VERIFICATION REPORT

DONAUCHEM NITROUS OXIDE ABATEMENT PROJECT IN ROMANIA

(ITL Project ID: RO1000219)

Monitoring Period:
13 September 2010 to 28 February 2012

REPORT NO. 2012-0727

REVISION NO. 01

DET NORSKE VERITAS

VERIFICATION REPORT

Date of first issue: 1 July 2012	Project No.: PRJC-373004-2012-CCS-NOR
Approved by Trine Kopperud	Organisational unit: DNV KEMA Energy & Sustainability Accredited Climate Change Services
Client: MGM Logistics, LLC.	Client ref.: Vladyslav Zhezherin

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Summary:

DNV Climate Change Services AS (DNV) has performed the verification of the emission reductions reported for the Joint Implementation (track 1) project activity "DonauChem Nitrous Oxide Abatement Project" in Romania (ITL Project ID: RO1000219) for the period 13 September 2010 to 28 February 2012.

In our opinion, the GHG emission reductions reported for the project in the monitoring report (Version 02) of 15 May 2012 are fairly stated.

The GHG emission reductions were calculated correctly on the basis of the approved monitoring methodology AM0034 (version 3.2) and the monitoring plan contained in the Project Design Document of 28 January 2010.

DNV Climate Change Services AS is able to certify that the emission reductions from the Joint Implementation (track 1) project activity "DonauChem Nitrous Oxide Abatement Project" in Romania during the period 13 September 2010 to 28 February 2012 amount to 543 483 tonnes of CO_2 equivalent.

Report No.: 2012-0727	Subject Group: Environment	
Report title: DonauChem Nitrous Oxide Abatement Project		
Work carried out by: Petr Cermánek, Rafi-ud-Din Khawaja		
Work verified by: Patrice Massicard (applicant), Trine Kopperud		
Date of this revision: 1 July 2012	Rev. No.: 01	Number of pages: 18

Indexing terms

Key words Climate Change Kyoto Protocol Validation Clean Development Mechanism	Service Area Verification Market Sector Process Industry

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Abbreviations

AIE	Accredited Independent Entity
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction(s)
CH_4	Methane
CL	Clarification request
CO_2	Carbon dioxide
CO_{2e}	Carbon dioxide equivalent
DCS	Distributed control system
DNV	Det Norske Veritas
DNA	Designated National Authority
EPA	Environmental Protection Agency of Romania
FAR	Forward Action Request
GHG	Greenhouse gas(es)
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
N_2O	Nitrous oxide
PDD	Project Design Document
UNFCCC	United Nations Framework Convention on Climate Change
GWP	Global Warming Potential

1 INTRODUCTION

MGM Logistics, LLC. has commissioned DNV Climate Change Services AS (DNV) to carry out the verification of emission reductions reported for the Joint Implementation (track 1) project activity "DonauChem Nitrous Oxide Abatement Project" (the project) in the period 13 September 2010 to 28 February 2012. This report contains the findings from the verification and a verification statement for the emission reduction units.

1.1 Objective

Verification is the periodic independent review and *ex post* determination by an Accredited Independent Entity (AIE) of the monitored reductions in GHG emissions that have occurred as a result of the registered JI project activity during a defined monitoring period.

The objective of this verification was to verify emission reductions reported for the "DonauChem Nitrous Oxide Abatement Project" for the period 13 September 2010 to 28 February 2012.

DNV has ensured that the following objectives were addressed during its assessment:

- The project activity has been implemented and operated as per the registered PDD /1/ and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- The monitoring report /2/ and other supporting documents provided are complete in accordance with the latest applicable JI requirements;
- Actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan /1/ and the approved methodology /20/;
- Data is recorded and stored as per the monitoring methodology AM0034, version 3.2. /20/

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 reported GHG emission data is sufficiently supported by evidence.

The verification shall ensure that reported emission reductions are complete and accurate in order to be certified.

The verification is incorporating both quantitative and qualitative information on emission reductions.

DNV's verification is based on the monitoring documentation /2//3/ provided by the PP, furthermore DNV has reviewed the registered PDD /1/ (including monitoring plan) and determination report /5/, previous verification report /6/, the applied monitoring methodology /20/, relevant decisions, clarifications and guidance from the CMP and the JI SC and any other information and references relevant to the project activity's resulting emission reductions.

1.3 Project Parties: Name of Project Parties (Host and other Parties)

Title of project activity:	*''DonauChem Nitrous Oxide Abatement Project'' in Romania*
UNFCCC registration No:	*ITL Project ID: RO1000219*
Baseline and monitoring methodology	*AM0034 (version 3.2)*
Project Participants:	*S.C. DonauChem S.R.L., Str. Portului nr. 1, 145200 Turnu Magurele, Jud. Teleorman, Romania, Dr. Constantin Neagoe, 0247-416438, constantin.neagoe@donauchem.ro*
Location of the project activity:	*Turnu Magurele in Teleorman Province in Romania*
Project's crediting period:	17 July 2009 to 31 December 2012
Period verified in this verification:	13 September 2010 to 28 February 2012

1.4 Methodology for Determining Emission Reductions

According to the AM0034, version 3.2 /20/, 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:

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

Where:

ER	Emission reductions of the project for the specific campaign (tCO2e)
NAP	Nitric acid production for the project campaign ($tHNO_3$). The maximum value of NAP shall not exceed the design capacity.
EF_{BL}	Baseline emissions factor ($tN_2O/tHNO3$)
EF_P	Emissions factor used to calculate the emissions from this particular campaign (i.e. the higher of EFma,n and EFn) – see below
GWP_{N2O}	Global warming potential of N_2O = 310

The average mass of N_2O baseline emissions per hour is estimated as product of the NCSG and VSG after applying statistical process as per the methodology requirements. The N_2O emissions per campaign are estimates product of N_2O emission per hour and the total number of complete hours of operation of the campaign using the following equation:

$$BE_{BC} = VSG_{BC} * NCSG_{BC} * 10^{-9} * OH_{BC} \quad (tN_2O)$$

The plant specific baseline emissions factor representing the average N_2O emissions per tonne of nitric acid over one full campaign is derived by dividing the total mass of N_2O emissions by the total output of 100% concentrated nitric acid for that period. The overall uncertainty of the monitoring system is determined and the measurement error is expressed as a percentage (*UNC*). The N_2O emission factor per tonne of nitric acid produced in the baseline period (EF_{BL}) shall then be reduced by the estimated percentage error as follows:

$$EF_{BL} = (BE_{BC} / NAP_{BC}) (1 – UNC/100)$$

where:

EF_{BL} Baseline N_2O emissions factor ($tN_2O/tHNO_3$)

BE_{BC} Total N_2O emissions during the baseline campaign (tN_2O)

$NCSG_{BC}$ Mean concentration of N_2O in the stack gas during the baseline campaign (mgN_2O/m^3)

OH_{BC} Total number of operating hours of the baseline campaign (h)

VSG_{BC} Mean gas volume flow rate at the stack in the baseline measurement period (m^3/h)

The average mass of N_2O project emissions per hour is estimated as product of the NCSG and VSG. The N_2O emissions per campaign are estimates product of N_2O emission per hour and the total number of complete hours of operation of the campaign using the following equation:

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

where:

VSG Mean stack gas volume flow rate for the project campaign (m^3/h)

NCSG Mean concentration of N_2O in the stack gas for the project campaign (mgN_2O/m^3)

PEn Total N2O emissions of the nth project campaign (tN_2O)

OH The total number of operation hours of the project campaign (h)

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:

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

In order to take into account possible long-term emissions trends over the duration of the project activity and to take a conservative approach a moving average emission factor is estimated estimated as follows:

$$EF_{ma,n} = (EF_1 + EF_2 + \ldots + EF_n) / n \quad (tN_2O/tHNO_3)$$

To calculate the total emission reductions achieved in a campaign, the higher of the two values $EF_{ma,n}$ and EF_n is applied as the emission factor relevant for the particular campaign to be used to calculate emissions reductions (EF_p) in equation given for ER above. Thus:

If $EF_{ma,n} > EF_n$ then $EF_p = EF_{ma,n}$

If $EF_{ma,n} < EF_n$ then $EF_p = EF_n$

Further a campaign-specific emissions factor shall be used to cap any potential long-term trend towards decreasing N_2O emissions that may result from a potential built up of platinum deposits. After the first ten campaigns of the crediting period of the project, the lowest EF_n observed during those campaigns will be adopted as a minimum (EF_{min}). If any of the later project campaigns results in a EF_n that is lower than EF_{min}, the calculation of the emission reductions for that particular campaign shall use EF_{min} and not EF_n As 10 project campaigns are not yet completed this is not applicable to this verification period.

In AM0034 version 3.2 /20/ no leakage calculation is required.

2 METHODOLOGY

The verification of the emission reductions has assessed all factors and issues that constitute the basis for emission reductions from the project. These include:

i) Emission factors for baseline, 3rd and 4th campaigns calculated as described above /2//3/;

ii) Records related to measuring quantity of produced HNO_3 /15//17/;

iii) Records related to collected data in AMS system (NDIR analyser, flow, temperatures, pressures);

iv) Catalyst information /13//14/;

v) Records on validation and/or calibration of the measuring equipment, standards and calculation software/12//16//18/.

The verification team has during its preparations identified the key reporting risks and used the assessment to determine to which extent the project operator's control systems were adequate for mitigation of these key reporting risks. In addition, other areas that can have an impact on reported emission reductions have also undergone detailed audit testing.

2.1 Verification Process

The verification process includes desk review of the monitoring report (and any updated versions) /2/, emission reduction calculation spread sheets /3/ and other supporting documents and data. Further, onsite assessments and interviews with those involved in project management and operations are conducted /24//25//26/. This follows preparation of draft verification report summarizing desk review and on-site assessment findings (i.e. CARs, CLs, and FARs). Upon successful closing of the CARs and CLs raised, the final verification report is prepared. The final report then undergoes a technical review, senior technical review, and final approval according to DNV's internal quality assurance procedures.

The data presented in the monitoring report /2/ were assessed by review of the detailed project documentation /1/ and production records /3//15//17/, as well as by interviews with personnel at Donau Chem srl /24//25/ and MGM Worldwide LLC /26/, and observation of collection of measurements, observation of established monitoring and reporting practices /2//7/ and assessment of the reliability of monitoring equipment /12//16//18/. This has enabled the verification team to assess the accuracy and completeness of reported monitoring results; to

verify the correct application of the approved monitoring methodology /20/ and the determination of the emission reductions.

In addition all parameters required by the monitoring methodology AM0034, version 3.2 /20/, and the management system were assessed during the site visit.

2.2 Verification Team

The verification team and their roles and involvement in the verification process are provided in the following table:

Verification team

				Type of involvement						
Role	***Last Name***	***First Name***	***Country***	Administrative	Desk review	Site visit	Reporting	Supervision of work	Technical review	TA 5.1 competence
Technical team leader (verifier)	Khawaja	Rafi –ud-Din	Norway		✓	✓	✓	✓		✓
Sector expert / accessor under training	Cermánek	Petr	Prague		✓	✓	✓			✓
Technical reviewer (applicant)	Massicard	Patrice	Norway						✓	
Technical reviewer	Kopperud	Trine	Norway						✓	✓

Duration of verification

Preparations: *From 02-04-2012 to 06-04-2012*

On-site verification: *12-04-2012*

Reporting, calculation checks and QA/QC*: From 17-05-2012 to 1 July 2012*

2.3 Review of Documentation

Basic document for the verification was the monitoring report for the second monitoring period from 13 September 2010 to 28 February 2012, version 1 dated 30 March 2012 and version 2 dated 15 May 2012 /2/ and spreadsheets with raw data and ERU calculation for 3rd and 4th campaign /3/, which covers the second monitoring period and which were submitted prior to the site visit.

In addition, the PDD version 2.1 dated 28 January 2010 /1/ was reviewed simultaneously with DNV determination report /5/, DNV verification report for the first monitoring period from 1

June 2009 to 12 September 2010 /6/ as well as the approved baseline and monitoring methodology AM0034 version 3.2 /20/. The project owner also provided evidences related to QAL1 and QAL2 and AST tests /8//9//11//12/, information about catalysts /13//14/ and certificates of calibration gases /18/.

All provided documents were assessed in accordance with Romanian Track 1 procedure and JI determination and verification manual.

The primary documents logbooks of nitric acid production, weekly maintenance checks and calibration report, laboratory records, trainings and information about legal requirements were available during the site visit.

2.4 Site Visits

The site visit was performed on 12 April 2012 at DonauChem plant in Turnu Magurele in Romania. The personnel who were interviewed or assisted the verification team during the site visit to:

- confirm that the operational and data collection procedures are implemented in accordance with the monitoring plan in the PDD,
- assess operation of the JI project activity is as per the registered PDD,
- cross-check between information provided in the monitoring report and data from other sources such as plant log books, inventories, purchase records or similar data sources,
- check the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PDD and the selected methodology,
- review information flows for generating, aggregating and reporting the monitoring parameters,

is specified in the table in section 5 (References).

2.4.1 Audit agenda

The agenda of the site visit 12 April 2012 was as follows:

08:00	Opening meeting / set agenda	
08:15	Project status and JI project management and responsibilities	
		Project status, main events related to JIP during the monitored period
		Deviations to the monitoring plan (if any)
		FARs from the 1st verification
		Operational and management structure of the JIP
09:15	Assessment of primary / secondary catalysts ex-changes	
		Documentation of primary catalyst installations (project campaigns)
		Documentation of secondary catalyst installations (project campaigns)
09:45	Operating Conditions	

Checking the project campaigns operational data

10:30 Assessment of monitoring equipment and calibration procedures, plant inspection

Ammonia oxidation reactor (AOR) monitoring equipment – calibration routines and documentation for all AOR parameters, inspection

N_2O analyzer and stack gas flow meter – calibration routines, inspection

Calibration gases and its validity – inspection

Lab for nitric acid measurements (density, concentration) – inspection

QAL1 certificates and QAL 2 / QAL 3 / AST reports

Determination of overall uncertainty of the automated measuring system (AMS)

Nitric acid production and mass balance calculations

13:30 Check of raw data for project campaigns

Assessment of raw data for project campaigns including trend curves

Calculation spread sheets

15:00 Assessment of Management system and Quality assurance

Procedures for training of monitoring personnel

Procedures for maintenance of monitoring equipment

Procedures to handle unexpected problems (troubleshooting)

Procedure for accessing the data

Routines for handling, archiving and securing of all required data; transfer of data to MGM

Procedure for internal audit

Procedure for follow-up regulation on N_2O and NOx emissions

16:00 Preparation for close-out meeting

16:30 Close-out meeting and presentation of findings

2.4.2 Assessment

Data and information provided by project participants were assessed and confirmed with primary records /15/ provided during the site visit and interviews with personnel at DonauChem /24//25/ and MGM /26/. Procedures established for ensure monitoring and

recording of individual parameters required by monitoring plan and monitoring methodology AM0034, version 3.2 /20/ were presented to verification team for assessment.

This has enabled the verification team to assess the accuracy and completeness of the reported monitoring results and to verify the correct application of the approved monitoring methodology and the determination of the reductions in N_2O emissions except findings found and reported in this document. All issued CARs and CLs were properly solved by project participants and included into the revision 02 of the monitoring report (dated 15May 2012) prior to finalization of this version of the verification report.

2.5 Reporting of Findings

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 a FAR during validation to be verified during verification 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 monitoring period.

Five CARs were issued, related to missing information in the monitoring report (response to open FARs from the first verification) or mistakes in ERUs calculation (wrong baseline EF, wrong correction factor for N_2O, missing or wrong data of nitric acid production). Also three CLs were issued related to clarification of information about the primary catalyst exchange, TAG numbers of gauze temperatures and the calibration date of the stack pressure meter. The CARs and CLs were sufficiently solved prior to finalization of this version of the verification report. No FAR was identified during this verification.

For more details see Appendix A.

3 VERIFICATION FINDINGS

This section summarises the findings from the verification of the emission reductions reported for the "DonauChem Nitrous Oxide Abatement Project" for the period 13 September 2010 to 28 February 2012.

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

Four FARs (out of five) were remaining opened from the previous (first) verification.

First FAR was related to internal audits – the PP has developed the plan of internal audits and assured its implementation and realization. It was evidenced by the report from the internal audit, thus the FAR1 is closed.

Second FAR was related to AST. The PP has assured the AST on a yearly basis or in case of any events that require unscheduled AST. Thus the FAR2 is closed.

Third FAR was related to EPA checking of the project as required by the Romanian JI Track I procedures. The PP has presented the protocol from the EPA audit at the plant with no specific requirements regarding the project. Thus the FAR3 is closed.

Last opened FAR was related to risk approach procedures in the light of spare parts and calibration procedures. Donauchem has established necessary mechanisms for training of personnel in case of problems with Shewart chart results; and assigning of responsible person of AMS manufacturer that provides plant with necessary spare parts and services. Thus the FAR5 is closed.

For more details see Appendix A.

3.2 Project Implementation

DNV verified that the project is implemented in accordance to the description contained in the registered PDD of 28 January 2010 /1/. The verification team confirmed, through visual inspection that all physical features of the proposed JI project activity including data collection systems and storage have been implemented in accordance with the registered PDD. DNV confirmed during the on-site visit that the JI project is completely operational.

Campaigns covered in this verification period:

The 3rd project campaign started on 13 September 2010 and was finished on 2 April 2011 /2//15/. The 4th project campaign started on 3 April 2011 and was finished on 28 February 2012 /2//15/.

The determination of the permitted operating ranges and the monitoring data in the baseline campaign was verified by DNV during the previous (1st periodic) verification /6/.

The type of the primary catalyst used during the both project campaigns (95% Pt, 5% Rh) was confirmed to be identical with the baseline campaign and the historical project campaigns through the certificates of catalysts and the catalyst invoices. The only change is in the supplier of the primary catalyst – Umicore (used in the 3rd campaign) was ex-changed with Heraeus in the 4th campaign /13//14/.

The secondary catalyst used during the both campaigns is still the same as during the campaigns No. 1 and 2.

In addition, for N_2O analyzer, weekly checking was performed by Shewhart chart /4/. The QAL1, QAL2 and annually AST have been presented /8//9//11//12/.

3.3 Information (data and variables) provided in the monitoring report that is different from that stated in the registered PDD

The 3rd project campaign length (119 916 tons HNO_3) as well as the 4th project campaign length (107 721 tons HNO_3) was greater than the normal campaign length (92 859 tons HNO_3) /2//15//17/. Thus, the baseline emission factor without recalculation has been used. The NCSG, NAP, OH, and average VSG have been calculated from values taken from the total baseline.

As per the determination report /5/, the design capacity of nitric acid plant is 240 000 t 100% nitric acid per year and the plant production will be varied as follows (according to DonauChem production plan): 2009 – 168 000 t, 2010 – 216 000 t, 2011 – 2018 – 235 000 t. The total nitric acid production of 227 637 tons 100% HNO_3 over the monitoring period from 13 September 2010 to 28 February 2012 (i.e. in 534 days) represents that the actual nitric acid production was lower than the design capacity (ie. 227 637 * 365/534 = 155 595 tons 100% HNO_3).

The predicted annual emission reductions in the registered PDD are 488 756 tCO2e for 2010 (365 days) and 531 749 tCO2e for 2011 and 2012 (365 days) /1/. Thus, the daily emission reductions estimated in the PDD are 1 339 tCO2e/day and 1 456 tCO2e/day for 2010 and 2011-2012, respectively. The emission reductions for both 3rd and 4th campaigns, which covers period 13 September 2010 to 28 February 2012 (i.e. 534 days), are 543 483 tCO_{2e} /2//3/. This corresponds to 1 018 tCO2e/day of daily emission reductions for the monitoring period. Thus the actual emission reductions are lower than the one estimated in the PDD.

3.4 Compliance of the monitoring plan with the monitoring methodology

The monitoring plan in the registered PDD /1/ was confirmed to be in accordance with the approved monitoring methodology, AM 0034, version 3.2 "Catalytic reduction of N_2O inside the ammonia burner of nitric acid plants" /20/, applied by the proposed JI project activity. All parameters stated in the monitoring plan are monitored and reported appropriately. The monitoring arrangements and sustaining records are sufficient to enable verification of emission reductions.

3.5 Compliance of monitoring with the monitoring plan

DNV confirms that the monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD of 28 January 2010 /1/. All parameters stated in the validated monitoring plan are monitored and reported appropriately.

DonauChem used Sidor Sick Maihak NDIR analyzer for N_2O concentration monitoring and Flowsick model FLSE100 for monitoring stack gas flow rate. The provided QAL1 /8/ and QAL2 /9/ tests were reviewed during the previous verification. The AST tests was realized by SGS Environmental Services in November 2009 /10/, December 2010 /11/ and November 2011 /12/ and confirmed that as Sidor so Flowsick are in compliance with the standard EN

14181.

As QAL3 realization records Shewart chart were provided /4/. The zero and span correction is provided every week and the data are resulted to the Shewart chart. The chart shows very few abnormalities, which were corrected by span and zero calibration.

All main parameters stated in the monitoring plan are monitored and reported appropriately except for the observations described in the CARs. The CARs was addressed properly in the revised monitoring report (version 2 of 15 May 2012).

3.6 Assessment of Monitoring Parameters

DNV verified the information flow for each parameter. Section 3.6.1 describes the data generation, aggregation and recording and how it has been verified by DNV. While sections 3.6.2 to 3.6.4 describe the verification of calculations and reporting by DNV for each of the parameters. Furthermore, DNV confirms that the assumptions, emission factors, default values that are applied have been justified.

3.6.1 Information flow

Most of the monitored parameters are measured continuously at the nitric acid plant (N_2O concentration, stack gas flow, temperature and pressure of the stack gas, oxidation temperature, and ammonia / air flow). All parameters are recorded in DCS and used for the calculations of achieved emission reductions in excel sheets /3/ as well as for reporting /2/.

Nitric acid production is measured by a float type level indicator at storage tanks and recorded in log books /15/. Archived values are used for the calculation of achieved emission reductions /3/ as well as for reporting /2/.

The type of the primary catalyst used is defined through the catalyst certificates and invoices /13//14/. This information is used also for reporting.

The verification team physically assessed the information flow and data collection system during the site visit and confirms that it meets the requirements of the monitoring plan contained in the registered PDD /1/ as per the applied and approved methodology AM0034, version 3.2. /20/

The verification team confirms that the monitoring report /2/ includes all parameters and the monitored data at the interval required by the methodology and PDD.

Each parameter and the values verified are listed in detail in Appendix B.

3.6.2 Historical data and permitted operating conditions

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) has been verified during the previous verification /6/.

The normal campaign length is 92 859 $tHNO_3$ /1//5/. Even if the supplier of the primary catalyst was changed between the 3rd (Umicore) and 4th (Heraeus) project campaign /13//14/, the composition of gauzes remained as defined in the registered PDD /1/ – 95% Pt + 5% Rh.

3.6.3 Monitored data for baseline emissions

The verification of the baseline campaign data and the determination of the baseline campaign emission factor were included in the scope of the previous verification /6/.

The baseline emission factor is applicable for both 3rd and 4th campaigns since the length of the project campaigns is 119 916 tons HNO_3, resp. 107 721 tons HNO_3 and hence longer than the average historic campaign length CL_{normal} of 92 859 tons HNO_3 so no recalculation of the baseline emission factor was needed /1//2/.

3.6.4 Monitored data for project emissions

The project campaigns data were provided and has been verified by DNV during this verification period. The 3rd project campaign covers period from 13 September 2010 to 2 April 2011 and 4th project campaign is dated from 3 April 2011 to 28 February 2012. The verification of project campaigns data and the project campaigns' emission factors /2//3/ was done against primary data from AMS, logbooks and production reports presented during the site visit /15//17/.

The only emission source from the project is the remaining quantity of N_2O in the stack gas. The parameters, corresponding equipment and related documentations (referring to the section D.1.1.1 of the registered PDD /1/ and the section III of the monitoring methodology AM0034 /20/) which have been assessed in detail are listed in Appendix B.

3.6.5 Default data

Default data were used only on 7 January 2011 during downtime of the analyzer was in /2//3//15/. During this down time period the highest value of N_2O emissions throughout of the campaign was used for the emission reductions calculation /3/ which is conservative approach.

3.6.6 Emissions outside the project boundary and leakages

There are no additional emissions to be recorded outside the project boundary. As per the requirements of the methodology /20/ leakage does not need to be taken into consideration.

3.7 Assessment of data and calculation of emission reductions

According to the AM0034 version 3.2 /20/, 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.

DNV confirms that appropriate methods and formulae for calculating baseline emissions and project emissions have been applied.

3.7.1 Baseline emission factor

According to the AM0034 version 3.2 /20/, the baseline emission factor is calculated by dividing the total mass of N_2O emissions by the total output of 100% concentrated nitric acid produced in the baseline period and then reduced by the overall uncertainty of the monitoring system.

In order to determine the baseline emission factor, the overall uncertainty of the monitoring system has been determined by QAL2 report which was carried out by SGS Environmental Services in October 2008 /9/.

The baseline emission factor is calculated 0.00824 $tN_2O/tHNO_3$. The baseline calculation was verified by DNV during the 1st verification /6/ and deemed correct.

3.7.2 Project emission factor

According to the AM0034 version 3.2 /20/, the campaign specific emissions factor (EFn) is calculated by dividing the total mass of N_2O emitted during that campaign by the total production of 100% concentrated nitric acid during the campaign.

The project emission factor for the 3rd project campaign is calculated to be 0.00051 $tN_2O/tHNO_3$. The project emission factor for the 4th project campaign is calculated to be 0.00057 $tN_2O/tHNO_3$ /2//3/. The project emission factors calculations were verified by DNV during this verification and deemed correct.

The moving average project emission factor up to 3rd campaign is 0.000375 $tN_2O/tHNO_3$ and it is lower than project emission factor for the 3rd campaign of 0.00051 $tN_2O/tHNO_3$ /2/. Thus the emission factor for the 3rd project campaign is to be applied as the particular emission factor for the 3rd campaign towards emission reduction calculations.

The moving average project emission factor up to 4th campaign is 0.0004775 $tN_2O/tHNO_3$ and it is lower than project emission factor for the 4th campaign of 0.00057 $tN_2O/tHNO_3$ /2/. Thus the emission factor for the 4th project campaign is to be applied as the particular emission factor for the 4th campaign towards emission reduction calculations.

3.7.3 Emission reduction

According to AM0034 version 3.2 /20/, the emission reductions for the project activity over a specific campaign are determined as follows:

$$ER_n = (EF_{BL} - EF_p) \cdot NAP_n \cdot GWP_{N_2O}$$

Where

ER_n	Emission reductions of the project for the *nth* campaign, tCO_2e
EF_{BL}	Baseline emission factor, in $tN_2O/ tHNO_3$
EF_p	Project emission factor, applicable to the *nth* campaign, in $tN_2O/ tHNO_3$
NAP_n	Nitric acid production during the *nth* campaign of the project activity, in, $tHNO_3$
GWP_{N_2O}	global warming potential, of N_2O set as 310 tCO_2e/tN_2O for the 1st commitment period

As indicated, the present Monitoring period covers 2 campaigns in the following period: from September 13th, 2010 to February 28th 2012 /2/.

The emission reductions in the 3rd campaign are calculated 287 355 tCO_{2e} /2//3/. The emission reductions in the 4th campaign are calculated 256 128 tCO_{2e} /2//3/. The emission reductions calculations were verified by DNV during this verification and deemed correct.

Thus the overall emission reductions achieved during the monitoring period from September 13th 2010 to February 28th 2012 are 543 483 tCO_{2e} /2/.

The daily emission reductions estimated in the PDD are 1 339 tCO2e/day and 1 456 tCO2e/day for 2010 and 2011-2012, respectively /1/. The emission reductions for the period from September 13th 2010 to 28th February 2012 (i.e. 534 days) are 543 483 tCO_{2e}. This corresponds to 1 018 tCO2e/day of daily emission reductions for the monitoring period. Thus the actual emission reductions are lower than the one estimated in the PDD.

3.8 Quality of Evidence to Determine Emission Reductions

Complete set of data for the monitoring period was made available to DNV.

DNV confirms that the calculations of baseline and project emission factors have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology document.

The main data are collected continuously by common AMS system and software used is Sick Maihak system covers Sidor Sick Maihak NDIR N_2O analyser, Sick Maihak model FLSE flow meter with transducer FLE-100, temperature measurement PT 100 and pressure sensor ABB. The nitric acid production is collected once per shift (8 hours) manually into the logbook.

The verification team confirmed the consistency of the AMS records, logbooks and excel sheets. Errors, which were found, were corrected prior to finalization of this report.

Calibration of test measurement devices was demonstrated by individual certificates presented on site /10//11//12//16//19/. All calibrations were found as correct and cover whole period of both campaigns.

The NDIR N_2O analyser has been calibrated once every week by a built-in calibrator with standard test gases /4/. The calibration frequency is in line with the recommendation of producer. The certificates of the test gases /18/ were available for verification.

The other measurements are performed by calibrated equipment according to the documented calibration procedures /19/. The key data were also cross-checked by the verification team via other sources, such as production log sheets /15/, mass balance /17/ and meters available in the operators control room or on-site.

3.9 Management System and Quality Assurance

The project is operated by DonauChem. The monitoring and reporting of data under the JI activity have been conducted by the collaboration of DonauChem and MGM International. The quality assurance and quality control procedures in terms of equipment operation and maintenance as well as data reporting are covered by the documented procedures /7/. The responsibilities and authorities for monitoring and reporting are in accordance with the responsibilities and authorities stated in the monitoring plan /1/.

Data handling solutions involve redundancy, data manipulation protection, integrity check as well as proper archiving.

The JI project is also subject of the periodical internal audit.

4 VERIFICATION STATEMENT

DNV Climate Change Services AS (DNV) has performed the verification of the emission reductions that have been reported for the "DonauChem Nitrous Oxide Abatement Project" (ITL Project ID: RO1000219) for the period 13 September 2010 to 28 February 2012. The crediting period is from 17th July 2009 to 31st December 2012 (fixed).

The project participants are responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project.

It is DNV's responsibility to express an independent verification statement on the reported GHG emission reductions from the project. DNV does not express any opinion on the selected baseline scenario or on the validated and registered PDD.

DNV conducted the verification on the basis of the monitoring methodology AM0034 (version 3.2), the monitoring plan contained in the registered Project Design Document of 28 January 2010 and the monitoring report (Version 02) dated 15 May 2012. The verification included i) checking whether the provisions of the monitoring methodology and the monitoring plan were consistently and appropriately applied and ii) the collection of evidence supporting the reported data.

DNV's verification approach draws on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. DNV planned and performed the verification by obtaining evidence and other information and explanations that DNV considers necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

DNV is able to confirm that project is implemented in accordance with the registered project design document version 02.1 of 28th January 2010, and that the monitoring plan is in accordance with the approved methodology AM0034, version 3.2 "Catalytic reduction of N_2O inside the ammonia burner of nitric acid plants" applied by the project. Furthermore, DNV confirms the monitoring is in accordance to the monitoring plan.

In our opinion the GHG emissions reductions of the "DonauChem Nitrous Oxide Abatement Project" (ITL Project ID: RO1000219) for the period 13 September 2010 to 28 February 2012 are fairly stated in the monitoring report (Version 02) dated 15 May 2012.

The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology AM0034 (version 3.2) and the monitoring plan contained in the registered PDD of 28 January 2010. DNV confirms that the calculations of baseline emissions, project emissions and leakage as appropriate have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology.

DNV Climate Change Services AS is able to verify that the emission reductions from the "DonauChem Nitrous Oxide Abatement Project" during the period 13 September 2010 to 28 February 2012 amount to 543 483 tonnes of CO_2 equivalent.

Oslo, 1 July 2012

Rafi-ud-Din Khawaja
JI Verifier
DNV Oslo, Norway

Trine Kopperud
Head of Approval Centre & Nordic
DNV Climate Change Services AS

5 REFERENCES

Documents provided by the Project Participants that relate directly to the GHG components of the project. These have been used as direct sources of evidence for the periodic verification conclusions, and are usually further checked through interviews with key personnel.

/1/	MGM International: *Project design document for the "DonauChem Nitrous Oxide Abatement Project", version 2.1*, 28 January 2010
/2/	MGM International: *Monitoring report, version 2* dated 15 May 2012 (previous version 1 dated 30 March 2012
/3/	MGM International: *Spreadsheets for 3rd Project Campaign*, 15 May 2012 *Spreadsheets for 4th Project Campaign*, 15 May 2012
/4/	MGM International: *Shewart charts*, 12 April 2012
/5/	DNV: *JI Determination report No.2008-1335, rev. 01* dated 3 May 2010
/6/	DNV: *JI Verification Report No. 2011-0703, rev. 01* dated 9 June 2011
/7/	S.C. DonauChem SRL: *Working procedure for monitoring data regarding the greenhouse gas emissions (N_2O) of the nitric acid plant.* Code: P.Ld.-05-01. Edition 2008/1
/8/	*QAL 1 certificates according to En 14181 and ISO 14956*: -TÜV Rheinland Group: QAL 1 for Flowsick 100-USD (tail gas flow meter) - TÜV Nord Umweltschutz GmbH & Co. KG for Sidor N_2O analyser.
/9/	SGS Environmental Services: *QAL2 report*. Investigation period October 2008
/10/	SGS Environmental Services: *AST report*, investigation period November 2009
/11/	SGS Environmental Services: *AST report*, investigation period December 2010
/12/	SGS Environmental Services: *AST report*, investigation period November 2011
/13/	Umicore: *Catalyst invoices and gauzes information*, 7 September 2010
/14/	Heraeus: *Catalyst invoices and gauzes information*, 22 + 30 March 2011, 8 April 2011
/15/	S.C. DonauChem SRL: *Production logbook and operational reports*, for period from 13 September 2010 to 28 February 2012
/16/	SC Timarom Star SRL: *Calibration certificates for tanks' float-level indicators*, 14 February 2011 (No. 277-TM.ST.-11, 278-TM.ST.-11, 279-TM.ST.-11)
/17/	S.C. DonauChem SRL: *Technical report of production 2010, 2011 and 2012 with Mass balance for 2010, 2011 and 2012*
/18/	Linde: *Sampling gases certificates for N_2O analyser*, nitrogen from 28 August 2011 and valid till 27 August 2012, nitrous oxide from 20 July 2011 and valid till 19 July 2012
/19/	Laborator SC DONAU CHEM SRL Turnu Magurele: *Calibration certificates*, May 2011

Background documents related to the design and/or methodologies employed in the design or other reference documents.

/20/	CDM Executive Board: *Approved Monitoring methodology AM0034, version 3.2*
/21/	JI Supervisory Committee: *Determination and verification manual, version 01* adopted at JISC 19
/22/	JI Supervisory Committee: *Guidance on criteria for baseline setting and monitoring, version 02* adopted at JISC18
/23/	DNV: *Sampling guidelines ICP-5-8-CDMJI-g13*, 1 November 2011

Persons interviewed during the initial verification, or persons who contributed with other information that are not included in the documents listed above.

/24/	Constantin Neagoe, DonauChem, Deputy General Director
/25/	Octavian Tabara, DonauChem, Counsellor
/26/	Sergey Klibus, MGM, Project manager
/27/	Oleksandr Yastremskyi, interpreter

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APPENDIX A

CORRECTIVE ACTION REQUESTS, CLARIFICATION REQUESTS AND FORWARD ACTION REQUESTS

Corrective action requests

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
CAR 1	FARs from the previous verification should be addressed in the MR. Response to FARs from the first verification is missing in the MR.	The correspondent annex has been added to MR	Response to FARs from the previous verification have been added in Annex III of the updated MR version 02 dated 15 May 2012. The CAR 1 is closed.
CAR 2	Correction factors used should be based on the valid QAL2 / AST. The correction factor used to correct N_2O concentration values for both the 3rd and the 4th project campaigns is 1.023, which does not meet this requirement (the correct value as per the valid QAL2/AST is 1.008).	The correspondent changes have been made in excel file and MR	The right value of the correction factor has been applied to N_2O concentration values used for both 3rd and 4th campaigns in the updated emission reduction calculation spreadsheet dated 15 May 2012 and in the MR version 2 dated 15 May 2012. The CAR 2 is closed.
CAR 3	The baseline EF used should be based on the conclusions from the determination and the value verified in the first verification since the baseline EF recalculation is not needed. The baseline EF value used for the 3rd campaign does not meet this requirement (a value of 0.00779 t N_2O/t HNO_3 has been used instead of 0.00824 t N_2O/t HNO_3).	The correspondent changes have been made in excel file and MR	The right value of the baseline EF has been used for the emission reduction calculations in calculation sheets of 3rd campaign dated 15 May 2012 and in the MR version 2 dated 15 May 2012. The CAR 3 is closed.

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
CAR 4	The data used for the ERUs calculation should be in conformance with the original raw data from the plant. Nitric acid production values in the period 15 – 18 December 2010 do not meet this requirement.	The correspondent changes have been made in excel file and MR	The right values of the nitric acid production (in conformity with production logs) was used for the emission reduction calculations in calculation sheets of 3rd campaign dated 15 May 2012 and in the MR version 2 dated 15 May 2012. The correction requested has resulted in reduction in emission reductions and is thus conservative. The CAR 4 is closed.
CAR 5	All relevant raw data should be used for the ERUs calculation. On 3 January 2011 at 23:00 this requirement is not met. The data for this time are available at the plant, but are not included in the ERUs calculation.	The correspondent changes have been made in excel file	The data for 3 January 2011 at 23:00 recorded in the AMS were added and used for the emission reduction calculations in calculation sheets of 3rd campaign dated 15 May 2012 and in the MR version 2 dated 15 May 2012. The CAR 5 is closed.

Clarification requests

CL ID	Clarification request	Response by Project Participants	DNV's assessment of response by Project Participants
CL 1	All significant measures / actions with influence on the project activity which has occurred during the monitoring period should be correctly addressed in the MR. Information regarding the change of the primary catalyst provider and repairs of the basket (by-passes) is missing in the MR. In addition, the reason of the shutdown 16 December 2010 is not correct in the MR – "Replacement of primary catalyst" is used instead of the correct "Market reason".	The correspondent changes have been made in MR	Information regarding the change of the primary catalyst provider and repairs of the basket (by-passes) was added into the MR version 2 dated 15 May 2012. The reason of shutdown 16 December 2010 was corrected to "Market reason" in the MR version 2 dated 15 May 2012. The CL 1 is closed.
CL 2	TAG numbers of monitoring equipment in the MR should be in conformance with the nameplates. The TAG numbers for the gauze temperature meters (4 meters) does not meet this requirement.	The correspondent changes have been made in MR	The TAG numbers of gauze temperature meters were corrected in the MR version 2 dated 15 May 2012. The CL 2 is closed
CL 3	Complete dates of the metering equipment calibration should be stated in the MR. The date of the PR0001 calibration does not meet this requirement.	The correspondent changes have been made in MR	The day of the PR0001 calibration was added into the MR version 2 dated 15 May 2012. The CL 3 is closed.

Forward action requests from previous verification

FAR ID	Forward action request	Summary of how FAR has been addressed in this reporting period	Assessment of how FAR has been addressed
FAR 1	As per JI procedures P.Ld.-05-01, JI Technical Coordinator is responsible for planning and ensuring internal audits; however, this has not been insured and needs to be insured in the future.	The plan of audits had been developed and evidence has been submitted.	The plan of audits has been introduced on-site by DonauChem to DNV as well as the report from the first internal audit of the project. The FAR 1 is closed.
FAR 2	AST needs to be planned for every year and after any events that would require AST test to be conducted.	To confirm QAL2 validity AST tests had been successfully performed by SGS (1st in November 2009. 2nd in December 2010, 3rd in November 2011). Plant performs AST on annual bases and has correspondent statement in JI Manual and the next verification is planned for October-November 2012. In case of any events that that require unscheduled AST it will be performed as soon as it possible.	AST has been performing annually or will be performed in case of any events that require unscheduled AST (however, no such events have occured). The FAR 2 is closed
FAR 3	EPA checking of JI project /track I project needs to be ensured according to Romanian JI Track I procedures	Correspondent EPA protocol has been submitted.	The report from EPA audit 15 March 2012 at DonauChem was introduced during the site-visit. There are no special requirements from EPA regarding JI project. The FAR 3 is closed.
FAR 4	Calibration gas of lower range needs to be procured and implemented during QAL 3 tests as per the AST report.	This FAR had been closed during previous verification	--

FAR ID	Forward action request	Summary of how FAR has been addressed in this reporting period	Assessment of how FAR has been addressed
FAR 5	The risk approach should be implemented to JI procedures in the light of spare parts and calibration procedures. Company provided calibration without taking into account result of Shewart chart and a problem related to measurement devices maintenance. Also any policy for spare of important measuring is not established.	Training with personnel about activities in case of problems with Shewart chart results had been performed. In case of any problems with AMS that require replacement of some parts or maintenance plan contacts assigned responsible person of AMS manufacturer that provides plant with necessary spare parts and services.	Donauchem has established necessary mechanisms that include: training of personnel in case of problems with Shewart chart results; and assigning of responsible person of AMS manufacturer that provides plant with necessary spare parts and services. The FAR5 is closed.

Forward action requests from this verification

FAR ID	Forward action request	Response by Project Participants	DNV's assessment of response by Project Participants
FAR 1	--	--	--

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APPENDIX B

ASSESSMENT OF MONITORING DATA FOR PROJECT EMISSIONS

Data variable	**NCSG** N_2O concentration in the stack gas at normal conditions (101.325 kPa, 0 deg C).	**Reported value for the project period** 3rd campaign **161.42** mgN_2O/Nm^3 4th campaign **181.61** mgN_2O/Nm^3
Assessment/Observation		
Instruments and locations:	***Tag no. SIDOR Sick-Maihak*** Analyser (serial No. 760634) is based on non-dispersive infrared principle, located at the nitric acid plant. A gas stream is continuously drawn from the stack by the sampling system under proper conditions (the line is heat traced to avoid condensation), and driven to the infrared cell.	
Accuracy:	The measurement expanded uncertainty is 5.1% in the PDD. The conclusion from the last AST dated in November 2011 is that the measurement uncertainty is still valid.	
Measuring and recording frequency:	**Measuring frequency:** Continuously **Recording frequency:** One minute average The N_2O concentration has been measured every second and 60 seconds average have been recorded. Although AM0034 specifies the measurement frequency as "every 2 seconds", every second data is acceptable in terms of accuracy.	
Calibration information	**Calibration frequency:** Once per year, QAL2 (October 2008) AST (November 2009, December 2010, and November 2011) **Latest date of calibration:** 1st November 2011 **Validity of calibration:** 30th October 2012 **Company performing the calibration:** SGS **Did the calibration confirm proper functioning of monitoring equipment:** Yes The weekly calibration has been also conducted once every week using standard test gases according to the manufacturer recommendation. The calibration records and Shewart chart were available for verification.	

	The calibration interval is in line with the monitoring plan of the PDD. DNV confirms that the calibration is valid throughout the monitoring period.
Information Flow:	The values are scanned every second and recorded in AMS in one minute averages. One minute averages are electronically transferred into the excel sheet and used for the emission reduction calculations. It was physically checked during the site visit. DNV confirms the successful verification of information flow of this parameter (see also chapter 3.6.1).
Verification method:	The values in the monitoring report were verified using the raw data from AMS by sampling.
Cross-check (if applicable)	In accordance with DNV Climate Change Services Sampling Guidelines (Document number: CDMJI – ICP-5-8-CDMJI-g13 dated 1 November 2011) since the data size was more than 1200 values, it was cross-checked more than 100 (balanced month per month) values using the raw data from AMS. All cross-checked data were found correct.
QA/QC:	Regular calibrations are conducted according to vendor specifications and recognized industry standards (EN 14181). Staff is trained in monitoring procedures.The equipment is controlled and calibrated in accordance with the monitoring plan. .
Partial data (if applicable)	NA

Data variable	**VSG** Volume flow of the stack gas at normal conditions (101.325 kPa, 0 deg C).	**Reported value for the project period** 3rd campaign **94,504** Nm^3/h 4th campaign **93,226** Nm^3/h
Assessment/Observation		
Instruments and locations:	***Tag no. Flowsick FLSE 100*** The stack gas flow rate is continuously measured with an ultra-sound flow meter with pressure and temperature measuring function for normalization. It is located at the nitric acid plant.	
Accuracy:	The measurement uncertainty is 6.27% in the PDD. The conclusion from the last AST dated in November 2011 is that the measurement uncertainty is still valid.	
Measuring and recording frequency:	**Measuring frequency:** Continuously **Recording frequency:** One minute average The flow has been measured every second and 60 seconds averages have been recorded. Although AM0034 specifies the measurement frequency as "every 2 seconds", every second data is acceptable in terms of accuracy.	
Calibration information	**Calibration frequency:** Once per year, QAL 2 (October 2008) AST (November 2009, December 2010, and November 2011) **Latest date of calibration:** 1st November 2011 **Validity of calibration:** 30th October 2012 **Company performing the calibration:** SGS **Did the calibration confirm proper functioning of monitoring equipment:** Yes The calibration interval is in line with the monitoring plan of the PDD. DNV confirms that the calibration is valid throughout the monitoring period.	

Information Flow:	The normalized values of flow are scanned every second and recorded in AMS in one minute averages (as well as pressure and temperature reading). One minute averages are electronically transferred into the excel sheet and used for the emission reduction calculations. It was physically checked during the site visit. DNV confirms the successful verification of information flow of this parameter (see also chapter 3.6.1).
Verification method:	The values in the monitoring report were verified using the raw data from AMS by sampling.
Cross-check (if applicable)	In accordance with DNV Climate Change Services Sampling Guidelines (Document number: CDMJI – ICP-5-8-CDMJI-g13 dated 1 November 2011) since the data size was more than 1200 values, it was cross-checked more than 100 (balanced month per month) values using the raw data from AMS. All cross-checked data were found correct.
QA/QC:	Regular calibrations are conducted according to vendor specifications and recognized industry standards (EN 14181). Staff is trained in monitoring procedures.The equipment is controlled and calibrated in accordance with the monitoring plan. .
Partial data (if applicable)	NA

Data variable	**TSG** Temperature of the stack gas	**Reported value for the project period** Not applicable. Not used to calculate emission reductions, only for VSG normalization.
Assessment/Observation		
Instruments and locations:	***Tag no.*** TI0001 Platinum temperature sensors (PTS) model P100 produced by Jumo which use variation of the electrical resistance of metals with temperature, installed at the nitric acid plant.	
Accuracy:		
Measuring and recording frequency:	**Measuring frequency:** Continuously **Recording frequency:** One minute average The temperature has been measured every second and 60 seconds average have been recorded. Although AM0034 specifies the measurement frequency as "every 2 seconds", every second data is acceptable in terms of accuracy.	
Calibration information	**Calibration frequency:** Once per two years **Latest date of calibration:** 4th June 2009 and 30th May 2011 **Validity of calibration:** 29th May 2013 **Company performing the calibration:** Laborator SC DONAU CHEM SRL Turnu Magurele **Did the calibration confirm proper functioning of monitoring equipment:** Yes The calibration interval is in line with the monitoring plan of the PDD. DNV confirms that the calibration is valid throughout the monitoring period.	
Information Flow:	The values are scanned every second and recorded in AMS in one minute averages. One minute averages are electronically transferred into the excel sheet. It was physically checked during the site visit. DNV confirms the successful verification of information flow of this parameter (see also chapter 3.6.1).	

Verification method:	The values in the monitoring report were verified using the raw data from AMS by sampling.
Cross-check (if applicable)	In accordance with DNV Climate Change Services Sampling Guidelines (Document number: CDMJI – ICP-5-8-CDMJI-g13 dated 1 November 2011) since the data size was more than 1200 values, it was cross-checked more than 100 (balanced month per month) values using the raw data from AMS. All cross-checked data were found correct.
QA/QC:	Regular calibrations are conducted according to vendor specifications and recognized industry standards (EN 14181). Staff is trained in monitoring procedures.The equipment is controlled and calibrated in accordance with the monitoring plan. .
Partial data (if applicable)	NA

Data variable	PSG Pressure of the stack gas	Reported value for the project period Not applicable. Not used to calculate emission reductions, only for VSG normalization.
Assessment/Observation		
Instruments and locations:	***Tag no.*** PR0001 The pressure transmitter of P121type made by Bourdon Haenni with dry ceramic sensor, analog output, installed at the nitric acid plant.	
Accuracy:		
Measuring and recording frequency:	**Measuring frequency:** Continuously **Recording frequency:** One minute average The pressure has been measured every second and 60 seconds average have been recorded. Although AM0034 specifies the measurement frequency as "every 2 seconds", every second data is acceptable in terms of accuracy.	
Calibration information	**Calibration frequency:** Once per two year **Latest date of calibration:** 25th June 2009 and 29th May 2011 **Validity of calibration:** 28th May 2013 **Company performing the calibration:** Laborator SC DONAU CHEM SRL Turnu Magurele **Did the calibration confirm proper functioning of monitoring equipment:** Yes The calibration interval is in line with the monitoring plan of the PDD. DNV confirms that the calibration is valid throughout the monitoring period.	
Information Flow:	The values are scanned every second and recorded in AMS in one minute averages. One minute averages are electronically transferred into the excel sheet. It was physically checked during the site visit. DNV confirms the successful verification of information flow of this parameter (see also chapter 3.6.1).	

Verification method:	The values in the monitoring report were verified using the raw data from AMS by sampling.
Cross-check (if applicable)	In accordance with DNV Climate Change Services Sampling Guidelines (Document number: CDMJI – ICP-5-8-CDMJI-g13 dated 1 November 2011) since the data size was more than 1200 values, it was cross-checked more than 100 (balanced month per month) values using the raw data from AMS. All cross-checked data were found correct.
QA/QC:	Regular calibrations are conducted according to vendor specifications and recognized industry standards (EN 14181). Staff is trained in monitoring procedures.The equipment is controlled and calibrated in accordance with the monitoring plan.
Partial data (if applicable)	NA

Data variable	**OH** Operating hours	**Reported value for the project period** 3rd campaign **4 030** hours 4th campaign **3 644** hours
Assessment/Observation		
Instruments and locations:	No specific instrument, based on AMS and production log. Plant operating status is determined on the basis of present thresholds for oxidation temperature.	
Accuracy:	NA	
Measuring and recording frequency:	**Measuring frequency:** Once per day **Recording frequency:** Once per day	
Calibration information	NA	
Information Flow:	The values are daily evaluated based on AMS and recorded into production log. Then values are transferred into the excel sheet and used for calculations. It was physically checked during the site visit. DNV confirms the successful verification of information flow of this parameter (see also chapter 3.6.1).	
Verification method:	The values in the monitoring report were verified using the raw data from production log.	
Cross-check (if applicable)	100% of values were checked and found correct.	
QA/QC:	Critical instruments (gauze temperature meters) are calibrated on a routine basis according to the plant's maintenance program.	
Partial data (if applicable)	NA	

Data variable	**NAP** Nitric acid production	**Reported value for the project period** 3rd campaign **119 916** t HNO_3 4th campaign **107 721** t HNO_3
Assessment/Observation		
Instruments and locations:	***Tag no.*** Production is measured by a float-type level indicators installed at storage tanks.	
Accuracy:	The measurement uncertainty is 0.2%.	
Measuring and recording frequency:	**Measuring frequency:** Once per shift (8 hours) **Recording frequency:** One per shift	
Calibration information	**Calibration frequency:** 10 years **Latest date of calibration:** 14th February 2011 **Validity of calibration:** 13th February 2021 **Company performing the calibration:** SC TIMAROM STAR SRL **Did the calibration confirm proper functioning of monitoring equipment:** Yes The calibration interval is in line with the monitoring plan of the PDD. DNV confirms that the calibration is valid throughout the monitoring period.	
Information Flow:	The values are calculated and recorded in production log once per shift (8 hours). These values are manually transferred into the excel sheet and used for the emission reduction calculations. It was physically checked during the site visit. DNV confirms the successful verification of information flow of this parameter (see also chapter 3.6.1).	

Verification method:	The values in the monitoring report were verified using the raw data from production log.
Cross-check (if applicable)	100% of values were checked. Only production values during the period 15 – 18 December 2010 were not in conformity with production log (see CAR 4). The PP has revised the excel sheet and monitoring report accordingly, and then all values were found correct.
QA/QC:	Critical instruments are calibrated on a routine basis according to the plant's maintenance program.
Partial data (if applicable)	NA

Data variable	**$GS_{project}$** Project gauze supplier	**Reported value for the project period** 3rd campaign **Umicore** 4th campaign **Heraeus**
Assessment/Observation		
Instruments and locations:	NA	
Accuracy:	NA	
Measuring and recording frequency:	**Measuring frequency:** Once per campaign **Recording frequency:** Once per campaign	
Calibration information	NA	
Information Flow:	The gauze supplier invoices / gauze specifications are received and archived once per campaign. This information is manually transferred into the monitoring report. It was physically checked during the site visit. DNV confirms the successful verification of information flow of this parameter (see also chapter 3.6.1).	
Verification method:	The name of the supplier is verified using the delivered documents (invoices, specifications). The name of the supplier has changed in the 4th campaign (from Umicore to Heraeus) which is not anything against the used methodology.	
Cross-check (if applicable)	NA	
QA/QC:	NA	
Partial data (if applicable)	NA	

Data variable	**$GC_{project}$** Project gauze composition	**Reported value for the project period** 3rd campaign **95% Pt, 5% Rh** 4th campaign **95% Pt, 5% Rh**
Assessment/Observation		
Instruments and locations:	NA	
Accuracy:	NA	
Measuring and recording frequency:	**Measuring frequency:** Once per campaign **Recording frequency:** Once per campaign	
Calibration information	NA	
Information Flow:	The gauze supplier invoices / gauze specifications are received and archived once per campaign. This information is manually transferred into the monitoring report. It was physically checked during the site visit. DNV confirms the successful verification of information flow of this parameter (see also chapter 3.6.1).	
Verification method:	The gauze composition is verified using the delivered documents (invoices, specifications) and found identical as during the historical and baseline campaigns.	
Cross-check (if applicable)	NA	
QA/QC:	NA	
Partial data (if applicable)	NA	

Data variable	**PE_n** N_2O emissions of n^{th} project campaign	**Reported value for the project period** 3^{rd} campaign **61.48** t N_2O 4^{th} campaign **61.70** t N_2O
Assessment/Observation		
Instruments and locations:	No specific instrument. N_2O project emission has been calculated on the basis of measurements of stack gas flow rate, N_2O concentration and the operating hours.	
Accuracy:	NA	
Measuring and recording frequency:	**Measuring frequency:** NA **Recording frequency:** Calculated and recorded at least at the end of each campaign	
Calibration information	NA	
Information Flow:	The values are calculated in the excel sheet based on measurements of stack gas flow rate, N_2O concentration and the operating hours. It was physically checked during this verification process. DNV confirms the successful verification of information flow of this parameter (see also chapter 3.6.1).	
Verification method:	The calculations were checked in the excel sheets and found correct.	
Cross-check (if applicable)	NA	
QA/QC:	NA	
Partial data (if applicable)	NA	

Data variable	**EF_n** Project emission factor.	**Reported value for the project period** 3rd campaign **0.00051** t N_2O/t 100% HNO_3 4th campaign **0.00057** t N_2O/t 100% HNO_3
Assessment/Observation		
Instruments and locations:	No specific instrument. Project emission factor has been calculated on the basis of measurements of the nitric acid production, stack gas flow rate and N_2O concentration.	
Accuracy:	NA	
Measuring and recording frequency:	**Measuring frequency:** NA **Recording frequency:** Calculated and recorded at least at the end of each campaign	
Calibration information	NA	
Information Flow:	The values are calculated in the excel sheet based on measurements of stack gas flow rate, N_2O concentration and the nitric acid production. It was physically checked during this verification process. DNV confirms the successful verification of information flow of this parameter (see also chapter 3.6.1).	
Verification method:	The calculations were checked in the excel sheets and found correct.	
Cross-check (if applicable)	NA	
QA/QC:	NA	
Partial data (if applicable)	NA	

Data variable	**$EF_{ma,n}$** Moving average emission factor	**Reported value for the project period** 3rd campaign **0.000375** t N_2O/t 100% HNO_3 4th campaign **0.0004775** t N_2O/t 100% HNO_3
Assessment/Observation		
Instruments and locations:	No specific instrument. Project emission factor has been calculated as the average of the emission factors of all previous project campaigns.	
Accuracy:	NA	
Measuring and recording frequency:	**Measuring frequency:** NA **Recording frequency:** Calculated and recorded at the end of each campaign	
Calibration information	NA	
Information Flow:	The values are calculated in the excel sheet based on emission factors of all previous project campaigns. DNV confirms the successful verification of information flow of this parameter (see also chapter 3.6.1).	
Verification method:	The calculations were checked in the excel sheets and found correct.	
Cross-check (if applicable)	NA	
QA/QC:	NA	
Partial data (if applicable)	NA	

Data variable	**EF_p** Emission factor used to determine emission reductions	**Reported value for the project period** 3rd campaign **0.00051** t N_2O/t 100% HNO_3 4th campaign **0.00057** t N_2O/t 100% HNO_3
Assessment/Observation		
Instruments and locations:	No specific instrument. EF_p has been determined as the higher of $EF_{ma,n}$ and EF_n	
Accuracy:	NA	
Measuring and recording frequency:	**Measuring frequency:** NA **Recording frequency:** Defined and recorded at the end of each campaign	
Calibration information	NA	
Information Flow:	The values are defined in the excel sheet based on comparison of $EF_{ma,n}$ and EF_n (the higher value is chosen as a EF_p. DNV confirms the successful verification of information flow of this parameter (see also chapter 3.6.1).	
Verification method:	The decisions about EF_p values were checked in the excel sheets and found correct.	
Cross-check (if applicable)	NA	
QA/QC:	NA	
Partial data (if applicable)	NA	

APPENDIX C

CURRICULA VITAE OF THE VERIFICATION TEAM MEMBERS

Rafi-ud-Din Khawaja

Rafi holds a Master's Degree in Environmental Engineering with over 8 years of experience in air pollution control technology, air pollution monitoring, risk management reviews, ambient air quality analysis, transport phenomena, urban and industrial air quality management.

He has acquired over four years of experience in validation and verification of numerous CDM and JI projects while working in DNV. He has been qualified as a CDM validator/technical reviewer for technical area Renewables and as a CDM validator/verifier as well as a Technical Reviewer (TR) for technical area N_2O (i.e. under Methodology group 11) under the Qualification Scheme of Climate Change Services of DNV.

His qualification, industrial experience and experience in JI / CDM demonstrate him sufficient competence as a JI verifier.

Petr Cermánek

Petr holds a Master's Degree from the Chemical University in Prague. He has a strong experience from the chemical industry in the Czech Republic, especially from nitric acid and fertilizer production. He was a manager of the nitric acid department (covering 2 nitric acid plants, storage and unloading of ammonia) at Lovochemie, a.s. During this time he has implemented the biggest JI project "Nitrous oxide emission reductions at Lovochemie" in the Czech Republic. He was also a leading person (for 4 years) at Agrofert Holding (covering 7 nitric acid plants) in the field of nitric acid production.

He has also acquired almost 1 year of experience in determination and verification of several JI projects while working in DNV.

His qualification, industrial experience and experience in JI demonstrate him sufficient sectoral competence in area TA 5.1 (Chemical process industries).

Trine Kopperud: holds a Bachelor First Honours Degree in Chemical and Process Engineering with an overall experience of around_25 years in chemical process industries. Prior to joining DNV she has gained experience from fertiliser production (including ammonia, nitric acid and catalysts production and sales), magnesium production and energy efficiency. Positions in research and operations including 5 years experience in N_2O abatement technologies (research & development, operation, application and sales).

She has experience of 5 years in validation and verification of CDM projects/JI and other 3rd party validation/verification services in several countries including China, Africa, India, Middle East and Eastern Europe.

Her qualification, industrial experience and experience in CDM/JI demonstrate her sufficient sectoral competence in Chemical Processes Industries and Metal production

Patrice Massicard**:** holds a Master degree in Mechanical Engineering. Having an overall experience of around 10 years. Prior to joining DNV, having around 3 years' experience in Oil & Gas industry and 5 years' experience in mechanical industry covering equipment design.

He has experience of around 2 years in DNV for the certification of oil & gas processing equipment, and 1 year experience in the validation and verification of CDM projects.

His qualification, industrial experience and experience in CDM demonstrate him sufficient sectoral competence in the field oil & gas and mechanical industries.