VERIFICATION REPORT

DONAUCHEM NITROUS OXIDE ABATEMENT PROJECT IN ROMANIA

(ITL Project ID: RO1000219)

Monitoring Period:
29 February 2012 to 31 December 2012

REPORT NO. 2012-1698

REVISION NO. 01

DET NORSKE VERITAS

VERIFICATION REPORT

Date of first issue: 14 January 2013	Project No.: PRJC-428956-2012-CCS-NOR
Approved by Ole A. Flagstad	Organisational unit: DNV KEMA Energy & Sustainability Accredited Climate Change Services
Client: MGM Logistics, LLC.	Client ref.: Vladyslav Zhezherin

DNV CLIMATE CHANGE SERVICES AS

Veritasveien 1,
1322 HØVIK, Norway
Tel: +47 67 57 99 00
Fax: +47 67 57 99 11
http://www.dnv.com
Org. No: NO 994 774 352 MVA

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 29 February 2012 to 31 December 2012.

In our opinion, the GHG emission reductions reported for the project in the monitoring report (Version 02.1) of 4 January 2013 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 29 February 2012 to 31 December 2012 amount to 311 211 tonnes of CO_2 equivalent.

Report No.: 2012-1698	Subject Group: Environment	
Report title: DonauChem Nitrous Oxide Abatement Project		
Work carried out by: Fahad Saleem, Rafi-ud-Din Khawaja		
Work verified by: Patrice Massicard, Trine Kopperud		
Date of this revision: 14 January 2013	Rev. No.: 01	Number of pages: 19

Indexing terms

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

☒ No distribution without permission from the client or responsible organisational unit

☐ free distribution within DNV after 3 years

☐ Strictly confidential

☐ Unrestricted distribution

Table of Content *Page*

Abbreviations

AIE	Accredited Independent Entity
CAR	Corrective Action Request
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 29 February 2012 to 31 December 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 29 February 2012 to 31 December 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 /28/;
- Data is recorded and stored as per the monitoring methodology AM0034, version 3.2. /28/

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 /7/, the applied monitoring methodology /28/, 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:	1 July 2009 to 31 December 2012
Period verified in this verification:	29 February 2012 to 31 December 2012

1.4 Methodology for Determining Emission Reductions

According to the AM0034, version 3.2 /28/, 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 ($tN_2O/tHNO_3$)
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 estimated as the product of N_2O emission per hour and the total number of completed hours of operation of the campaign using the following equation:

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

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:

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

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 an 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 /28/ no leakage calculation is required.

2 METHODOLOGY

DNV has assessed and determined that the implementation and operation of the project activity, and the steps taken to report emission reductions comply with JI criteria and relevant guidance provided by the JI Supervisory Committee. 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, 4th and 5th campaigns calculated as described above in section 1.4 /3/;

ii) Records related to measuring quantity of produced HNO_3 /16/ /19/;

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

iv) Catalyst information /14/ /15/;

v) Records on validation and/or calibration of the measuring equipment, standards and calculation software/13/ /18/ /20/ /25/.

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.

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	Khawaja	Rafi –ud- Din	Norway		✓	✓	✓	✓		✓

leader (verifier)										
Verifier	Saleem	Fahad	Norway		✓		✓			✓
Technical reviewer	Massicard	Patrice	Norway						✓	
Technical reviewer	Kopperud	Trine	Norway						✓	✓

Duration of verification

Preparations: *From 23-27 November 2012*

On-site verification: *28 November 2012*

Reporting, calculation checks and QA/QC*: From 29 November 2012 to 14 January 2013*

Note: The site visit was conducted before the end of the monitoring period. This was done in order to meet the expected ERU issuance deadline of 31 December 2012 because of the possible changes in the EU legislation for the 3rd phase of EU-ETS (refer to CL1 for details).

2.1 Review of Documentation

Basic document for the verification was the monitoring report for the third monitoring period from 29 February 2012 to 31 December 2012, version 01 dated 24 November 2012 and Version 02.1 dated 4 January 2013 /2/ and spreadsheets with raw data and ERU calculation for 4th and 5th project campaign /3/, both of which cover the third monitoring period and were submitted to DNV. The first version of MR (version 01 dated 24 November 2012) and the excel sheet provided to DNV covered the monitoring period from 29 February 2012 to 21 November 2012. But the monitoring period was extended up to 31 December 2012 after the site visit and the MR and excel sheet were updated accordingly (refer to CL1 for details).

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 second monitoring period from 13 September 2010 to 28 February 2012 /7/ as well as the approved baseline and monitoring methodology AM0034 version 3.2 /28/. The project owner also provided evidences related to QAL1 and QAL2 and AST tests /10/ /11/ /12/ /13/, information about catalysts /14/ /15/ and certificates of calibration gases /20/.

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

2.2 Site Visit

Detailed verification of all data contained in the monitoring report was performed during a site visit at DonauChem plant on 28 November 2012. The on-site assessment involved:

(i) Assessment of the implementation and operation of the JI project activity as per the registered PDD;

(ii) Review of information flows for generating, aggregating and reporting the monitoring parameters;

(iii) Interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the monitoring plan in the PDD;

(iv) A 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;

(v) A check of the monitoring equipments including calibrations performances and observations of monitoring practices against the requirements of the PDD and the selected methodology;

(vi) Review of calculations and assumptions made in determining the GHG data and emission reductions;

(vii) Identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

Data and information provided by project participants were assessed and confirmed with primary records /16/ provided during the site visit and interviews with personnel at DonauChem and MGM /32/-/36/. Procedures established for ensure monitoring and recording of individual parameters required by monitoring plan and monitoring methodology AM0034, version 3.2 were presented to verification team for assessment. The primary documents logbooks of nitric acid production /16/ , weekly maintenance checks /17/ and calibration reports /10/-/13/ /18/ /24/ /25/, laboratory records, trainings and information about legal requirements were available during the site visit.

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 resolved by project participants and the monitoring report was updated to Version 02.1 (dated 4 January 2013) prior to finalization of this version of the verification report.

2.3 Reporting of Findings

The objective of this phase of the verification was to resolve any issues which needed be clarified prior to DNV's conclusion that i) the project activity has been implemented and operated in accordance with the PDD, ii) the monitoring plan complies with the monitoring methodology and the actual monitoring complies with the monitoring plan and iii) the data and calculation of GHG emission reductions are correct.

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.

The verification team raised three CARs, one CL and no FARs. The project participants adequately addressed the CARs and CL raised and have provided an updated monitoring report Version 02.1 of 4 January 2013 and spread sheets /3/ (see Appendix A. for more details).

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 29 February 2012 to 31 December 2012.

3.1 Remaining Issues FARs from Previous Verification

There was no remaining FAR from the previous verification.

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 4th project campaign started on 13 April 2011 and finished on 19 April 2012 /2/ /16/. The 4th project campaign was originally supposed to end on 28 February 2012 (as reported in the verification report of the second monitoring period /7/) but due to the delay in delivery of the new set of primary gauzes, the 4th project campaign was extended until 19 April 2012. It was confirmed that only the part of the 4th project campaign included in the current monitoring period has been used towards emission reduction calculation (refer to CAR3 in Appendix A for details). The 5th project campaign started on 20 April 2012 and was still on-going at the end of the current monitoring period /2/ /16/.

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

The type of the primary catalyst used during both project campaigns was: 95% Pt, 5% Rh. This was confirmed to be identical with the baseline campaign and the historical project campaigns through the certificates of catalysts and the catalyst invoices /14/ /15/. The only change is in the supplier of the primary catalyst –Heraeus (used in the 4th project campaign) was ex-changed with Umicore in the 5th project campaign /14/ /15/.

The secondary catalyst used during this monitoring period remained unchanged from the last monitoring period.

In addition, for N_2O analyzer, weekly checking (QAL3) was performed by Shewhart chart /4/. The QAL1, QAL2 and annually AST have been presented /10/-/13/.

Installation of DeNOx system:

It is stated in the PDD that in order to comply with the legal requirement for NO_x emission (which will become effective from 31 December 2013), Donauchem is obliged to install a DeNOx system at the nitric acid plant /1/. This obligation was fulfilled by installing an SCR DeNOx system in January 2012, which became fully operational on 14 June 2012. This was confirmed by DNV by reviewing the commissioning report and acceptance report of the DeNOx system /21/ /22/. The DeNOx system did not have any impact on the N_2O emission

levels. This was confirmed from the contract for the supply De NOx system /26/ where (while describing the performance of the DeNOx system) it is stated that *N_2O content in the tail gas will not be affected by O4-89 catalyst* /26/.

Further, DNV checked all the special events that took place during the current monitoring period and confirmed that the events reported in Annex II of MR Version 02.1 dated 4 January 2013 are complete and correct. DNV verified this by checking the data from the productions logbook and operational reports /16/. The special events were further verified by checking the trend curves of different operating parameters. It was also confirmed that the shutdown periods (relevant hours) have been excluded from emission reaction calculation /3/.

31 December 2012 is the last date of the first commitment period under Kyoto protocol's JI mechanism and is also the last day of the crediting period of this project. From 1 January 2013, N_2O emissions from DonauChem's nitric acid plant will be covered under third phase of EU-ETS.

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

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 132 074 tonnes 100% HNO_3 over the monitoring period (20 069 tonnes 100% HNO_3 for the part of 4th project campaign included in this monitoring period and 112 005 tonnes 100% HNO_3 for the fifth project campaign) from 29 February 2012 to 31 December 2012 (i.e. in 307 days) is lower than the design capacity (i.e. 240 000 * 307/365 = 201 863 tonnes 100% HNO_3).

The predicted annual emission reductions in the registered PDD are 531 749 tCO_2e for the year 2012 (365 days) /1/. Thus, the daily emission reductions estimated in the PDD are 1 456 tCO_2e/day for the year 2012. The total emission reductions achieved during this monitoring period from 29 February 2012 to 31 December 2012 (307 days) are 311 211 tCO_2e. This corresponds to 1 013.72 tCO_2e/day of daily emission reductions for the monitoring period. Thus the actual emission reductions are lower than those estimated in the PDD /1/. The main reason for the lower amount of emission reductions is lower than design production of nitric acid during the monitoring period.

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" /28/, applied by the 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 uses Sidor Sick Maihak NDIR analyzer for N_2O concentration monitoring and Flowsick model FLSE100 for monitoring stack gas flow rate. The QAL1 and QAL2 certificates /10/ /11/ have been provided to DNV. The latest AST were conducted by SGS Environmental Services in November 2011 and September 2012 /12/ /13/ and confirmed that the N2O analyzer as well as the stack gas flow meter 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 is used to produce Shewart chart /17/. The chart shows very few abnormalities, which were corrected by span and zero calibration.

Nitric acid production is measured by a float type level indicator at storage tanks and recorded in log books /16/. Calibration certificate of level indicator is provided /18/.

Therefore DNV confirms that all main parameters stated in the monitoring plan are monitored and reported appropriately. The monitoring methodologies and sustaining records are sufficient to enable verification of the reported emissions reductions.

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 /16/. 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 confirmed through the catalyst certificates and invoices /14/ /15/. 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 /28/.

The verification team confirms that the monitoring report /2/ includes all parameters and the monitored data at the interval required by the monitoring methodology /28/ and PDD /1/.

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

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 first verification /6/.

The normal campaign length is 92 859 $tHNO_3$ /1/ /5/. Even though the supplier of the primary catalyst was different for the 4th and 5th project campaign (Heraeus and Umicore respectively) /14/ /15/, the composition of gauzes remained as defined in the registered PDD – 95% Pt + 5% Rh /1/.

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

3.6.3 Monitored data for project emissions

The project campaigns data were provided and has been verified by DNV during this verification period. The 4th project campaign started on 13 April 2011 and finished on 19 April 2012 /2/ /16/. The campaign was actually supposed to end on 28 February 2012 but due to the delay in delivery of the new set of primary gauzes, the 4th project campaign was extended until 19 April 2012. The 5th project campaign started on 20 April 2012 and was still on-going at the end of the current monitoring period /2/ /16/. 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 /16/ /19/.

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 /28/) which have been assessed in detail are listed in Appendix B.

3.6.4 Default data

AMS downtime was reported for one hour each on 25 March 2012 (4th project campaign) and 26 August 2012 (5th project campaign) /3/. During these AMS down time periods, the highest value of N_2O concentration for the respective project campaign was used for the emission reductions calculation /3/, which is as per the methodology requirements and gives conservative results in terms of emission reductions and is therefore acceptable.

Moreover, because of the electrode contamination problems with the stack gas flow and temperature sensors (by ammonia salts and metal scrap), the maximum value of VSG measured during the fifth project campaign has been used for the period from 9-25 December 2012. This is as per the methodology requirements and gives conservative results in terms of emission reductions and is therefore acceptable.

3.6.5 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 /28/, 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 /28/, 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 /28/, 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 /11/.

The emission factor of the baseline campaign was calculated to be 0.00824$tN_2O/tHNO_3$. The baseline calculations were verified by DNV during the 1st verification and are deemed to be correctly executed /6/.

The length of the 4th project campaign (127 790 tonnes HNO_3) as well as the 5th project campaign (112 005 tonnes HNO_3) was greater than the normal campaign length (92 859 tonnes HNO_3) /2/ /3/ /16/ /19/. Thus, the baseline emission factor (0.00824$tN_2O/tHNO_3$) has been used without recalculation for both campaigns as per the methodology /3/ /28/.

3.7.2 Project emission factor

According to the AM0034 version 3.2 /28/, the campaign specific emissions factor (EF_n) is calculated by dividing the total mass of N_2O emitted during that project campaign by the total production of 100% concentrated nitric acid during the campaign.

The project emission factor for the 4th project campaign is calculated to be 0.00065 $tN_2O/tHNO_3$. The project emission factor for the 5th project campaign is calculated to be 0.00054 $tN_2O/tHNO_3$ /3/. The project emission factors calculations were verified by DNV to be correctly executed.

The moving average project emission factor up to 4th project campaign is 0.000497 $tN_2O/tHNO_3$, which is lower than project emission factor for the 4th project campaign of 0.00065 $tN_2O/tHNO_3$ /3/. Thus the emission factor for the 4th project campaign (0.00065 $tN_2O/tHNO_3$) has been applied towards emission reduction calculations.

The moving average project emission factor up to 5th project campaign is 0.00051 $tN_2O/tHNO_3$, which is lower than project emission factor for the 5th project campaign of 0.00056 $tN_2O/tHNO_3$ /3/. Thus the emission factor for the 5th project campaign has been applied towards emission reduction calculations.

3.7.3 Emission reduction

According to AM0034 version 3.2 /28/, 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 29 February 2012 to 31 December 2012.

The total emission reductions for the 4th project campaign (from 13 April 2011 to 19 April 2012) are calculated to be 300 677 tCO_2e /2/ /3/. But the emission reductions for the 4th project campaign, which fall in the current monitoring period i.e. from 29 February 2012 to 19 April 2012, are calculated to be 44 549 tCO_2e (by subtracting the emission reductions claimed for the part of 4th project campaign covered in previous monitoring period (256 128 tCO_2e) from the total emission reductions (300 677 tCO_2e). The emission reductions calculated for the 5th project campaign amount to 266 662 tCO_2e. Thus the overall emission reductions achieved during the monitoring period from 29 February 2012 to 31 December 2012 are 311 211 tCO_{2e} /2/ /3/. The emission reductions calculations were checked by DNV and it was verified that they have been correctly executed according to the formulae in the monitoring methodology /28/.

3.8 Quality of Evidence to Determine Emission Reductions

Complete set of data for the monitoring period was made available to DNV (data from 29 February 2012 to 21 November 2012 was provided before the site visit in the first versions of MR and the spreadsheets /2/ /3/. The MR and the spreadsheet for the fifth project campaign were updated after the site visit with the monitoring period extended until 31 December 2012. The data from 21-28 November 2012 was verified while being on-site, whereas plant production records /27/ were provided to DNV for the remaining days of the monitoring period (from 29 November 2012 to 31 December 2012), in order to cross verify the data reported in the excel spreadsheet. 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 monitoring methodology.

The main data are collected continuously by common AMS system and software used is Sick Maihak system, which 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 reported 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/-/13/, /18/. All calibrations were found as correct and cover the whole monitoring period.

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 manufacturer. The certificates of the test gases were available for verification /20/.

The other measurements are performed by calibrated equipment according to the documented calibration procedures /8/. The key data were also cross-checked by the verification team via

other sources, such as production log sheets /16/, mass balance /19/ and meters available in the operators control room or on-site.

According to the JI procedure /8/, Donau Chems follows up on any environmental regulation with reagrds to obligatory N_2O and NO_x emission reduction from the plant. According to the IPPC permit for the Donau Chem plant, there is no regulation for the year 2012 which requires mandatory reduction of NOx or N_2O from the nitric acid plant /9/. According to the IPPC permit, emissions will be regulated from 1 January 2013. Therefor DNV confirms that for the current monitoring period no environmental regulation is in place in Romania which will require mandatory abatement of N_2O and NO_x from nitric acid plant.

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 /8/. 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 29 February 2012 to 31 December 2012. The crediting period is from 1 July 2009 to 31 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 02.1 dated 4 January 2013. 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.

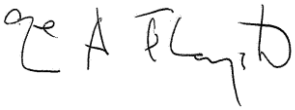
DNV is able to confirm that project is implemented in accordance with the registered project design document version 02.1 of 28th January 2010, and that the monitoring plan is in accordance with the approved methodology AM0034, version 3.2 "Catalytic reduction of N_2O inside the ammonia burner of nitric 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 29 February 2012 to 31 December 2012 are fairly stated in the monitoring report (Version 02.1 dated 4 January 2013.

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 29 February 2012 to 31 December 2012 amount to 311 211 tonnes of CO_2 equivalent.

Oslo, 14 January 2013



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

Ole A. Flagstad
Approver
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 01 dated 24 November 2012 and Version 02.1 dated 4 January 2013*
/3/	MGM International: - *Spreadsheets for 4th Project Campaign*, 23 November 2012 - *Spreadsheets for 5th Project Campaign*, 23 November 2012 (before site visit) - *Spreadsheets for 5th Project Campaign*, 5 December 2012 (after site visit)
/4/	MGM International: *Shewart charts* for the period from 29 February 2012 to 31 December 2012
/5/	DNV: *JI Determination report no.2008-1335, rev. 01* dated 3 May 2010
/6/	DNV: *JI Verification Report for the period from 1 June 2009 to 12 September 2010, report no. 2011-0703, rev. 01* dated 1 May 2011
/7/	DNV: *JI Verification Report for the period from 13 September 2010 to 28 February 2012, report no. 2012-0727, rev. 01* dated 1 July 2012
/8/	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
/9/	IPPC Permit (Nr.157 from 29.10.2007) - N_2O reduction via JI project Appendix 10.8 and Action plan (Valid until 31.12.2013)
/10/	*QAL 1 certificates according to En 14181 and ISO 14956*: -TÜV Rheinland Group: QAL 1 for Flowsick 100-USD (tail gas flow meter) dated 8 May 2007. - TÜV Nord Umweltschutz GmbH & Co. KG for Sidor N_2O analyser, dated 30 March 2007.
/11/	SGS Environmental Services: *QAL2 report*. Investigation period October 2008, report date November 2008.
/12/	SGS Environmental Services: *EN14181 AST validation N_2O measurements at the Donauchem nitric acid plant*, investigation period November 2011, *report dated January 2012*
/13/	SGS Environmental Services: *EN14181 AST validation N_2O measurements at the Donauchem nitric acid plant*, test conducted from 27-28 September 2012, report dated 18 October 2012
/14/	Umicore: *Catalyst invoices and gauzes information*, 16 April 2012 (for 5th project campaign)
/15/	Heraeus: *Catalyst invoices and gauzes information*, 22 and 30 March 2011, 8 April 2011 (for the 4th project campaign)

/16/	S.C. DonauChem SRL: *Production logbook and operational reports*, for period from 29 February 2012 to 31 December 2012
/17/	S.C. DonauChem SRL: *Weekly maintenance checks and calibration logbook and operational reports*, for period from 29 February 2012 to 31 December 2012
/18/	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), valid until 13 February 2021
/19/	S.C. DonauChem SRL: *Technical report of production 2010, 2011 and 2012 with Mass balance for 2010, 2011 and 2012*
/20/	*Linde Sampling gases certificates for N_2O analyser*: - Nitrogen (99.999%) from 28 August 2011 and valid till 27 August 2012 - Nitrogen (99.999%) from 10 April 2012 and valid till 9 April 2013 - Nitrous oxide from 20 July 2011 and valid till 19 July 2012 - Nitrous oxide (2400 mg/m^3) dated 4 July 2012 and valid until 3 July 2013 - Nitrous oxide (1200 mg/m^3) dated 9 February 2012 and valid until 8 February 2013
/21/	STEULER: *Commissioning Certificate for NOx-Abatement system for off-gases of Nitric acid facility at Donau Chem*, dated 29 June 2012
/22/	STEULER: *Acceptance Report for NOx-Abatement system for off-gases of Nitric acid facility at Donau Chem*, dated 29 June 2012
/23/	SGS Environmental Services: Email from SGS confirming the applicability of QAl2 correction factor for NCSG at lower range of concentration measurement, dated 13 November 2012
/24/	**Calibration certificates for Stack gas instrument; calibration conducted by Donau chem:** TSG – Temperature of stack gas (TI0001): Calibration dates: 30 May 2011 and 17 April 2012. Valid until 16 April 2014. PSG – Pressure of stack gas (PR0001): Calibration dates: 29 May 2011 and 19 April 2012. Valid until 18 April 2014.
/25/	S.C Donau Chem: Calibration certificates for instruments as per Annex I of MR (for the year 2011 and 2012)
/26/	*Steuler Anlagenbau GmbH & Co. KG* and *InterAgro S.A* (operator of Donau Chem plant): Contract for the Supply of DeNOx system for the Donau Chem's nitric acid plant dated 19 October 2011.
/27/	S.C Donau Chem: Daily production records for the period from 29 November 2012 to 31 December 2012

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

/28/	CDM Executive Board: *Approved Monitoring methodology AM0034, version 3.2*
/29/	JI Supervisory Committee: *Determination and verification manual, version 01* adopted at JISC 19

/30/	JI Supervisory Committee: *Guidance on criteria for baseline setting and monitoring, version 02* adopted at JISC18
/31/	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.

/32/	Constantin Neagoe, DonauChem, Deputy General Director
/33/	Octavian Tabara, DonauChem, Counsellor
/34/	Sergey Klibus, MGM, Project manager
/35/	Ochea Ion, DonauChem, Plant Manager
/36/	Iana Lulian, DonauChem, Technologist

- o0o -

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	The following corrections need to be made to the MR: - On the title page, the monitoring period needs to be mentioned separately and the end of the 4th campaign which partially occurred during this monitoring period also needs to be mentioned. - The shutdown of 15 November 2012 that was confirmed from plant records need to be mentioned in Annex II of updated the MR. - Edits corresponding to the CARs listed below need to be made to the MR as well.	Correspondent changes have been made in MR	Corresponding edits have been made in the MR. CAR 1 is closed.

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
CAR 2	It has been stated by DonuChem and further checked by DNV by documents review that the DeNOx system has been installed at the nitric acid plant during this monitoring period. It is considered a major event by DNV and the installation of the DeNOx system is also required by the PDD. Thus, this needs to be mentioned in the MR along with including the timeline of different activates that occurred towards its implementation.	Information about DeNOx system installation and performance have been added to MR	Description about the installation of DeNOx system has been included in the MR. the DeNOx system was installed in January 2012 and came into operation from 14 June 2012 /21/ /22/. CAR 2 is closed.

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
CAR 3	Under the ''Donau op hours and prod'' tab of the emission reduction calculation spreadsheet for the 5th campaign, data from 20 March 2012 onwards has been counted towards NAP and OH calculations. This is considered double counting by DNV since the same data is counted towards the end of the 4th campaign as well. This needs to be corrected to start from 20 April 2012 and go onwards to the end of the 5th campaign. This will result in lower NAP, lower OH and lower emission reductions. Therefore corresponding edits need to be made in all relevant sections of the emission reduction calculation spreadsheet and the MR needs to be updated as well.	Period from 20 March to 19 April 2012 have been excluded from spreadsheet for the 5th campaign and results have been recalculated	The excel sheet for fifth project campaign has been updated. NAP and OH values have been used from 20 April 2012 onwards i.e. after the start of the fifth project campaign. Emission reduction calculations and MR has been updated accordingly. DNV has checked the calculation and confirms that it has been correctly executed. CAR 3 is closed.

Clarification requests

CL ID	Clarification request	Response by Project Participants	DNV's assessment of response by Project Participants
CL 1	It has been stated that the monitoring period that ends now on 21 November 2012 might be extended to 31 December 2012 by adding data from 21 November 2012 until 31 December 2012 and providing evidences to support the data. In order for DNV to conclude this verification, it needs to be clarified whether the monitoring period will be extended to the end of 2012 or not.	The monitoring period have been extended to the end of 2012 because changes of legislation that can influence the terms of ERUs issuance have not been approved.	After the site visit, the MR and ER calculation sheet have been updated with data up to 31 December 2012. Data from 29 February 2012 to 21 November 2012 was provided before the site visit in the first versions of MR and the spreadsheets /2/ /3/. The MR and the spreadsheet for the fifth project campaign were updated after the site visit with the monitoring period extended until 31 December 2012. The data from 21-28 November 2012 was verified while being on-site, whereas plant production records were provided to DNV for the remaining days of the monitoring period i.e. 29 November 2012 to 31 December 2012 /27/. It was confirmed by reviewing the production records that the data was correctly reported in the updated MR and excel spreadsheet. CL1 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
--	--	--	--

No FARs are open from the previous verification.

Forward action requests from this verification

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

No FARs were raised during this verification.

- o0o -

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** 4^{th} project campaign **205.93** mgN_2O/Nm^3 5^{th} project campaign **178.19** 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 5.06% in the PDD. The conclusion from the last AST conducted in September 2012 is that the measurement uncertainty has changed and a new value of 7.04% has been defined for the overall uncertainty of the AMS. Since the uncertainty of AMS is only used in the baseline emission factor calculation, which was already defined in the 1^{st} verification period, therefor the change in the uncertainty of the system does not impact the emission reduction calculation in any way. Furthermore, a QAL2 correction factor of 1.008 was defined in the QAL2 test conducted in 2008. The latest AST report /13/ states that the QAL2 factor is not valid anymore but it was confirmed by the company performing AST that QAL2 factor is still valid in the lower range of concentration measurement and that the same value can be used for the current monitoring period /23/.	
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, November 2011 and September 2012) **Latest date of calibration:** 27-28 September 2012	

	Validity of calibration: 27 September 2013 **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 /20/. The calibration records and Shewart chart were available for verification /4/ /17/. 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** 4th project campaign **93 700** Nm^3/h 5th project campaign **92 476** 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, which was revised to 7.04% as per the latest AST report /13/. However, this does not impact the emission reduction calculation in any way. The QAL2 correction factor is 1.047 /11/ and as per the latest AST report this factor is still valid. DNV confirmed that the same value of correction factor has been used in emission reduction calculations /3/.	
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, November 2011 and September 2012) **Latest date of calibration:** 27-28 September 2012 **Validity of calibration:** 27 September 2013 **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 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 two years /24/ **Latest date of calibration:** 30 May 2011 and 17 April 2012 **Validity of calibration:** 16 April 2014 **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 /24/ **Latest date of calibration:** 29 May 2011 and 19 April 2012 **Validity of calibration: 1**8 April 2014 **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** 4th project campaign **4 327** hours 5th project campaign **3 833** 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** 4th project campaign **127 790** t HNO_3 5th project campaign **112 005** 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 /18/ **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) /16/. The final daily production 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.
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** 4th project campaign: **Heraeus** 5th project campaign: **Umicore**
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 /14/ /15/. 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** 4th project campaign **95% Pt, 5% Rh** 5th project 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** 4^{th} project campaign **83.46** t N_2O 5^{th} project campaign **63.16** 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** 4th project campaign **0.00065** t N_2O/t 100% HNO_3 5th project campaign **0.00056** 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** 4th project campaign **0.0004975** t N_2O/t 100% HNO_3 5th project campaign **0.000510** 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** 4th project campaign **0.00065** t N_2O/t 100% HNO_3 5th project campaign **0.00056** 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 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 five 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.

Fahad Saleem holds a Master Degree in Chemical Engineering. He has an overall experience of more than 4 years. Prior to joining DNV, he has 3 years' experience in Fertilizer industry covering plant operation.

He has an experience of more than 1 year in validation and verification of CDM/JI projects and other 3rd party validation/verification services.

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in TA 5.1/11.1/12.1.

Patrice Massicard holds a Master degree in Mechanical Engineering and has 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 equipments, and 1 year experience in the validation of CDM projects.
His qualification, industrial experience and experience in CDM demonstrate him sufficient sectoral competence in the filed oil & gas and mechanical 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 year experience in N_2O abatement technologies (research & development, operation, application and sales).

She has experience of more than 6 years in validation and verification of CDM projects/JI in several countries including China, India, Africa, Middle East and Eastern Europe.

Her qualification, industrial experience and experience in CDM/JI demonstrate her sufficient sectoral competence in Chemical Processes Industries TA 5.1/11.1/12.1. and Metal production TA 9.1.