



VOLUNTARY CARBON STANDARD 2007.1

VERIFICATION REPORT

**CATALYTIC REDUCTION OF N₂O INSIDE THE AMMONIA
BURNERS OF THE NITRIC ACID PLANT IN CAOJING,
SHANGHAI**

**Monitoring Period: 2009-11-28 to 2010-06-30
(incl. both days)**

Report No: 8000390643 - 10/502

Date: 2011-02-25

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Verification Report: Catalytic Reduction of N₂O inside the Ammonia Burners of the Nitric Acid Plant in Caojing, Shanghai

TÜV NORD JI/CDM Certification Program

P-No.: 8000390643 - 10/502



Name of Verification company:	Date of the issue:
TÜV NORD CERT GmbH	2011-02-25
Report Title:	Approved by:
Verification Report: Catalytic Reduction of N ₂ O inside the Ammonia Burners of the Nitric Acid Plant in Caojing, Shanghai	Mr. E. Krupp
Client:	Project Title:
Shanghai BASF Polyurethane Co. Ltd.	Catalytic Reduction of N ₂ O inside the Ammonia Burners of the Nitric Acid Plant in Caojing, Shanghai
Summary:	
Shanghai BASF Polyurethane Co. Ltd. has commissioned the TÜV NORD JI / CDM Certification Program to carry out the 1st verification of the project "Catalytic Reduction of N₂O inside the Ammonia Burners of the Nitric Acid Plant in Caojing, Shanghai" in Shanghai, Peoples Republic of China with regard to the requirements of VCS 2007.1 Standard. The project activity entails the installation of a secondary catalyst in the ammonia reactor at the nitric acid production unit of Shanghai BASF Polyurethane Co. Ltd plant. Thereby reducing the emission of N₂O as a potent GHG in to the atmosphere. Reporting period: From 2009-11-28 to 2010-06-30 In the course of the verification 03 Corrective Action Requests (CARs), 04 Clarification Requests (CLs) and 04 Forward Action Request (FAR) were raised. The verification is based on the draft monitoring report, revised monitoring report, the monitoring plan as set out in the validated VCS PD, the validation report, emission reduction calculation spreadsheets and supporting documents made available to the TÜV NORD JI/CDM CP by the project participant. In detail the conclusions can be summarised as follows: - all operations of the project are implemented and installed as planned and described in the validated project description, - the monitoring plan is in accordance with the applied approved methodology ,i.e. AM0034 version 03.2,	

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- the installed equipment essential for measuring parameters required for calculating emission reductions is calibrated appropriately,
- the monitoring system is in place and functional. The project has generated GHG emission reductions.

As the result of the 1st periodic verification, the verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

Emission reductions 391,678 t CO₂ equivalents

Emission Reductions Period:	Emission Reductions (tCO_{2e})
2009-11-28 to 2009-12-31	61,277
2010-01-01 to 2010-06-30	330,401

Work carried out by:	Number of pages:
Mr. Rainer Winter (TL) Mr. Jean Yu Mr. Nat Lin Mr. Dirk Speyer	36

Abbreviations

AMS	Automated Measurement System
BAU	Business as usual
CA	Corrective Action / Clarification Action
CAR	Corrective Action Request
CEM	Continuous Emission Monitoring
CDM	Clean Development Mechanism
CO₂	Carbon dioxide
CO_{2e}	Carbon dioxide equivalent
CP	Certification Program
CL	Clarification Request
DNA	Designated National Authority
EB	CDM Executive Board
EIA	Environmental Impact Assessment
ER	Emission Reduction
E&I	Electrical and Instrumentation
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
MR	Monitoring Report
NAP	Total nitric acid production
QC/QA	Quality control/Quality assurance
SBPC	Shanghai BASF Polyurethane Co. Ltd
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Voluntary Carbon Standard
VCS – PD	VCS - Project Description
VCU	Voluntary Carbon Unit
VER	Verification
VVM	Validation and Verification Manual

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1 INTRODUCTION

The **Shanghai BASF Polyurethane Co. Ltd.** has commissioned the TÜV NORD JI/CDM Certification Program to carry out the 1st periodic verification of the project:

“Catalytic Reduction of N₂O inside the Ammonia Burners of the Nitric Acid Plant in Caojing, Shanghai”

with regard to the relevant requirements of the Voluntary Carbon Standard 2007.1^{/VCS/}. The verifiers have reviewed the implementation of the monitoring plan (MP) in the registered VCS project for the monitoring period 2009-11-28 to 2010-06-30.

The applied monitoring methodology is “AM0034, Version 03.2 “Catalytic reduction of N₂O inside the ammonia burner of nitric acid plants”.

1.1 Objective

The purpose of this verification, by independent checking of objective evidence, is as follows:

- to verify that the project is implemented as described in the project design document;
- to assess the implementation of the monitoring plan (MP) content in the VCS-PD;
- to assess the project's compliance with other relevant rules, including the host country (China) legislation;
- to confirm that the monitoring system is implemented and fully functional to generate voluntary emission reductions (VERs / VCU's) without any double counting; and
- to establish that the data reported are accurate, complete, consistent, transparent and free of material error or omission by checking the monitoring records and the emissions reduction calculation.

1.2 Scope and Criteria

The verification of this project is based on the validated project design document^{/VCS-PD/}, the monitoring report^{/MR/}, emission reduction calculation spread sheets^{/XLS/}, supporting documents made available to the verifier and information collected through performing interviews and during the on-site assessment. Furthermore publicly available information was considered as far as available and required.

The TÜV NORD JI/CDM CP has employed a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generation of emission reductions.

1.3 VCS Project Description

1.3.1 Project Characteristics

Essential data of the project is presented in the following Table 1-1.

Table 1-1: Project Characteristics

Item	Data
Project title	Catalytic Reduction of N ₂ O inside the Ammonia Burners of the Nitric Acid Plant in Caojing, Shanghai
Project owner	SHANGHAI BASF POLYURETHANE CO. LTD.
Any specific project categories	☐ Mega project (> 10 ⁶ t CO _{2eq} / a) ☐ Micro project (< 5000 t CO _{2eq} / a) ☐ AFOLU project ☐ Grouped project ☒ No specific project category
VCS PD	2010-07-24
Applied Methodology	AM 0034 Version 3.2
Project starting date	2009-11-28
Technical Area(s)	Q: N ₂ O
Crediting period	☐ Renewable Crediting Period (7 y) ☒ Fixed Crediting Period (10 y)
Start of crediting period	2009-11-28

1.3.2 Project Location

The details of the project location are given in table 1-2:

Table 1-2: Project Location

No.	Project Location
Host Country	China
Region:	Shanghai
Project location address:	No.25 Chu Hua Road Caojing Shanghai zip code 201507 People's Republic of China
Latitude:	30°47'13'' N
Longitude:	121°27'51'' E

1.3.3 Technical Project Description

The project involves the installation of a secondary N₂O reduction catalyst in the ammonia oxidizer of the nitric acid production plant of Shanghai BASF Polyurethane Co., Ltd.

The emission reductions are a result of the catalytic decomposition of nitrous oxide. Nitrous oxide which is formed as by-product of the nitric acid production will be removed by a secondary catalyst installed directly below the ammonia oxidation gauzes. The nitrous oxide would otherwise be emitted within the tail gas of the nitric acid plant to the atmosphere.

The key parameters of the project are given in table 1-3:

Table 1-3a: Technical data of the project

Parameter	Unit	Value
NH ₃ – Oxidizer		
Manufacturer	-	Oschatz, Germany
Diameter	mm	5056
Start of commercial production	-	2006-07-15
Operating conditions as per specifications		
- Temperature (min/max):	°C	830 – 900
- Pressure (min/max):	MPa	0.28 – 0.45
- Ammonia flow rate (max):	t/h	11.250 (110 % load)
- Ammonia to Air ratio (max)	Vol.-%	11.35
Ammonia Oxidation Catalyst		
Manufacturer	-	- *)
Composition:	-	Pt: - *) Rd: - *) Pd: - *)
Absorber		
Manufacturer	-	Caldemon Iberica. S.A.
Design capacity	t/a (metric)	265,000
N ₂ O Analyzer		
Manufacturer	-	ABB
Type	-	AO2240-URAS 26 N2O
Measurement Principle	-	NDIR
Serial No.	-	3.356558.8
Stack volume flow rate measurement		
Manufacturer	-	Dr. Födisch Umweltmesstechnik AG
Type	-	Flow Measuring Device FMD 99
Measurement Principle	-	Differential Pressure

*) The values are considered confidential

Table 1-3b: Parameters confirmed during validation

Parameter	Name	Unit	Value
Operating conditions of the NH ₃ oxidizer during historic campaigns			
- Temperature (min/max):	OT _{normal}	°C	857.8 – 875.6
- Pressure (min/max):	OP _{normal}	MPa	0.28 – 0.45
- Ammonia flow rate (max):	AFR _{max}	t/h	11.250
- Ammonia to Air ratio (max)	AAR _{max}	Vol.-%	11.35
Historic campaign length	CL _{normal}	t	169,992

*) The values are based on plant records of the historic campaigns as available from 2007-01-01;

1.3.4 Appointment of team members and technical reviewer

On the basis of a competence analysis and individual availabilities a verification team was appointed. Furthermore also the personnel for the technical review and the final approval were determined.

The list of involved personnel, the tasks assigned and the qualification status are summarized in the table 1-4 below.

Table 1-4: Involved Personnel

	Name	Company	Function ¹⁾	Qualification Status ²⁾	Scheme competence	Technical competence ⁴⁾	Host country Competence	Team Leading competence
☒ Mr. ☐ Ms.	Winter, Rainer	TÜV NORD CERT	TL	SA	☒	Q	☐	☒
☒ Mr. ☐ Ms.	Lin, Nat	TÜV NORD, Shanghai	TM	E	☒		☒	☐
☐ Mr. ☒ Ms.	Yu, Jean	TÜV NORD, Shanghai	TM	E	☒		☒	☐
☒ Mr. ☐ Ms.	Speyer, Dirk	TÜV NORD CERT		T	☐		☐	☐

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	Name	Company	Function ¹⁾	Qualification Status ²⁾	Scheme competence	Technical competence ⁴⁾	Host country Competence	Team Leading competence
☒ Mr. ☐ Ms.	Walter, Ulrich	TÜV NORD CERT	TR ³⁾	E	☒	Q	☐	☐
☒ Mr. ☐ Ms.	Winter, Stefan	TÜV NORD CERT	TR ³⁾	A	☒		☐	☒
☒ Mr. ☐ Ms.	Krupp, Eric	TÜV NORD CERT	FA	SA	☒		☐	☒

¹⁾ TL: Team Leader; TM: Team Member, TR: Technical review; FA: Final approval

²⁾ GHG Auditor Status: A: Assessor; E: Expert; SA: Senior Assessor; T: Trainee; TE: Technical Expert

³⁾ No team member

⁴⁾ As per S01-MU03 or S01-VA070 A2 (such as A, B, C.....)

1.4 Level of Assurance

The verification has been planned and organized to achieve a

☒ reasonable level of assurance

☐ limited level of assurance.

2 METHODOLOGY

The verification of the project consisted of the following steps:

- Contract review
- Appointment of team members and technical reviewers
- Publication of the monitoring report
- Desk review of the Monitoring Report^{/MR/} submitted by the client and additional supporting documents.
- Verification planning,
- On-Site assessment,
- Background investigation and follow-up interviews with personnel of the project developer and its contractors,
- Draft verification reporting
- Resolution of corrective actions (if any)
- Final verification reporting
- Technical review
- Final approval of the verification.

The sequence of the verification is given in the table 2.1 below:

Table 2-1: Verification sequence

Topic	Time
Assignment of verification	2010-08-27
On-site visit	2010-11-22 to 2010-11-24
Draft reporting finalised	2011-02-01
Final reporting finalised	2011-02-25
Technical review on final reporting finalised	2011-02-25
Final approval	2011-02-28

The main verification approaches are described below.

2.1 Review of Project Documentation

The VCS PD ^{/PD/} and supporting background documents related to the project design and baseline were reviewed.

Furthermore, the verification team used additional documentation by third parties like host party legislation, technical reports referring to the project design or to the basic conditions and technical data.

The references used in the course of this verification are summarized in section 5.

2.2 On-Site Assessment

2.2.1 Review of Performance Records

During the on-site visit the verification team has reviewed performance records, such as

- Technical setup and relevant details of the installed monitoring system equipment,
- Raw data generated by the installed monitoring system,
- Records related to the monitoring data aggregation trails,
- Operational records which can be used to countercheck the monitored data,
- Proofs of control measures taken by the PP to mitigate the reporting risk,
- Proofs of qualification measures for personnel involved in the monitoring.

Furthermore additional documents which have not been made available at the desk review stage, such as confidential or commercial sensitive data and / or documents related to the legal status of the project activity, such as approvals, authorizations and official stipulations, have been reviewed during the on-site visit.

2.2.2 Follow-up Interviews

The verification team has carried out interviews in order to assess the information included in the project documentation and to gain additional information regarding the compliance of the project with the relevant criteria applicable for the VCS. The main topics of the interviews with project participants, consultants and local stakeholders, if applicable, are summarized in Table 2-2.

Table 2-2: Interviewed persons and interview topics

Interviewed Persons / Entities	Interview topics
Project proponent representatives- Shanghai BASF Polyurethane Co. Ltd.	- General aspects of the project - Technical equipment and operation - Changes since validation - Monitoring and measurement equipment - Remaining issues from validation / previous verifications - Calibration procedures - Quality management system - Involved personnel and responsibilities - Training and practice of the operational personnel - Implementation of the monitoring plan - Monitoring data management - Data uncertainty and residual risks - GHG calculation - Procedural aspects of the verification - Maintenance - Environmental aspects - Editorial issues of the Monitoring Report - Emergency preparedness plans
Project consultant – Future Camp Climate GmbH	

A comprehensive list of all interviewed persons is part of section 5 ‘References’.

2.2.3 Collection of Measurements

During the on-site visit the verification team has collected and reviewed evidences of original measurement results, as obtained by the installed monitoring system. Furthermore all systems and procedural steps involved in the data aggregation have been checked in detail and corresponding data has been collected in order to enable the conceptualized detailed audit testing procedures.

2.2.4 Observation of established practices and testing of the accuracy of monitoring equipment

The verification team, during the on-site visit, was also focussed to observe actual monitoring practices. The team has interacted with the operational personnel responsible for the monitoring of the project activity in order to observe, as far as possible, how relevant monitoring practices and measures to ensure the accuracy of the monitoring results, such as functional tests, calibrations etc. are carried out.

2.3 Review of additional data from other sources if appropriate

In order to countercheck information obtained during the desk review and/or the on-site visit additional information sources have been reviewed. This involves, inter alia, the review of:

- relevant legislation, policies and other relevant legal information,
- applicable national norms and standards,
- information available in the public domain about comparable project activities,
- the verifiers project database, incl. project data comparisons.

All such data considered during the verification of this project activity is listed in chapter 5 of this report.

2.4 Verification of correct application of monitoring methodologies

The verification team has reviewed the monitoring system in order to assess the ongoing compliance with

- a) the applied monitoring methodology (i.e. the approved CDM methodology AM0034 version 03.2),
- b) applicable methodological tools related to the applied approved methodology and
- c) all validated i.e. approved deviations from the approved methodology and/or the applicable methodological tools.

Any deviations thereof, if applicable, are identified and assessed, in line with section 5.3 of VCS 2007.1, in context of section 3.1 of this report.

2.5 Review of monitoring results

The monitoring results as produced by the monitoring system have been reviewed, which includes:

- a) the raw data generation and the data aggregation trails up to the values given in the monitoring report.
- b) the control measures applied by the project participant to mitigate the reporting risk and
- c) the application of detailed data testing procedures which include, inter alia, statistical data analysis, calculation spreadsheet walk-throughs, data compari-

son, plausibility and data integrity checks, completeness checks, counter calculation of monitoring results.

The verification team has further checked whether the applicable accuracy requirements of the applied methodology or any other applicable standards are met. Any deviations thereof and related findings are reported in section 3 of this report.

2.6 Determination of reductions in GHG emissions

The emission reductions are determined as the difference of baseline and project emissions in line with the applicable monitoring methodology. On the basis of the achieved monitoring results the verification team has reviewed the correct

- application of the calculation formulae and
- the calculation procedure itself.

During the determination process the verification team determines whether in all calculations the principle of conservativeness has been established.

2.7 Resolution of any material discrepancy

Material discrepancies identified in the course of the verification are addressed either as CARs, CLs or FARs.

A **Corrective Action Request (CAR)** is established where:

- mistakes have been made in assumptions, application of the methodology or the project documentation which will have a direct influence the project results,
- the requirements deemed relevant for verification of the project with certain characteristics have not been met or
- there is a risk that the project would not be registered or that emission reductions would not be able to be verified and certified.

A **Clarification Request (CL)** will be issued where information is insufficient, unclear or not transparent enough to establish whether a requirement is met.

A **Forward Action Request (FAR)** will be issued when certain issues related to project implementation should be reviewed during the subsequent verification.

A detailed list of the CARs CLs and FAR raised and discussed in the course of this verification is included in the next section 3 of this report.

3 VERIFICATION FINDINGS

In this section the assessments and findings from the desk review of the VCS PD, site visit, interviews and supporting documents as well as the final assessments are summarised. Table 3-1 includes an overview of all raised CARs, CLs and FARs.

Table 3-1: Overview of CARs, CLs and FARs issued

No.	Topic / Chapter	CAR	CL	FAR
3.1	Remaining issues, including any material discrepancy	-	1	1
3.2	Project implementation	-	-	-
3.3	Completeness of monitoring	2	2	1
3.4	Accuracy of emission reduction calculations	1	-	1
3.5	Quality of evidence to determine emission reductions	-	-	-
3.6	Management and operational system	-	1	1
-	SUM	3	4	4

3.1 Remaining issues, including any material discrepancy, from previous validation

Description

The project was also validated by TÜV NORD. The validation report was issued on 2010-07-20². During the validation the following 2 FARs were issued:

- *FAR 3.1.5-1: "The verifier needs to check whether the project takes part in any other GHG programme".* This issue was discussed in detail with the PP during the site visit. The PP has confirmed that a) no other activities related to any other GHG programme have been carried out and b) no other activities are intended to be carried out. Nevertheless the PP is requested to issue a corresponding undertaking. In this context the CL 3.1-1 was raised. The verification team has further checked publicly available information to find out, whether another registration under any other GHG scheme has been achieved or is underway. No indication of such activities was achieved by the verification team. In order to ensure that this issue is addressed again during the next periodic verification the FAR remains active.
- *FAR 3.1.7-5: "Confidential data for baseline and historic campaigns should be made available again for verification".* During the 1st periodic verification the verification team has checked again all required information which was disclosed under confidentiality. No open issues remain in this context.

² On 2010-11-22 revision 1 was issued; in which an inconsistency within the report was corrected.

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During the validation of the project, which has been carried out by the same GHG auditor, the historic campaigns were already finished and the normal operating conditions of this historic campaign have been verified in the context of the validation. All related information have been described in the VCS validation report. The corresponding information was not verified again in the context of this verification.

So far the project is not yet registered with the VCS. As per oral information of the PP it is intended to submit the validation report together with this verification report in order to combine the registration and first issuance.

Thus, as no formal acceptance of this project has been achieved by the regulator the above statements are subject to the project's registration on the basis of the issued validation report without any material changes.

No other issues remain from the validation of the project.

Related Findings

- ☐ No CARs, CLs or FARs have been identified in this context
- ☒ The following finding(s) have been addressed:

Finding:	3.1-1		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	An undertaking shall be provided that the project does not take part in any other Emissions trading scheme.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	A confirmation by SBPC from 2 nd January 2011 is provided, stating that the project activity has not applied for crediting under any other scheme/crediting standard (Confirmation_Project-Crediting.bmp).		
DOE Assessment #1 <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	SBPC offers an undertaking that the project is only applying for crediting under the VCS standard. OK.		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☒ Appropriate action was taken ☐ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements		

Finding:	3.1-2		
Classification	☐ CAR	☐ CL	☒ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The verifier needs to check whether the project takes part in any other GHG programs.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>			
DOE Assessment #1 <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>			
Conclusion <i>Tick the appropriate checkbox</i>	☒ To be checked during the next periodic verification ☐ Appropriate action was taken ☐ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements		

Final Assessment

All remaining issues from the validation have been addressed appropriately.

3.2 Project implementation

Description

The project activity entails the installation of a secondary catalyst in the ammonia reactors at nitric acid production plant of Shanghai BASF Polyurethane Co. Ltd.. The project equipment has been installed before the VCS registration and no change is observed during the current VCS verification activity.

The project proponent, SBPC has installed a Continuous Emission Monitoring system provided by M/s ABB AO2000 URAS 26 comprising of a Continuous Emissions Analyser (for N₂O concentration of stack gas), sample probe, sample conditioning System, a Flow Sensor for stack gas flow measurement of M/s Dr. Födisch, Germany (FMD 99) and a data processing unit provided by M/s Durag, Germany (D-EMS-2000). The details of the project design have been described in chapter 1 of this report.

The composition of the ammonia oxidation catalyst was checked and is confirmed to be as per the registered VCS - Project Description for the baseline campaign and the gauze supplier has not changed ^{/CQC/}.

The project has been implemented as planned and described in the validated VCS - Project Description. No technical changes related to the project design have been carried out since the conclusion of the validation. Thus all related validation assessments are to be considered as valid.

Related Findings

- ☒ No CARs, CLs or FARs have been identified in this context
- ☐ The following finding(s) have been addressed:

Final Assessment

The project implementation is as described in the VCS PD.

3.3 Completeness of monitoring

Description

The monitoring system has been established on the basis of the approved CDM methodology AM0034 version 03.2 and the validated monitoring plan as described in the VCS-PD.

In order to implement the monitoring plan in the context of the project activity and to give additional guidance for the personnel involved in the monitoring, the PP has decided to create a so called VER Handbook. This VER handbook includes all provisions of the validated monitoring plan.

Considering the fact, that the necessity for MP revisions has already occurred and might further occur in the course of the crediting period and that deviations from the applied methodology can – in line with section 5.3 of the VCS 2007.1 – be approved in the course of future verifications, any revisions of the MP shall in future be tracked in the VER Handbook.

The VER Handbook (version 1, as of October 2010) has been checked in detail and the verifier confirms that all provisions of the validated MP – except the issues to be

discussed below - have been transcript to the VER Handbook. In the meantime correct amendments and modifications, concerning the findings discussed below, have been made in VER Handbook version 1.1, as of December 2010.

The following table includes a list of deviations from the validated monitoring plan as described in the VCS-PD which have already been implemented or are intended to be implemented in the course of the future project monitoring. In line with the VCS 2007.1 standard such deviations shall be permitted where they do not impact negatively on the conservativeness of the applicable methodological criteria and procedures. As a part of this verification the verifier has carried out the assessment of the listed deviations against this criterion. The specific validation opinion is included in below table.

No.	Deviation issue	Validation opinion
1	Introduction of additional monitoring parameters CL _{BL} and CL _n	These parameters have been included only for reasons of transparency. Basically this is the same parameter as NAP.
2	Renaming of parameters oxidation temperature and pressure (OT _{BC} , and OP _{BC}). BL, for baseline campaign has been substituted by BC	The change in parameter names has only been introduced for reasons of consistency and thus has no influence on the monitoring approaches.
3	Data storage provisions have been changed to allow the substitution of paper by other electronic means	This change is acceptable as it does not affect the intended redundancy of the monitoring information

As per the above discussion all above described deviations are acceptable and should further on be considered to constitute (together with all other provisions of the MP as described in the VCS-PD) a revised monitoring plan which is to be followed in future monitoring periods.

The monitored data has been checked in detail for the baseline campaign as well as for the first project campaign. The project monitoring follows the provisions of the international standard EN 14181.

During the first periodic verification the verification team has already assessed the completeness of the monitoring against the provisions of the revised MP. Except the issues addressed in the findings list below it is confirmed that all provisions of this monitoring plan are met, i.e.:

- All monitoring parameters listed in the MP have been monitored,
- All provisions regarding the monitoring equipment to be used have been met,
- All provisions regarding the frequency of monitoring are in line with the MP stipulations,

- The QA/QC procedures related to the monitoring have been established and were found to be effective.
- The provisions for archiving of relevant monitoring records have been implemented.

Related Findings

- ☐ No CARs, CLs or FARs have been identified in this context
- ☒ The following finding(s) have been addressed:

Finding:	3.3-1		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The BL campaign has started on March 13 th 2:00 a.m.. Thus the MR and the calculation need to be adjusted accordingly. Furthermore the baseline campaign was found to be finished by 2009-11-22 4:00 p.m., which is beyond CL _{normal} .		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The campaign starting date has been corrected and the campaign length has been adjusted to the normal campaign length (169,991.83 t HNO ₃) as production limit to the baseline. Please refer to revised monitoring report (MR_v2) and calculation tools (CT_BL_v2). In both documents this and secondary changes resulting from it have been implemented.		
DOE Assessment #1 <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	OK. All necessary corrections corresponding to the starting date and length of the baseline campaign have been made in the Monitoring Report and calculation tool. Thus CAR 3.3 -1 has been closed.		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies the requirements		

Finding:	3.3-2		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The NAP values considered for calculation have been derived on the basis of a fixed concentration factor of 68% and not on the basis of existing density measurements. As per the VER handbook the lab analysis, which is carried out twice a day should be considered as basis for calculation.		

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Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	Please refer to the amended calculation tools (CT_BL_v2; CT_P1_v2) where you may find the consideration of measured concentration factors from the lab analysis. Raw concentration data is presented in a special slide ("HNO₃ Concentration"). A daily value is then applied for recalculation of HNO₃ production (slides "BE-data-OH" and "PE-data"). This applied daily value is the average value of the two measurement values per day. The application of the directly measured concentration (instead of default values of 68%) leads to marginally higher production volumes. Resulting changed values also show up in the revised monitoring reports (MR_v2).
DOE Assessment #1 <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	OK. The revised calculation tools (_v2) and monitoring reports (_v2) have been corrected as required. Daily concentration values (determined as average values of two density measurements) have been used now for the calculation of all NAP values in baseline and project campaign. CL is closed.
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies the requirements

Finding:	3.3-3		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The MR should reflect significant events and other relevant changes during the monitoring period.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	Reflecting significant events during baseline and project campaigns, tables to the respective sections 1.4 of the baseline monitoring report (table 7) and 2.5 of project monitoring report (table 6) have been amended. Please refer to the revised monitoring reports (MR_v2).		
DOE Assessment #1 <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	OK., revision has been made. Significant events have been given in the final baseline monitoring report (v 2) in table 7 (a plant shut down over about 23 days) and in the final project monitoring report (v 2) in table 6 (a plant shut down over about 3 days). Also downtimes of the monitoring system are reported. This CAR is closed.		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies the requirements		

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Finding:	3.3-4		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	All revisions of / deviations from the validated monitoring plan which have been included in the newly designed VER Handbook should be described in detail.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	Version control of the changes to the validated monitoring plan had already been included both in the submitted monitoring report (v1) as well as the submitted monitoring plan (v2). During verification meeting the audit team though expressed its preference of having a more comprehensive version control included in the handbook only. Accordingly, the version control section (section 3) of the monitoring plan was erased and the existing explanation on changes to the monitoring plan of the handbook was further elaborated. On the extended explanations to all implemented changes/amendments vis-à-vis the PD, please refer to version control (section 2) of the revised monitoring plan (HB_v1.1).		
DOE Assessment #1 <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	Correct amendments were made; additional detailed information is given in the final version. OK, this CL is closed.		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☒ Appropriate action was taken ☐ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements		

Finding:	3.3-5		
Classification	☐ CAR	☐ CL	☒ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The provisions of the (validated) VER handbook are considered to substitute the MP provisions of the validated VCS-PD. Thus future verifications should be carried out against the provisions of the MP as described in the valid VER Handbook.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>			
DOE Assessment #1 <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>			

Conclusion <i>Tick the appropriate checkbox</i>	☒ To be checked during the next periodic verification ☐ Appropriate action was taken ☐ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies the requirements
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Final Assessment

The monitoring procedure is in-line with the validated PD and is assessed to be complete.

3.4 Accuracy of emission reduction calculations

Description

The calculation of the emission reduction is based on hourly averages data or parameters retrieved from the data processing unit (D-EMS-2000). Error readings or implausible values are automatically eliminated. Only hourly data have been used when the nitric acid plant generally operate “normal” in the VCS-PD defined ranges. The statistical evaluations for calculating campaign specific emissions, described in AM0034 /Version 03.2, are applied. For AMS down-time intervals during the baseline campaign the IPCC default value of 4.5 kg N₂O/tHNO₃ is taken; for AMS down-time intervals during the project campaign the highest measured emission factor (0.8625 kg N₂O/tHNO₃) is applied.

Calculation of baseline emission factor:

The original baseline campaign length is 180,988 tHNO₃, the average historic campaign length CL_{normal} is 169,992 tHNO₃. Therefore, CL_{normal} was used as a cap on the length of the baseline period $CL_{BC} = 169,958$ tHNO₃ (adjusted to the normal campaign length).

For calculating the emission factor, the overall uncertainty of the monitoring system (UNC = 4.59%) was taken into account. EF_{BC} is calculated traceable to be 7.25 kgN₂O/kgHNO₃.

Calculation of project emission factor:

The project campaign length $CL_{PC1} = 190,717$ tHNO₃ is longer than $CL_{normal} = 169,992$ tHNO₃. EF_{PC1} is calculated comprehensible to be 0.62kg N₂O/kgHNO₃.

Calculation of emission reduction:

The emission reduction for the project campaign #1 is calculated traceable in accordance to the requirement of AM0034 to be 391,678 tCO_{2e}.

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Related Findings

- ☐ No CARs, CLs or FARs have been identified in this context
- ☒ The following finding(s) have been addressed:

Finding:	3.4-1		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The weighted average calculation for EF should be executed on the basis of NAP shares.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	Please refer to calculation tools (CT_BL_v2; CT_P1_v2) where requested change has been applied. Slightly changed values as a result of NAP share based calculations also show up in the revised monitoring reports (MR_v2).		
DOE Assessment #1 <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The calculations (_v2) have been corrected as required. NAP shares have been used, all calculations for EF have been carried out in line with the requirements of AM0034. OK.		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the first periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements		

Finding:	3.4-2		
Classification	☐ CAR	☐ CL	☒ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The substitute value strategy, to account for downtimes of the monitoring system could be simplified for future verifications.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	This simplification shall be defined and implemented during second verification.		
DOE Assessment #1 <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>			

Conclusion <i>Tick the appropriate checkbox</i>	☒ To be checked during the next periodic verification ☐ Appropriate action was taken ☐ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements
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Final Assessment

The data monitoring systems are reliable, all calculations accurate and in line with the requirements of AM0034.

3.5 Quality of evidence to determine emission reductions

Description

The equipment AO2000 URAS 26 is capable of analyzing N₂O concentrations in the tail gas on a continuous basis. The volume flow rate of this tail gas is measured by the installed flow sensor FMD99. SBPC has a monitoring system which complies with EN 14181. As per the system detailed out in the methodology AM0034, a three level quality assurance is under implementation. These three levels are QAL1, QAL2 and QAL3.

QAL1 has been certified for both, the Automated Measuring System (AO2000-URAS26) dated 14-10-2006 ^{/QAL1_NC/} and for the volume flow meter (FMD 99) dated 13-05-2008 ^{/QAL1_V/}.

QAL2^{/QCR/} study has been carried out by AIRTEC Gesellschaft für Umweltmessungen GmbH. Under this test for the Automatic Measuring System, the EN 14181 has been used in conjunction with AM0034 methodology. The study was carried out from 13-10-2009 to 15-10-2009. This test confirms the compliance of CEM to AM0034.

QAL3 is carried out for the N₂O analyser every week by SBPC E&I Team to ensure continuous correctness of the monitoring system. Results are entered into QAL3 module in the DURAG system.

The correction factors derived from the calibration curve of the QAL2 audit for all components of the AMS as determined during the QAL2-test in accordance with EN14181 are applied to both NCTG and VTG.

Data output from the analyser will be processed using a data processing system from M/s DURAG GmbH. This processing unit is for a continuous acquisition of all monitored parameter, long-term storage and calculation of data. The data processing system is declared suitable for these performed tasks. The recording frequency of the

N₂O analyser (URAS 26) and volume flow rate of tail gas (FMD 99) is 2 seconds. The automated measuring system provides continuous readings for gas concentration and volume flow as average values for every 60 minutes of operation. This data from the CEM is available also in Excel format and is cross-checked to confirm the values of project campaign # 1 covered under the monitoring period.

The determination of nitric acid production (NAP) during baseline and verification period is based correctly on continues mass flow measurements together with lab analyses (density).

Related Findings

- ☒ No CARs, CLs or FARs have been identified in this context
- ☐ The following finding(s) have been addressed:

Final Assessment

The monitored data under the project are reliable and accurate to determine emission reductions. The installed monitoring equipment is according and calibrated appropriately to the requirement of AM0034.

3.6 Management and operational system

Description

SBPC is ISO 9001/14001 and 18001 certified^{/IMS/} and has proper procedures for data monitoring and recording. A CDM team at SBPC is responsible for data collection, analyses and archiving: A task group for the N₂O emission reduction project is supporting SBPC E&I engineer. The E&I engineer is responsible for maintenance and troubleshooting procedures. The calculation of the emission reduction is done by the CDM team and validated by the nitric acid plant manager, who prepares the report. The VCS project activity is reviewed periodically by the VCS Team and discussed weekly at data control and documentation meetings. Clear responsibilities for the project management in regard to the monitoring are implemented^{/ORG/}. Also concrete troubleshooting procedures have been defined in the VER Handbook. Staff is trained in monitoring procedures, training plans exists and training records are available^{/SQ/}.

Related Findings

- ☐ No CARs, CLs or FARs have been identified in this context

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☒ The following finding(s) have been addressed:

Finding:	3.6-1		
Classification	☐ CAR	☐ CL	☒ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	A procedure to backup the DURAG data could not be evidenced during the onsite visit.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The DURAG backup procedure will be explained during second verification.		
DOE Assessment #1 <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>			
Conclusion <i>Tick the appropriate checkbox</i>	☒ To be checked during the first periodic verification ☐ Appropriate action was taken ☐ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements		

Finding:	3.6-2		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Several editorial corrections are required to be addressed in the MR, the ER calculation tools and the VER Handbook.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	For amended changes, please refer to verification documents in their revised versions (MR_v2; CT_P1_v2; CT_BL_v2; HB_v1.1).		
DOE Assessment #1 <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	Correct amendments were made; the revised monitoring report, the calculation tools and the VER Handbook have been corrected and modified. OK.		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the first periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements		

Final Assessment

The CDM Team at SBPC has properly implemented roles and responsibilities for the project monitoring. A VER Handbook presents all essential information (measurement, data acquisition, maintenance, troubleshooting procedures, quality procedures etc.) and should be used by staff during plant operation.

4 VERIFICATION STATEMENT

Shanghai BASF Polyurethane Co. Ltd. has commissioned the TÜV NORD JI / CDM Certification Program to carry out the 1st verification of the Project “Catalytic Reduction of N₂O inside the Ammonia Burners of the Nitric Acid Plant in Caojing, Shanghai” in Shanghai, with regard to the requirements of VCS 2007.1 Standard. The verification covers the monitoring period from 2009-11-28 to 2010-06-30.

The project activity entails the installation of a secondary catalyst in the ammonia reactor at the nitric acid production unit of Shanghai BASF Polyurethane Co. Ltd. plant. Thereby reducing N₂O a potent GHG in to the atmosphere.

In the course of the verification 3 Corrective Action Requests (CARs), 4 Clarification Requests (CLs) and 4 Forward Action Requests (FAR) were raised.

The verification is based on the draft monitoring report, revised monitoring report, the monitoring plan as set out in the validated VCS PD, the validation report, emission reduction calculation spreadsheets and supporting documents made available to the TÜV NORD JI/CDM CP by the project participant.

In detail the conclusions can be summarised as follows:

- all operations of the project are implemented and installed as planned and described in the validated project description,
- the monitoring plan is in accordance with the applied approved methodology i.e., AM0034 version 03.2,
- the installed equipment essential for measuring parameters required for calculating emission reductions is calibrated appropriately,
- the monitoring system is in place and functional. The project has generated GHG emission reductions.

As the result of the 1st periodic verification, the verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

Project emissions	36,874 t CO ₂ equivalents.
Baseline emissions	428,552 t CO ₂ equivalents.
Emission reductions	391,678 t CO₂ equivalents.

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Essen, 2011-02-28

A handwritten signature in black ink, appearing to read 'Winter' in a cursive style.

Rainer Winter
TÜV NORD JI/CDM CP
Validation Team Leader

Essen, 2011-02-28

A handwritten signature in black ink, appearing to read 'Krupp' in a stylized, angular cursive.

Eric Krupp
TÜV NORD JI/CDM CP
Final Approval

5 REFERENCES

Table 5-1: Documents provided by the project participant

Reference	Document										
/AST/	Annual Surveillance Test report (draft version as of 2010-11-19).										
/BR/	Breakdown records for the respective equipments related to the for the project activity during the monitoring period.										
/BLS/	Business License of SBPC, issued by Shanghai City Industry and Commercial Administration Bureau (renewed on 2009-04-22), operation scope includes, among others, production of MDI, TDI and nitric acid.										
/CAG/	- Certificate of Analysis for project's calibration gas (N₂O) issued by Air Liquid Shanghai, dated 2009-10-15 and valid to 2010-10-14. - Certificate of Analysis for project's calibration gas (N₂O) issued by Air Liquid Shanghai, dated 2010-10-13 and valid to 2011-10-12.										
/DNH/	Delivery Note by gauze supplier.										
/IAR/	- Internal audit plan of 2009. - Internal audit plan of 2010. - Internal audit reports and results respective to the project activity.										
/IMS/	1. Quality Management System (ISO 9001: 2008) Certificate of SBPC issued by Shanghai Audit Centre of Quality System. 2. Environmental Management System (ISO 14001: 2004) Certificate of SBPC (2008-12-18) issued by Shanghai Audit Centre of Quality System. 3. Occupation Health and Safety Management System (OHSAS 18001: 1999) Certificate of SBPC (2008-12-18) issued by Shanghai Audit Centre of Quality System. (evidence for Quality Control and Quality Assurance of the SBPC).										
/IMR/	Instrument Maintenance Record (replacement equipment/meter/instrument): <table border="1"> <thead> <tr> <th>Parameter ID</th><th>Maintenance Date</th></tr> </thead> <tbody> <tr> <td>F130201</td><td>2007-09-16</td></tr> <tr> <td>T110216</td><td>2008-11-09 2010-07-11</td></tr> <tr> <td>P110225</td><td>December 2008</td></tr> <tr> <td>F120106</td><td>2010-01-28</td></tr> </tbody> </table>	Parameter ID	Maintenance Date	F130201	2007-09-16	T110216	2008-11-09 2010-07-11	P110225	December 2008	F120106	2010-01-28
Parameter ID	Maintenance Date										
F130201	2007-09-16										
T110216	2008-11-09 2010-07-11										
P110225	December 2008										
F120106	2010-01-28										
/IPM/	Invoice of precious metal purchasing.										
/LOG/	Log (Records) of the following were checked:										

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Reference	Document
	- N₂O concentration in the stack gas. - Operating Hours of the reactor. - Average concentration of nitric acid (%). - Gauze composition during project campaign.
/LA/	Layout of the project activity site describing the metering position.
/MR/	Monitoring report (version 1) for the project, dated 2010-11-15. Monitoring report (version 2) for the project, dated 2010-12- 01 (_v2_2010-12-01). Monitoring report (version 2) for the project, dated 2011-12- 01 (_v2_2011-02-25).
/MCC/	Preventable Maintenance Checking according to the ISO 9001's procedure: - Weekly Zero-check of the N₂O Analyzer (Parameter ID: Q120105; Location: A615). - SBPC Transmitters preventable maintenance check sheet (Parameter ID: F120106-02; Location: A615), dated 2009-04-18. - SBPC Transmitters preventable maintenance check sheet (Parameter ID: F120106-02; Location: A615), dated 2010-04-20. - SBPC Transmitters preventable maintenance check sheet (Parameter ID: T110216; Location A615), dated 2009-04-18. - SBPC Transmitters preventable maintenance check sheet (Parameter ID: T110216; Location A615), dated 2010-04-20. - SBPC Transmitters preventable maintenance check sheet (Parameter ID: F120106-01; Location A615), dated 2009-04-18. - SBPC Transmitters preventable maintenance check sheet (Parameter ID: F120106-01; Location A615), dated 2010-04-20. - SBPC Transmitters preventable maintenance check sheet (Parameter ID: F110137; Location A615), dated 2009-01-20. - SBPC Transmitters preventable maintenance check sheet (Parameter ID: F110137; Location A615), dated 2009-07-04. - SBPC Transmitters preventable maintenance check sheet (Parameter ID: F110137; Location A615), dated 2009-12-31. - SBPC Transmitters preventable maintenance check sheet (Parameter ID: F110137; Location A615), dated 2010-06-23 - SBPC Transmitters preventable maintenance check sheet (Parameter ID: P110225; Location A615), dated 2009-04-18. - SBPC Transmitters preventable maintenance check sheet (Parameter ID: P110225; Location A615), dated 2010-04-20. - SBPC Transmitters preventable maintenance check sheet (Parameter ID: F130201; Location A615), dated 2009-04-18. - SBPC Transmitters preventable maintenance check sheet (Parameter ID: F130201; Location A615), dated 2010-04-20.
/ORG/	Organizational chart with roles and responsibility of operating personnel working on the project activity for data collection, archiving and monitoring activi-

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Reference	Document
	ties (operational and management structure for the project activity).
/PMA/	Precious metal (Pt, Rd, Pd) Purchase Agreement between supplier and Shanghai BASF Polyurethane Co. Ltd, dated 2006-06-16.
/CQC/	Certifications of Quality of Catalyst Gauze.
/PMR/	Periodic Proof Test and Maintenance Record, dated on 2007-05-01, 2008-06-15, 2009-06-08 and 2010-07-04.
/QAL1_V/	QAL1 report (complete adherence of the measurement system FMD 99 to the requirements of EN14181 and EN ISO 14956) by TÜV Rheinland, dated 13-05-2008.
/QAL1_NC/	QAL1 report (complete adherence to the requirements of the analyzer system URAS26 to the requirements of EN14181), Bundes-Anzeiger, 20 th April 2007, No. 74.
/QCR/	QAL 2 calibration report, dated 2009-10-13 as per standard (EN 14181).
/SQ/	Staff's Qualification: - Staff's Training records in Maintenance Dept., dated on 2009-03-12, 2009-07-01, 2009-09-01, 2009-10-12 and 2010-03-01. - Operation training for staffs by experts from SBPC, BASF SE, Dr. Födisch AG and DURAG GmbH, dated on 2009-03-14.
/TS/	Technical specification: 1. Secondary Catalyst in the ammonia reactor 2. All the stake monitoring equipments 3. Technical specification of ABB A02000 URAS 26 for analysing N₂O concentration.
/VCS PD/	VCS Project Description - Catalytic Reduction of N ₂ O inside the Ammonia Burners of the Nitric Acid Plant in Caojing, Shanghai - PD Version 3, 24 th June 2010.
/VCS-VAL/	VCS Validation Report from TÜV NORD CERT GmbH - Catalytic Reduction of N ₂ O inside the Ammonia Burners of the Nitric Acid Plant in Caojing, Shanghai - Report No: 8000372692-09/208, 20 th June 2010 (rev 1 from 11 th November 2010).
/VER HB/	VER-Handbook, v1, as of October 2010; VER-Handbook, v1.1, as of November 2010; VER-Handbook, v1.1, as of December 2010; (Documentation of the monitoring procedures and their implementation).

Reference	Document
/XLS/	Emission reduction excel calculation spreadsheets (Vers. 1: CJ_Calc-Tool_BL; CJ_Calc-tool_PC1; Vers. 2: CJ_Calc-tool_PC1_v2_2011-01-27; CJ_Calc-Tool_BL_v2_2011-01-27).

Table 5-2: Background investigation and assessment documents

Reference	Document
/AM0034/	Approved CDM Methodology AM0034 /Version 03.2 "Catalytic reduction of N ₂ O inside the ammonia burner of nitric acid plants"
/AM0028/	Approved CDM Methodology AM0028, Version 4.1: "Catalytic N ₂ O destruction in the tail gas of Nitric Acid or Caprolactam Production Plants"
/CPM/	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)
/ESP/	Emission Standard of Pollutants for Nitric Acid Industry
/EN14181/	EN DIN 14181: Quality assurance of automated measuring systems
/IPPC/	1. 1996 IPCC Guidelines for National Greenhouse Gas Inventories: work book 2. 2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book
/VCS/	Voluntary Carbon Standard 2007.1
/VVM/	Validation and Verification Manual (Version 1.2)

Table 5-3: Websites used

Reference	Link	Organisation
/cd4cdm/	www.cd4cdm.org	UNEP Riso Centre
/ipcc/	www.ipcc-nggip.iges.or.jp	IPCC publications
/vcs/	www.v-c-s.org	VCSA
/unfccc/	http://cdm.unfccc.int	UNFCCC

Table 5-4: List of interviewed persons

Reference	Mol ¹		Name	Organisation
/IM01/	V	☒ Mr. ☐ Ms	Jeff Dai	Shanghai BASF Polyurethane Co. Ltd/ DGM, Maintenance, Engineering & EHS
/IM01/	V	☐ Mr. ☒ Ms.	Karolina Zhang	Shanghai BASF Polyurethane Co. Ltd/ Process Engineer
/IM01/	V	☒ Mr. ☐ Ms.	Li Qiang	Shanghai BASF Polyurethane Co. Ltd/ Instrument Engineer
/IM01/	V	☒ Mr. ☐ Ms	Xue Ping Di	Shanghai BASF Polyurethane Co. Ltd/ Working Staff
/IM01/	V	☒ Mr. ☐ Ms	Wu Hai	Shanghai BASF Polyurethane Co. Ltd/ Chief of Metering Maintenance
/IM01/	V	☒ Mr. ☐ Ms.	Markus Wiehe	BASF/ Business Development Green House Gas Projects
/IM02/	V	☒ Mr. ☐ Ms.	Daniel Scholz	FutureCamp Climate GmbH/ Emission Trading & Climate Projects

¹⁾ Means of Interview: (Telephone, E-Mail, Visit)