated according to the clarification of Annex 12 in EB51 meeting. Please see the revised MR and workbook.	OK. The update monitoring report and spreadsheet was checked and correct. This CL is closed.

APPENDIX B

Clarification following request for review

<u>Reasons for the request for review:</u> The DOE verified that the secondary abatement system was only installed on 17/05/09, which was after the start of the project campaign (18/03/09) due to market supply reasons. The DOE considered it conservative to include values of NCSG and VSG from the start of the project campaign. However, in the calculation of project campaign emission factor, the DOE did not raise concerns regarding the inclusion of NAP production for the period in which the abatement system was not yet in place and in the calculation of emission reductions. Clarification is required.

DNV's Clarification:

DNV is of the opinion that NAP produced during the entire project campaign shall be used when calculating the project emission factor and emission reductions in order to be in compliance to the approved methodology AM0034 version 02 applied by the project activity. Further DNV is of the opinion that this is correct regardless of the point in time when the secondary catalyst is installed. Please refer to Fig.1 below for illustration of emission reduction for different point in time for the installation of the secondary catalyst.

As per the approved methodology AM0034 version 02, total N_2O emissions of the nth project campaign (PE_n) are estimated as follows:

$$PE_n = VSG * NCSG * 10^{-9} * OH \quad (tN_2O)$$

A campaign specific emissions factor is calculated by dividing the total mass of N_2O emissions during that campaign by the total production of 100% concentrated nitric acid during that same campaign as follows:

$$EF_n = PE_n / NAP_n \ (tN_2O/tHNO_3)$$

According to AM0034, the emission reductions for the project activity over a specific campaign are determined by deducting the campaign-specific emission factor from the baseline emission factor and multiplying the result by the production output of 100% concentrated nitric acid over the campaign period and the GWP of N_2O as follows:

$$ER = (EF_{BL} - EF_P) * NAP * GWP_{N2O} \quad (tCO_{2e})$$

In the equation for PE_n calculation, OH is defined as the number of hours of operation in the project campaign (h). The project campaign itself is from 18 March 2009[1] to 15 November 2009, the numbers of hours of operation OH were thus also including the part of the campaign when the secondary catalyst was not installed yet (18/03/2009 to 17/05/2009) as per the approved methodology. Equally, the campaign specific emissions factor (EF_n) was calculated by dividing PE_n to the total production of 100% concentrated nitric acid during that same campaign. DNV is of the opinion that by considering the total operating hours in the project campaign OH and cutting the NAP in the period in which the abatement system was not yet in place would not be as per the requirements of the methodology, hence the inclusion of the

[1] The time of installation of primary catalyst (ammonia oxidation catalyst) and hence the start of the project campaign. According to AM0034 the period of time beginning from the installation of a new gauze pack until subsequent plant shut down is defined as a campaign.

NAP for the period in which the abatement system was not yet in place is from our opinion correct according to the methodology.[2]

Furthermore, in the emission reduction (ER) calculation formula, NAP is defined as the Nitric acid production for the project campaign ($tHNO_3$) and EF_P is subtracted from EF_{BL}. Since in the EF_{BL} calculation total operation hours and total nitric acid production within the baseline campaign were used for baseline emission factor calculation and equally total operating hours and total NAP was used for the full project campaign, it would not be justified if the NAP in the period in which the abatement system was not yet in place was excluded from the ER calculations. DNV has verified that real N_2O emissions occurring in the project activity are not excluded by considering the NAP (and other corresponding parameters) in the period in which the abatement system was not yet in place.

In figure 1 below it is illustrated how the emissions reductions changes in situations where the secondary catalyst is installed at different point in time during a project campaign. In the first illustration the secondary catalyst is installed at the same time as the primary catalyst (ie. at the start of the project campaign). The grey area is the emission reductions achieved. The second illustration is reflecting the situation where the secondary catalyst is installed a period of time after the start of the project campaign (installation of secondary catalyst marked with an arrow). The level of abatement efficiency after the secondary catalyst is installed is marked as y. The emission factor EF_{p1} in this figure is the emission factor calculated as per the methodology and it is obviously higher than y since it includes the higher emissions of N_2O occurring prior to the installation of the secondary catalyst. This is further illustrated in the third illustration where the catalyst is installed at the very end of a project campaign. From the illustrations it can be seen that when the project emission factor is calculated as an average emission factor for the entire campaign it will not be correct to use NAP only for the period of the campaign after the installation of the secondary catalyst in the calculation of the emissions reductions, as this will not be according to the methodology and also not reflecting the actual emissions reductions occurring. This can be further explained as follows: If the NAP for the period in which the abatement system was not yet in place was excluded from the emission factor calculation, EFp1 would be much higher and would not reflect the actual emission reduction that occurred as a result of the project activity. Considering the third illustration, if part of the NAP was excluded, the remaining NAP would be very small and as a result EFp1 would be very high. In fact, EFp1 would be higher than EFbl so the CER calculation would give result in negative emission reductions for the entire campaign even though it is clear that an emission reduction has in fact occurred. This demonstrates that excluding a portion of the NAP would result in a calculation that is disconnected from the reality of the project.

[2] See parameter P.5 NAP, AM0034 version 02 were it is defined: Recording frequency: Daily, compiled for entire campaign; Proportion of data to be monitored: 100%. Hence not including NAP for the entire campaign would be a deviation from the methodology,

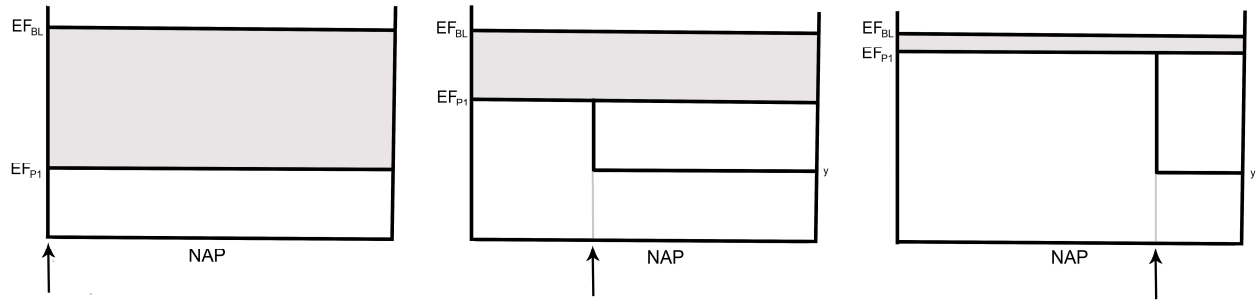

Fig.1 Illustration of emission reductions for different point in time for the installation of the secondary catalyst in a project campaign when applying AM0034.

DNV also refers to the request for revision of the methodology AM0034 titled ‘‘Later installation of abatement catalyst’’ submitted on 03 Aug 09 (*AM_REV_0163*) /2/. Under the ‘‘Recommendations by the Meth Panel’’ for the request for revision of the methodology ‘‘AM_REV_0163’’, the suggested approach not to include the values obtained during the time the plant operated without the abatement and to recalculate EF_{BL} was deemed ‘‘not conservative’’ since it just eliminates real N_2O emissions occurring in the project activity due to an unconsidered circumstance. DNV understands from the meth panel recommendations that the part of the project campaign during which the secondary catalyst was not installed (i.e. from 18/03/2009 to 17/05/2009) should be considered as part of the project campaign. This was also deemed correct by DNV as per the definition of the start of the project campaign as per the methodology, AM0034.

Further, when assessing the project data for this project campaign, it can be seen that the NCSG values before the installation of the abatement catalyst were higher than for the corresponding period of the baseline campaign. So in effect this part of the campaign had negative emission reductions, by including all data from the entire campaign in the calculations this negative emission reduction is effectively taken into account in the overall emission reduction calculation.

Summary:
In order to be in compliance to the methodology, DNV is of the opinion that the inclusion of the NAP for the calculation of the project campaign emission factor and emission reductions for the period in which the abatement system was not yet in place are as per the requirements of the methodology. NAP was included over the entire campaign because not doing so would lead to a deviation from the approved methodology and the validated PDD. Unabated N_2O emissions were included in the estimation of emissions reductions. The methodology does not require that the abatement catalyst shall be installed simultaneously with the primary catalyst. In other words, it does not require a deviating interpretation of “campaign” if the project activity starts later than the installation of the primary catalyst. The project complies with VVM 01.2 paragraphs 199, 204 and 207; no assumptions related to the later installation of the abatement catalyst were needed, and hence no further clarification in monitoring report or calculation worksheet was required.