MONITORING REPORT FORM (F-CDM-MR)
Version 02.0

MONITORING REPORT

Title of the project activity	MONOMEROS NITROUS OXIDE ABATEMENT PROJECT
Reference number of the project activity	1428
Version number of the monitoring report	1
Completion date of the monitoring report	June 28th 2012
Registration date of the project activity	14/02/2008
Monitoring period number and duration of this monitoring period	Monitoring Period # 4 (13/05/2011- 29/03/2012)
Project participant(s)	Monomeros Colombo Venezolanos S.A.- MGM Carbon Portfolio, S.a.r.l.
Host Party(ies)	Colombia
Sectoral scope(s) and applied methodology(ies)	(5) Chemical industries - Catalytic reduction of N_2O inside the ammonia burner of nitric acid plants (Monitoring Methodology AM0034 V.2) - AM0028 "Catalytic reduction of N2O in the tail gas of Nitric Acid or Caprolactam Productions Plants" version 04.1 (EB 28) is used to select the baseline scenario".
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	100.081 t CO_2 e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	61.563 t CO_2 e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The current project activity is taking place at the nitric acid plant owned by Monomeros Colombo Venezolanos S.A. (MCV) in Barranquilla, Atlántico State, Colombia has installed a secondary catalyst below the primary one, inside the ammonia burner, which destroys the N_2O transforming it in N_2 and O_2.

Nitrous oxide (N_2O) is an undesired by-product gas from the manufacture of nitric acid. Nitrous oxide is formed during the catalytic oxidation of ammonia. Over a suitable catalyst, a maximum 98% (typically 92-96%) of the ammonia fed is converted to nitric oxide (NO). The remainder participates in undesirable side reactions that lead to the production of nitrous oxide, among other compounds.
Waste N_2O from nitric acid production is typically released into the atmosphere, as it does not have any economic value or toxicity at typical emission levels. N_2O is an important greenhouse gas which has a high global warming potential (GWP) of 310.

In order to monitor the emission, the plant installed an Automated Monitoring System (AMS), consisting of an Infrared Gas Analyzer and a Gas Flow meter, at the stack.

Relevant dates for the project activity:

Table 1 – Relevant dates

Date	Events
15/02/2007-17/02/2008	Baseline Campaign
14/02/2008	CDM Project registration date
09/03/2008 – 24/03/2009	First Project Campaign
25/03/2009 – 03/05/2010	Second Project Campaign
04/05/2010 – 12/05/2011	Third Project Campaign
13/05/2011 – 29/03/2012	Fourth Project Campaign

Total emission reductions achieved in this monitoring period: 61,563 tonnes of CO_2e

A.2. Location of project activity

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The project activity is located in the nitric acid plant owned by MCV in Barranquilla city, Atlántico State, Colombia: Latitude 11º 10’ N
Longitude 74º 50’ W

A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)		Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
(i)	Colombia (host)	Monomeros Colombo Venezolanos S.A.	NO
(ii)	Switzerland	MGM Carbon Portfolio, S.a.r.l.	NO

A.4. Reference of applied methodology
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The selected methodology is:

- AM0034 "Catalytic reduction of N_2O inside the ammonia burner of nitric acid plants" version 02 (EB 27).

- AM0028 "Catalytic reduction of N_2O in the tail gas of Nitric Acid or Caprolactam Productions Plants" version 04.1 (EB 28) is used to select the baseline scenario.

The "Tool for the demonstration and assessment of additionality" version 03 (EB 29) was used to demonstrate additionality.

A.5. Crediting period of project activity
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14/02/2008 to 13/02/2015 (renewable)

SECTION B. Implementation of project activity
B.1. Description of implemented registered project activity
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The Nitric Acid Plant has been operating since 1970.

The Baseline campaign started on 15/02/2007 and ended on 17/02/2008.

The project was registered on 14/02/2008.

The First Project Campaign took place between 09/03/2008 and 24/03/2009, although the first monitoring period began on 14/02/2008. Between 13/02/2008 and 08/03/2008 the plant was shut down and no emission reductions were generated.

The Second Project Campaign took place between 25/03/2009 and 03/05/2010.

The Third Project Campaign took place between 04/05/2010 and 12/05/2011.

The Fourth Project Campaign took place between 13/05/2011 and 29/03/2012.

The Project is operating according to the monitoring plan established in the registered PDD version 03 dated 20/09/2007.

Resolution 909/2008, which includes new limits for NO_X emissions, was issued by the Ministerio de Ambiente, Vivienda y Desarrollo Territorial (Environmental, Housing and Territorial Development Ministry) on 5 June 2008. The Resolution came into force on June 5, 2010, two years after its publication. [1]

According to the approved monitoring methodology AM0034 ver. 2, "Catalytic reduction of N_2O inside the ammonia burner of nitric acid plants", in the case of new NOx regulations the re-assessment of the baseline scenario shall be undertaken using the same 5-Step process used for baseline scenario selection, and the additionality of the project must be re-demonstrated.

The abovementioned Resolution, however, has no effect whatsoever on the project activity since the NO_X emissions at the Monómeros plant were already below the limits on NO_X emissions imposed by the new regulation since the beginning of the baseline campaign. Therefore the baseline scenario selected in the PDD, the continuation of the status quo, remains valid, as does the demonstration of additionality described in the registered PDD[2]. Please see Annex I for further details.

The following list shows the events that occurred during the Fourth Project Campaign

Date	Event	Reference document
13/05/2011	Plant shutdown during 14 hours for Gauzes change.	Nitric Acid Plant office log book. Monthly Production Report
22/05/2011	Plant shutdown during 4 hours for failure in supply of energy to Plant due to shut down of Gas Turbine EG-001.	Nitric Acid Plant office log book. Monthly Production Report
12/06/2011	Plant shutdown during 160 hours for planned maintenance.	Nitric Acid Plant office log book. Monthly Production Report
19/06/2012	Plant shutdown during 3 hours for false signal interlocking for high Ratio NH_3/air	Nitric Acid Plant office log book. Monthly Production Report
02/07/2011	Plant shutdown during 32 hours for NOx gas escape from condenser back cover, E-1109.	Nitric Acid Plant office log book. Monthly Production Report
03/07/2011	Plant shutdown during 2 hours for NOx gas escape from condenser back cover, E-1109.	Nitric Acid Plant office log book. Monthly Production Report
09/07/2011	Plant shutdown during 19 hours for in supply of energy to Plant due to shut down of Gas Turbine EG-002.	Nitric Acid Plant office log book. Monthly Production Report
23/07/2011	Plant shutdown during 8 hours. in supply of energy to Plant due to shut down of Gas Turbine EG-001.	Nitric Acid Plant office log book. Monthly Production Report
25/07/2011	Plant shutdown during 3 hours. in supply of energy to Plant due to shut down of Gas Turbine EG-001.	Nitric Acid Plant office log book. Monthly Production Report
02/08/2011	Plant shutdown during 16 hours. for high Ratio NH3/air to open LPV-11A01 with direct signal.	Nitric Acid Plant office log book. Monthly Production Report
18/08/2011	Plant shutdown during 15 hours for planned maintenance	Nitric Acid Plant office log book. Monthly Production Report
12/09/2011	Plant shutdown during 3 hours for vacuum loss due to failures in the supply of coolant water.	Nitric Acid Plant office log book. Monthly Production Report
28/09/2011	Plant shutdown during 10 hours for planned maintenance	Nitric Acid Plant office log book. Monthly Production Report
09/11/2011	Plant shutdown during 56 hours for Repair of the secondary catalyst basket and replacement of secondary catalyst.	Nitric Acid Plant office log book. Monthly Production Report
16/01/2012	The Plant shut down during 95 hours for failure in the supply of natural gas in the complex.	Nitric Acid Plant office log book. Monthly Production Report
23/01/2012	Plant shutdown during 20 hours. failure in the supply of natural gas in the complex.	Nitric Acid Plant office log book. Monthly Production Report

[1] http://www.minambiente.gov.co/

[2] On 16 March 2009, Monómeros Colombo Venezolanos S.A. received a compliance certificate from the regional authority (DAMAB - Departamento Administrativo del Medio Ambiente de Barranquilla – www.damab.gov.co/) confirming that the Monómeros Colombo Venezolanos S.A. production facilities are operated according to Decreto 02 de 1982 del Ministerio de Salud de la República de Colombia. NOx emissions tests are archived by Monómeros Colombo Venezolanos S.A. as well as by DAMAB and will be presented to the DOE during on-site verification. Upon request, they can be made available to the CDM EB.

Date	Event	Reference document
26/01/2012	Plant shutdown during 3 hours to repair scape in suction valve X-1101	Nitric Acid Plant office log book. Monthly Production Report
26/02/2012	Plant shutdown during 6 hours. for failure in supply of energy to Plant due to shut down of Gas Turbine EG-002 and boiler # 4.	Nitric Acid Plant office log book. Monthly Production Report
27/02/2012	Plant shutdown during 10 hours for failure in supply of energy to Plant from Barranquilla.	Nitric Acid Plant office log book. Monthly Production Report
03/03/2012	Plant shutdown during 5 hours for failure in the trip mechanism of the K-1101 air compressor.	Nitric Acid Plant office log book. Monthly Production Report

No events or situations occurred during the monitoring period, which may impact the applicability of the methodology

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan or applied methodology

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There have been no deviations in the applied methodology

B.2.2. Corrections

>>N.A

B.2.3. Permanent changes from registered monitoring plan or applied methodology

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No changes to the monitoring plan or applied methodology as described in the registered CDM-PDD ver 03 dated 20/09/2007 have been requested.

B.2.4. Changes to project design of registered project activity

>>N.A

B.2.5. Changes to start date of crediting period

>>N.A

B.2.6. Types of changes specific to afforestation or reforestation project activity

>>N.A

SECTION C. Description of monitoring system

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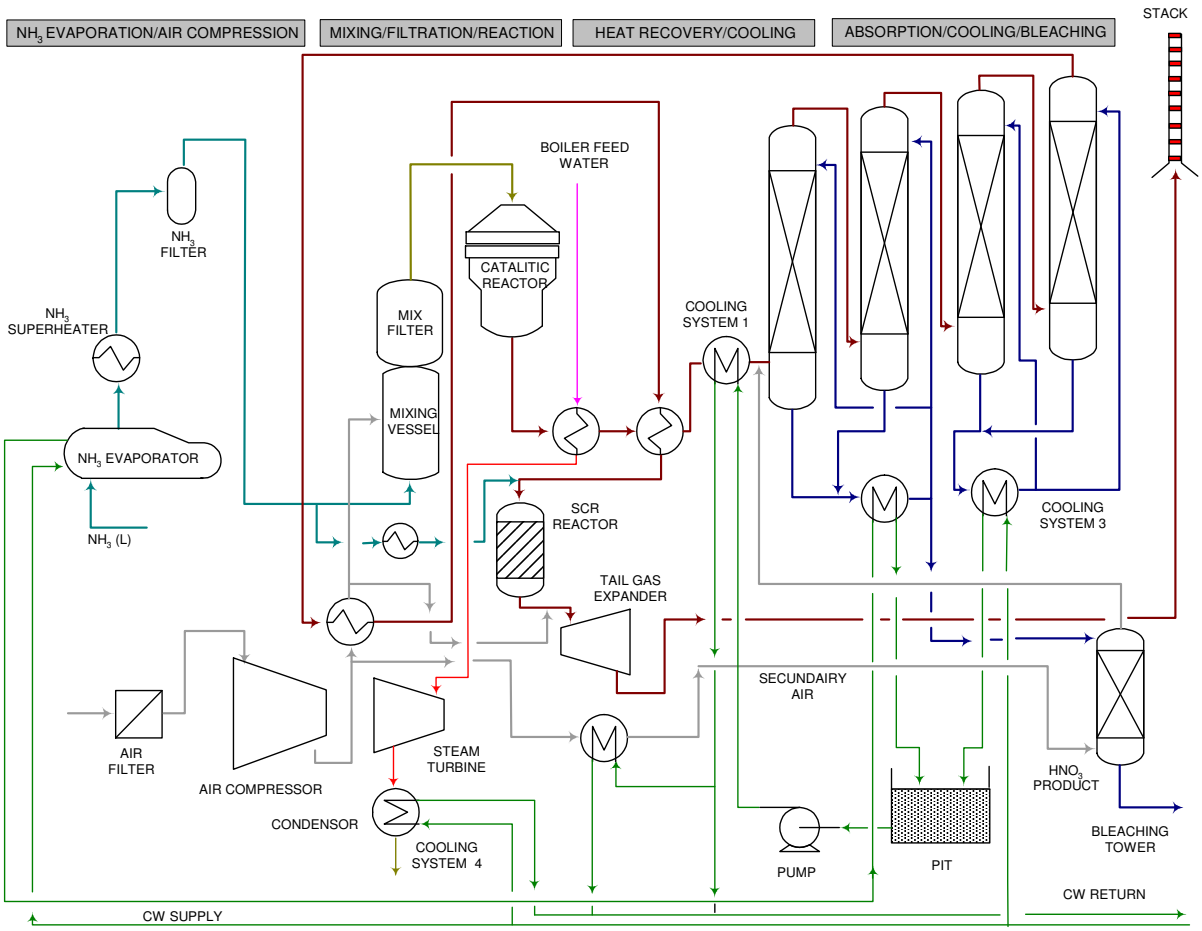


The relation between the project operational and management structure, and other actors of the proposed CDM project activity, is described as follows:

- The responsible Plant Operator is in charge of the supervision of the data acquisition system (DAS) that is implemented to record plant operation data. The Plant Operator reports the relevant data generated by the DAS to the Monitoring Engineer.

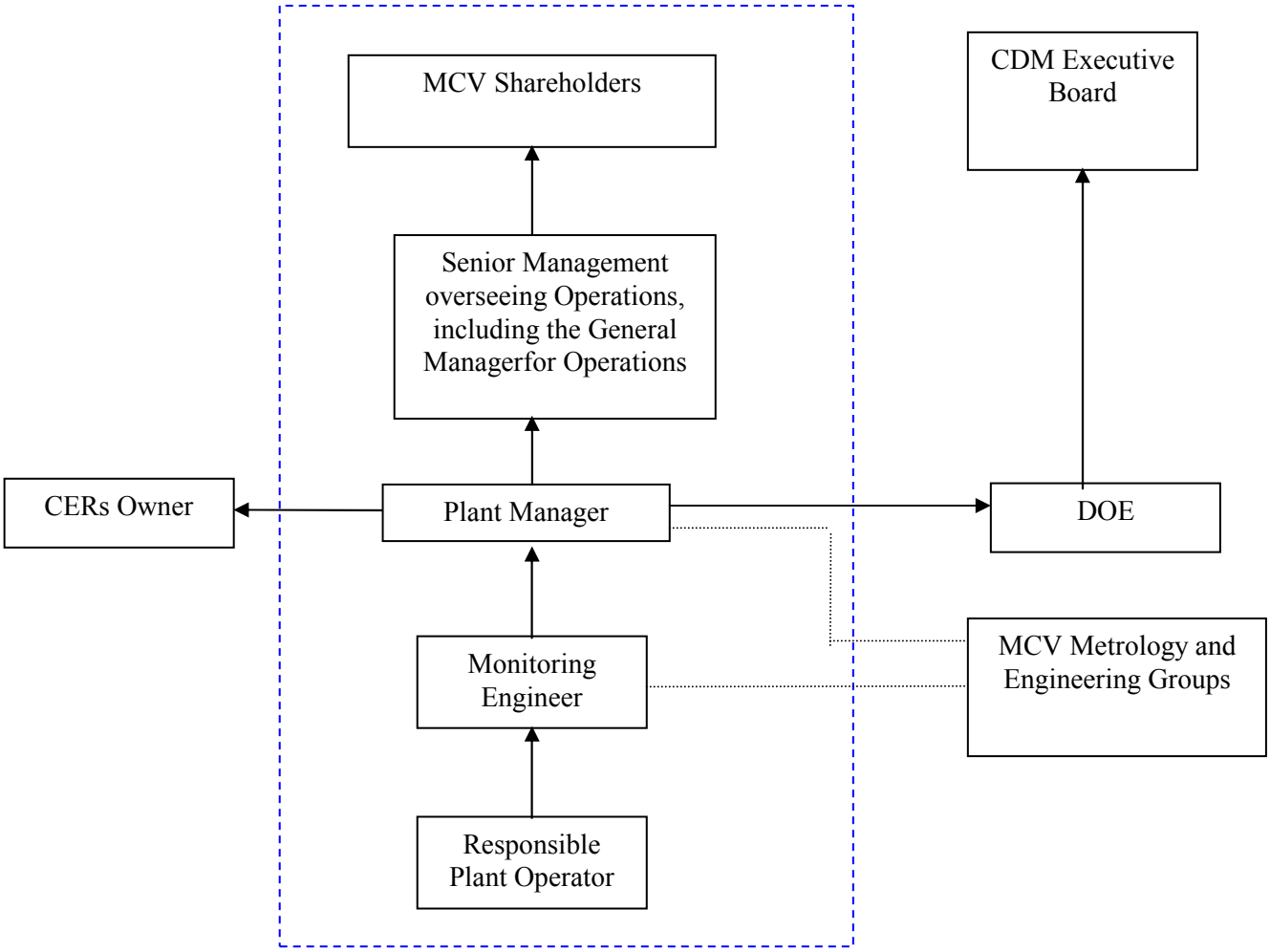
- The Monitoring Engineer is the plant staff member in charge of processing the data generated by the DAS. The Monitoring Engineer receives the relevant plant data from the responsible Plant Operator. These data are entered into a spreadsheet especially designed for the monitoring plan.

- The Plant Manager is responsible for ensuring that the CDM project activity at plant level is implemented in compliance with the registered PDD and other relevant standards. The Plant Manager routinely reports to the General Manager for Operations on the overall progress of the CDM project activity. At any time that the Plant Manager wants or needs to follow the implementation of the CDM project activity, he/she asks for a report from the Monitoring Engineer. Periodically the Plant Manager sends the monitoring report to the DOE in charge of performing the verification.

- MCV Metrology and Engineering Groups are available at all times to support the Monitoring Engineer in case of personnel loss or changes. The relevant Plant Manager also has MCV Metrology and Engineering Groups available as resources for assistance when required.

- The DOE performs the verification and subsequently submits the corresponding verification report to the CDM Executive Board.

- MCV shareholders receive annually from the Plant Manager, the same report as is sent to the DOE.



Description of the AMS

The Monomeros plant has installed a continuous gas analyzer from the supplier ABB, model AO2000. The specific module that is used to measure N_2O is a URAS 14 non-dispersive infrared gas analyzer. The URAS 14 has been on the market for several years and has proven to be a reliable instrument; this module is certified by TÜV to comply with German 27th BlmSchV regulation for several compounds (such as CO, NO, SO_2).

For stack flow measurement, the plant selected as primary meter an Annubar principle (multiple pressure differentials) unit, model 485 Annubar primary, manufactured by Rosemount Inc. (USA).

Good monitoring practice and performance characteristics

The European Norm EN 14181:2004 is recommended as guidance regarding the selection, installation and operation of the AMS under Monitoring Methodology AM0034, and stipulates three levels of Quality Assurance Levels (QAL):

QAL1: Suitability of the AMS for the specific measuring task.

The EN 14181: 2004 QAL1 report was provided by the equipment manufacturer considering the performance characteristics as measured by a qualified Technical Inspection Authority and the specific installation characteristics and site conditions at the plant. The QAL1 report confirmed that the N_2O analyzer (AO 2000- URAS 14 NDIR supplied by ABB GmbH) is suitable to perform the indicated analysis (N_2O concentration). Report is available at the site for future audits.

QAL2: Validation of the AMS following its installation.

QAL2 describes a procedure for the determination of the calibration function and its variability, by means of certain number of parallel measurements, performed with a Standard Reference Method. The testing laboratory performing the measurements with the Standard Reference Method shall have an accredited quality assurance system according to EN ISO/IEC 17025 or relevant (national) standards.

QAL2 test were performed in May 2007 and on May 2011, by SGS Environmental Services (Accredited according to EN ISO / IEC 17025). The QAL2 report is available for DOE review. The report concludes the monitoring system complies with the standard.

In order to keep records of AMS data before and after QAL2 test as generated (un-manipulated data), the corrective formulae (calibration functions) were applied during data processing (with the aid of spreadsheets), meaning calibration functions were not programmed on the Distributed Control System (DCS) of the plant (which functions as data acquisition system).

QAL3: Ongoing quality assurance during operation.

QAL3 of EN 14181: 2004 check for drift and precision, in order to demonstrate that the AMS is in control during its operations so that it continues to function within the required specification for uncertainty. This was achieved by conducting periodic zero and span checks on the AMS, and evaluating results obtained using control charts. Results of periodic calibrations were analyzed graphically with the aid of Shewart charts. All monitoring equipment has been serviced and maintained according to the manufacturer's instructions and international standards by qualified personnel. Calibration and maintenance records are well kept at Monomeros plant and available for auditing purposes.

AST: annual surveillance test (AST)

The AST is a procedure to evaluate whether the measured values obtained from the AMS still meet the required uncertainty criteria, as evaluated during the QAL2 test. As with the QAL2, it also requires a limited number of parallel measurements using an appropriate standard reference method.

AST 2009, AST 2010, AST 2011 and AST 2012 were performed by SGS Environmental Services (Accredited according to EN ISO / IEC 17025) in June 2009, June 2010, May 2011, and May 2012 respectively. The AST reports are available for DOE review. The reports concludes the following: The QA/QC system complies with the requirements of EN 14181 QAL3; the analyzer passed the test on variance, suitability and linearity; the flow meter passed the test on variance and suitability; and data given by the instruments at the stack comply with the data registered in the data acquisition system.

SECTION D. Data and parameters
D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data/Parameter	**B.11 AFR_{max}**
Unit	kg NH_3/hour
Description	Maximum Ammonia Flow Rate
Source of data	Specified by the ammonia oxidation catalyst manufacturer
Value(s) applied	3.282
Purpose of data	The data is used for baseline emission calculation
Additional comment	

Data/Parameter	**B.14 CL_{normal}**
Unit	tonne 100% HNO_3
Description	The normal campaign length is defined as the average campaign length for the historic campaigns used to define operating conditions.
Source of data	Historical data
Value(s) applied	83.165
Purpose of data	The data is used for baseline emission calculation
Additional comment	Four historical campaigns were used in the calculations.

Campaign number	Date of installation	Date of removal	HNO_3 production
128	03/04/2003	11/02/2004	74,553
129	12/02/2004	04/01/2005	79,271
130	07/01/2005	23/01/2006	89,287
131	12/02/2006	14/02/2007	89,548

Campaign number 127 was eliminated because it was abnormal (physical damage observed in the primary catalyst).
For more details see the document "Normal campaign length Reviewed-Feb2010.xls"

Data/Parameter	**B.15 $AIFR_{max}$**
Unit	kg NH_3/kg air
Description	Maximum Ammonia to Air Flow Rate to the ammonia oxidation reactor
Source of data	Specified by the ammonia oxidation catalyst manufacturer.
Value(s) applied	0,066

Purpose of data	The data is used for baseline emission calculation
Additional comment	

Data/Parameter	**B.17 OT_{normal}**
Unit	^{o}C
Description	Normal Range for Oxidation Temperature
Source of data	Historical process data.
Value(s) applied	832- 872
Purpose of data	The data is used for baseline emission calculation
Additional comment	

Data/Parameter	**B.19 OP_{normal}**
Unit	Pa (abs)
Description	Normal Range for Oxidation Pressure
Source of data	Design data.
Value(s) applied	303,948- 384,890
Purpose of data	The data is used for baseline emission calculation
Additional comment	

Data/Parameter	**B. 20 GS_{normal}**
Unit	N.A.
Description	Gauze supplier during operating condition campaigns (the previous five campaigns).
Source of data	Historical process data
Value(s) applied	Johnson Matthey PLC
Purpose of data	The data is used for baseline emission calculation
Additional comment	

Data/Parameter	**B. 23 GC_{normal}**
Unit	**%**
Description	Gauze composition for the operation condition campaigns (the previous five campaigns).

Source of data	Historical process data
Value(s) applied	90,0 % Pt, 10,0 % Rh.
Purpose of data	The data is used for baseline emission calculation
Additional comment	

D.2. Data and parameters monitored

Data/Parameter	**P.1 NCSG**
Unit	mg N_2O/Nm^3 (converted from ppm if necessary)
Description	N_2O concentration in the stack gas for the project campaign
Measured/Calculated /Default	Measured/Calculated - every 2 sec. used for calculation of campaign mean (average, after exclusion of extreme values and outliers)
Source of data	AMS (Infrared gas analyser) at MCV's plant.
Value(s) of monitored parameter	942,74
Monitoring equipment	AO2000 continuous gas analyser, with analysis module URAS 14 (infrared photometer). S/N: 4606448/1000
Measuring/Reading/ Recording frequency	Every two seconds
Calculation method (if applicable)	N.A.
QA/QC procedures	Procedure I-6321-001 "Instructivo Para Ajuste Y Calibración De Analizador De N_2O De Planta 11", AST and QAL2 test according to EN 14181.
Purpose of data	Project emission calculations.
Additional comment	

Data/Parameter	**P.2 VSG**
Unit	Nm^3/hour
Description	Volume flow rate in the stack gas for the project campaign
Measured/Calculated /Default	Measured - every 2 sec. used for calculation of campaign mean (average, after exclusion of extreme values and outliers)
Source of data	AMS (Flow meter) at MCV's plant.
Value(s) of monitored parameter	36.638
Monitoring equipment	Annubar type Flow Transmitter Rosemount 3095MFA (multiple pressure differential principle). S/N Tx: 0022859 - S/N Sensor: 3081256.
Measuring/Reading/ Recording frequency	Every two seconds
Calculation method (if applicable)	N.A.
QA/QC procedures	According with standard EN 14181. AST is performed on an annual basis.
Purpose of data	Project emission calculations.
Additional comment	

Data/Parameter	**P.3 PE_n**
Unit	tonne N_2O
Description	N_2O emission of the 4th project campaign
Measured/Calculated /Default	Calculated
Source of data	Calculated from monitored data
Value(s) of monitored parameter	226,65
Monitoring equipment	N.A.
Measuring/Reading/ Recording frequency	Once, at the end of the project campaign
Calculation method (if applicable)	According to applied methodology
QA/QC procedures	N.A.
Purpose of data	Project emission calculations.
Additional comment	

Data/Parameter	**P.4 OH**
Unit	Hour
Description	Total operating hours for the project campaign
Measured/Calculated /Default	Measured
Source of data	Process control system at MCV's plant.
Value(s) of monitored parameter	6.562 hours
Monitoring equipment	N.A.
Measuring/Reading/ Recording frequency	Daily
Calculation method (if applicable)	The distributed control system of the plant will record effective operating time of the plant by monitoring periods when the value registered for the hourly average of the oxidation reactor temperature reaches a value of 650ºC or higher.
QA/QC procedures	This Thermocouple is changed every campaign. In the reactor at the same distance of the gauzes is installed another temperature meter which can be used to compare the data of the first in case of a failure.
Purpose of data	Project emission calculations.
Additional comment	

Data/Parameter	**P.5 NAP**
Unit	tonne 100% HNO_3
Description	Total nitric acid production for the project campaign
Measured/Calculated /Default	Measured
Source of data	Production logs of MCV's plant.
Value(s) of monitored parameter	65.758[3]
Monitoring equipment	<table><tr><td></td><td>FIS-11C02</td><td>FIT-12N09</td></tr><tr><td>Type:</td><td>Mass Flow Transmitter (Coriolis) Micro Motion CMF200</td><td>Mass Flow Transmitter (Coriolis) Micro Motion CMF050</td></tr><tr><td>Serial Number:</td><td>S/N Tx: 390682 - S/N Sensor: 2203854</td><td>S/N Tx: 3043896 - S/N Sensor: 486759</td></tr></table>
Measuring/Reading/ Recording frequency	Daily
Calculation method (if applicable)	Daily production is measured directly by a mass flow meter (Coriolis principle) that records the combined Nitric acid produced by both the Nitric Acid Plant and the Caprolactam Plant; the device also measures density and temperature, so concentration correction is done automatically with the help if the DCS. The specific Caprolactam Plant production is measured by a second device of the Coriolis type. The DCS calculates the daily production of the nitric acid plant as the difference between the first (Coriolis) and second (Coriolis) device measurements.
QA/QC procedures	Procedures PR02A-P005 "Procedimiento para el Cálculo de la Producción de la Planta de Ácido Nítrico" and I-6321-053 "Instructivo para el Mantenimiento, Ajuste y Calibración de Transmisores de Flujo Másico Micromotion".
Purpose of data	Project emission calculations.
Additional comment	

[3] NAP for the fourth project campaign did not exceed the design capacity. The design capacity of MCV plant is 275 tonne HNO_3/day, therefore the nameplate capacity is 100.375 tonne HNO_3 considering 365 days as per definition of nameplate capacity. The total production of fourth project campaign was 65.758 tonne HNO_3 produced during 287 operating days, resulting in 83.630 tonne HNO_3 for a period of 365 days.

Data/Parameter	P.6 TSG
Unit	ºC
Description	Temperature of the stack gas during the project campaign
Measured/Calculated /Default	Measured
Source of data	AMS (Flow meter)
Value(s) of monitored parameter	119,82
Monitoring equipment	Multivariable Transmitter Rosemount Annubar type flow 3095MFA. S/N Tx: 0022859 - S/N Sensor: 3081256.
Measuring/Reading/ Recording frequency	Every two seconds
Calculation method (if applicable)	N.A.
QA/QC procedures	AST and QAL2 test according to EN 14181
Purpose of data	Project emission calculations.
Additional comment	

Data/Parameter	P.7 PSG
Unit	kgf/cm^2
Description	Pressure of the stack gas during the project campaign
Measured/Calculated /Default	Measured
Source of data	AMS (Flow meter).
Value(s) of monitored parameter	1,04
Monitoring equipment	Multivariable Transmitter Rosemount Annubar type flow 3095MFA. S/N Tx: 0022859 - S/N Sensor: 3081256.
Measuring/Reading/ Recording frequency	Every two seconds
Calculation method (if applicable)	N.A.
QA/QC procedures	AST and QAL2 test according to EN 14181
Purpose of data	Project emission calculations.
Additional comment	

Data/Parameter	**P.8 EF_n**
Unit	tonne N_2O / tonne 100% HNO_3
Description	Project emission factor calculated from monitored data for the project campaign
Measured/Calculated /Default	Calculated
Source of data	Calculated from monitored data
Value(s) of monitored parameter	0,00345
Monitoring equipment	N.A.
Measuring/Reading/ Recording frequency	Once for each campaign
Calculation method (if applicable)	According to applied methodology
QA/QC procedures	N.A.
Purpose of data	Project emission calculations.
Additional comment	

Data/Parameter	**P.9 $EF_{ma,n}$**
Unit	tonne N_2O/tonne 100% HNO_3
Description	Moving average emission factor
Measured/Calculated /Default	Calculated
Source of data	Calculated from monitoring data
Value(s) of monitored parameter	0,00281
Monitoring equipment	N.A.
Measuring/Reading/ Recording frequency	Calculated at the end of a campaign ‘n’
Calculation method (if applicable)	According to applied methodology
QA/QC procedures	N.A.
Purpose of data	Project emission calculations.
Additional comment	

<table>
<tr><td>Data/Parameter</td><td>P.12 CL_n</td></tr>
<tr><td>Unit</td><td>tonne 100% HNO_3</td></tr>
<tr><td>Description</td><td>The project campaign length for the nth campaign (CL_n) is defined as the nitric acid produced during the nth campaign (see project nitric acid production).</td></tr>
<tr><td>Measured/Calculated /Default</td><td>Calculated</td></tr>
<tr><td>Source of data</td><td>Production logs of MCV’s plant.</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>65.758 ton 100% HNO3</td></tr>
<tr><td>Monitoring equipment</td><td>
<table>
<tr><td></td><td>FIS-11C02</td><td>FIT-12N09</td></tr>
<tr><td>Type:</td><td>Mass Flow Transmitter (Coriolis) Micro Motion CMF200</td><td>Mass Flow Transmitter (Coriolis) Micro Motion CMF050</td></tr>
<tr><td>Serial Number:</td><td>S/N Tx: 390682 - S/N Sensor: 2203854</td><td>S/N Tx: 3043896 - S/N Sensor: 486759</td></tr>
</table>
</td></tr>
<tr><td>Measuring/Reading/ Recording frequency</td><td>Calculated once at the end of the project campaign</td></tr>
<tr><td>Calculation method (if applicable)</td><td>Daily production is measured directly by a mass flow meter (Coriolis principle) that records the combined Nitric acid produced by both the Nitric Acid Plant and the Caprolactam Plant; the device also measures density and temperature, so concentration correction is done automatically with the help if the DCS. The specific Caprolactam Plant production is measured by a second device of the Coriolis type. The DCS calculates the daily production of the nitric acid plant as the difference between the first (Coriolis) and second (Coriolis) device measurements.</td></tr>
<tr><td>QA/QC procedures</td><td>Procedures PR02A-P005 “Procedimiento para el Cálculo de la Producción de la Planta de Ácido Nítrico” and I-6321-053 “Instructivo para el Mantenimiento, Ajuste y Calibración de Transmisores de Flujo Másico Micromotion”.</td></tr>
<tr><td>Purpose of data</td><td>Project emission calculations.</td></tr>
<tr><td>Additional comment</td><td></td></tr>
</table>

Data/Parameter	**P.13 EF_p**
Unit	tonne N_2O/tonne 100% HNO_3
Description	Emission factor that will be applied to calculate the emission reductions from this specific campaign
Measured/Calculated /Default	Calculated
Source of data	Calculated from monitoring data
Value(s) of monitored parameter	0,00345
Monitoring equipment	N.A.
Measuring/Reading/ Recording frequency	Calculated at the end of the n^{th} campaign
Calculation method (if applicable)	According to applied methodology
QA/QC procedures	N.A.
Purpose of data	Project emission calculations.
Additional comment	

Data/Parameter	**P.14 EF_{min}**
Unit	tonne N_2O/tonne 100% HNO_3
Description	The lowest among the emission factors of the 10 first campaigns
Measured/Calculated /Default	Calculated
Source of data	Calculated from monitoring data
Value(s) of monitored parameter	N.A.
Monitoring equipment	N.A.
Measuring/Reading/ Recording frequency	After first ten campaigns of the project crediting period
Calculation method (if applicable)	According to applied methodology
QA/QC procedures	
Purpose of data	Baseline and project emission calculations.
Additional comment	

Data/Parameter	**B.1 $NCSG_{BC}$**
Unit	mg N_2O/Nm^3 (converted from ppm if necessary)
Description	Mean concentration of N_2O in the stack gas for the baseline campaign
Measured/Calculated /Default	Measured
Source of data	AMS (Infrared gas analyzer) at MCV's plant.
Value(s) of monitored parameter	2,022
Monitoring equipment	AO2000 continuous gas analyzer, with analysis module URAS 14 (infrared photometer). S/N: 4606448/1000
Measuring/Reading/ Recording frequency	Every two seconds
Calculation method (if applicable)	N/A
QA/QC procedures	Procedure I-6321-001 "Instructivo Para Ajuste y Calibración De Analizador De N_2O De Planta 11", AST and QAL2 test according to EN 14181.
Purpose of data	Project emission calculations.
Additional comment	

Data/Parameter	**B.2 VSG_{BC}**
Unit	Nm^3/hour
Description	Mean gas volume flow rate in the stack gas during the baseline campaign
Measured/Calculated /Default	Measured
Source of data	AMS (Flow meter) at MCV's plant.
Value(s) of monitored parameter	33.439
Monitoring equipment	Annubar type Flow Transmitter Rosemount 3095MFA (multiple pressure differential principle). S/N Tx: 0022859 - S/N Sensor: 3081256
Measuring/Reading/ Recording frequency	Every two seconds
Calculation method (if applicable)	N/A
QA/QC procedures	According with standard EN 14181. AST is performed on an annual basis
Purpose of data	Project emission calculations.
Additional comment	

Data/Parameter	**B.3 BE_{BC}**
Unit	tonne N_2O
Description	Total N_2O emission during the baseline campaign
Measured/Calculated /Default	Calculated
Source of data	Monitored data
Value(s) of monitored parameter	572,54
Monitoring equipment	N.A
Measuring/Reading/ Recording frequency	Calculated at least once at the end after the baseline campaign
Calculation method (if applicable)	According to applied methodology
QA/QC procedures	N.A.
Purpose of data	Project emission calculations.
Additional comment	

Data/Parameter	**B.4 OH_{BC}**
Unit	Hour
Description	Total operating hours for the baseline campaign
Measured/Calculated /Default	Measured
Source of data	Process control system at MCV's plant
Value(s) of monitored parameter	8.466
Monitoring equipment	N.A.
Measuring/Reading/ Recording frequency	Daily
Calculation method (if applicable)	The distributed control system of the plant will record effective operating time of the plant by monitoring periods when the value registered for the hourly average of the oxidation reactor temperature reaches a value of 650ºC or higher.
QA/QC procedures	The Thermocouple is changed every campaign. In the reactor at the same distance of the gauzes is installed another temperature meter which can be used to compare the data of the first in case of a failure.
Purpose of data	Baseline and project emission calculations.
Additional comment	

<table>
<tr><td>Data/Parameter</td><td>B.5 NAP_{BC}</td></tr>
<tr><td>Unit</td><td>tonne 100% HNO_3</td></tr>
<tr><td>Description</td><td>Total nitric acid production for the baseline campaign</td></tr>
<tr><td>Measured/Calculated /Default</td><td>Measured</td></tr>
<tr><td>Source of data</td><td>Production logs of MCV’s plant.</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>84.823</td></tr>
<tr><td>Monitoring equipment</td><td>
<table>
<tr><td></td><td>FIS-11C02</td><td>FIT-12N09</td></tr>
<tr><td>Type:</td><td>Mass Flow Transmitter (Coriolis) Micro Motion CMF200</td><td>Flow Transmitter Rosemount model Vortex 8800A</td></tr>
<tr><td>Serial Number:</td><td>S/N Tx: 390682 - S/N Sensor: 2203854</td><td>S/N Sensor and Tx: 21173</td></tr>
</table>
</td></tr>
<tr><td>Measuring/Reading/ Recording frequency</td><td>Daily</td></tr>
<tr><td>Calculation method (if applicable)</td><td>Daily production is measured directly by a mass flow meter (Coriolis principle) that records the combined Nitric acid produced by both the Nitric Acid Plant and the Caprolactam Plant; the device also measures density and temperature, so concentration correction is done automatically with the help if the DCS. The specific Caprolactam Plant production is measured by a second device of the Vortex type. The DCS calculates the daily production of the nitric acid plant as the difference between the first (Coriolis) and second (Vortex) device measurements.</td></tr>
<tr><td>QA/QC procedures</td><td>Procedures PR02A-P005 “Procedimiento para el Cálculo de la Producción de la Planta de Ácido Nítrico” and I-6321-053 “Instructivo para el Mantenimiento, Ajuste y Calibración de Transmisores de Flujo Másico Micromotion”.</td></tr>
<tr><td>Purpose of data</td><td>Baseline and project emission calculations.</td></tr>
<tr><td>Additional comment</td><td></td></tr>
</table>

Data/Parameter	**B.6 TSG_{BC}**
Unit	**ºC**
Description	Temperature of the stack gas during the baseline campaign
Measured/Calculated /Default	Measured
Source of data	AMS (Flow meter).
Value(s) of monitored parameter	114,7
Monitoring equipment	Multivariable Transmitter Rosemount Annubar type flow 3095MFA. S/N Tx: 0022859 - S/N Sensor: 3081256
Measuring/Reading/ Recording frequency	Every two seconds
Calculation method (if applicable)	N/A
QA/QC procedures	AST and QAL2 test according to EN 14181
Purpose of data	Project emission calculations.
Additional comment	

Data/Parameter	**B.7 PSG_{BC}**
Unit	kgf/cm^2
Description	Pressure of the stack gas during the baseline campaign
Measured/Calculated /Default	Measured
Source of data	AMS (Flow meter).
Value(s) of monitored parameter	1,05
Monitoring equipment	Multivariable Transmitter Rosemount Annubar type flow 3095MFA. S/N Tx: 0022859 - S/N Sensor: 3081256
Measuring/Reading/ Recording frequency	Every two seconds
Calculation method (if applicable)	N/A
QA/QC procedures	AST and QAL2 test according to EN 14181
Purpose of data	Project emission calculations.
Additional comment	

Data/Parameter	**B.8 EF_{BL}**
Unit	tonne N_2O/tonne 100% HNO_3
Description	Baseline N_2O Emission Factor
Measured/Calculated /Default	Calculated
Source of data	Calculated from monitored data
Value(s) of monitored parameter	0,00647[4] tonne N_2O / tonne 100% HNO_3.
Monitoring equipment	N.A.
Measuring/Reading/ Recording frequency	Calculated once at the end of the baseline campaign
Calculation method (if applicable)	According to applied methodology
QA/QC procedures	N.A.
Purpose of data	Project emission calculations.
Additional comment	

Data/Parameter	**B.9 UNC**
Unit	**%**
Description	**Overall Uncertainty of the Monitoring System.**
Measured/Calculated /Default	Calculated
Source of data	Calculated in the QAL2 test
Value(s) of monitored parameter	4,05 %
Monitoring equipment	N.A.
Measuring/Reading/ Recording frequency	N.A.
Calculation method (if applicable)	Data obtained from QAL2 test carried out by SGS Environmental Services.
QA/QC procedures	N.A.
Purpose of data	Project emission calculations.
Additional comment	

[4] This value was extracted from the document: "MCV_BLEF_calculation_for_fourth_project_campaign-ver1.1.xls". The baseline emission factor was recalculated for fourth project campaign because CL_n was shorter than $CL_{normal.}$ The value of EF_{BL} that would have applied if no recalculation was required, is 0,00647 tonne N_2O/ tone 100% HNO_3 (for more details see the document: "MCV_BLEF_calculation-for-Fourth-project-campaing ver 1.0.xls")

Data/Parameter	B.10 AFR
Unit	kg NH_3/hour
Description	Ammonia Gas Flow Rate to Ammonia Oxidation Reactor for the baseline campaign
Measured/Calculated /Default	Measured
Source of data	Distributed Control System of MCV's plant.
Value(s) of monitored parameter	2.807
Monitoring equipment	Flow Transmitter D/P cell Rosemount 1151DP5S22M1B1. S/N : 1450154.
Measuring/Reading/ Recording frequency	Continuous
Calculation method (if applicable)	N.A.
QA/QC procedures	Critical instruments are calibrated on a routinely basis every campaign. Additionally the cell that measures the ammonia flow is already calibrated and the ammonia to Air ratio is calculated and recorder with the AMS data
Purpose of data	Project emission calculations.
Additional comment	

Data/Parameter	B. 12 AIFR
Unit	kg NH_3/kg air
Description	Ammonia to air flow ratio to the ammonia oxidation reactor for the baseline campaign
Measured/Calculated /Default	Measured
Source of data	Distributed Control System of MCV's plant.
Value(s) of monitored parameter	0,0607
Monitoring equipment	Flow Transmitter D/P cell Rosemount 3051CD1A22A1JB4E5L4M6T1. S/N : O536957
Measuring/Reading/ Recording frequency	Every hour
Calculation method (if applicable)	NA
QA/QC procedures	Critical instruments are calibrated on a routinely basis every campaign. Additionally the cell that measures the ammonia flow is already calibrated and the ammonia to Air ratio is calculated and recorder with the AMS data
Purpose of data	Project emission calculations.
Additional comment	

Data/Parameter	**B.13 CL_{BL}**
Unit	tonne 100% HNO_3
Description	Campaign length is defined as the total number of tonnes of nitric acid at 100% concentration produced with one set of gauzes.
Measured/Calculated /Default	Calculated
Source of data	Distributed Control System of MCV's plant.
Value(s) of monitored parameter	84.823 tonnes 100% HNO_3
Monitoring equipment	N.A.
Measuring/Reading/ Recording frequency	Calculated after the end of each campaign.
Calculation method (if applicable)	Daily production is measured directly by a mass flow meter (Coriolis principle) that records the combined Nitric acid produced by both the Nitric Acid Plant and the Caprolactam Plant; the device also measures density and temperature, so concentration correction is done automatically with the help if the DCS. The specific Caprolactam Plant production is measured by a second device of the Coriolis type. The DCS calculates the daily production of the nitric acid plant as the difference between the first (Coriolis) and second (Coriolis) device measurements.
QA/QC procedures	Procedures PR02A-P005 "Procedimiento para el Cálculo de la Producción de la Planta de Ácido Nítrico" and I-6321-053 "Instructivo para el Mantenimiento, Ajuste y Calibración de Transmisores de Flujo Másico Micromotion".
Purpose of data	Baseline and project emission calculations.
Additional comment	

Data/Parameter	**B.16 OT_h**
Unit	ºC
Description	Oxidation temperature of the ammonia reactor for each hour
Measured/Calculated /Default	Measured
Source of data	Distributed Control System of MCV's plant.
Value(s) of monitored parameter	849,5 ºC
Monitoring equipment	Leeds and Northrop model thermocouple type k chromel alumel cat. no. 8784 k-1-5-36-1-3-1) sheat h 5/16 lenght 36" junction type cast iron with mounting bushing for temperature 2100 GF. S/N : O501882
Measuring/Reading/ Recording frequency	Every hour
Calculation method (if applicable)	Reactor temperature is measured by a thermocouple installed through the reactor wall, near the oxidation catalyst; the signal from such device is acquired by the Distributed Control System (DCS) and stored electronically at a given time interval. The operating range is correlated with oxidation temperature (650-900 ° C). This range is set taking into account the minimum operating temperature at low load and temperature shut down of the gauzes.
QA/QC procedures	This Thermocouple is replaced every campaign. In the event of a failure during the campaign the plant is shut down and the thermocouple is replaced for a new one.
Purpose of data	Baseline and project emission calculations.
Additional comment	

Data/Parameter	**B.18 OP_h**
Unit	Pa abs
Description	Oxidation pressure of the ammonia reactor for each hour
Measured/Calculated /Default	Measured
Source of data	Distributed Control System of MCV's plant.
Value(s) of monitored parameter	324,311 Pa
Monitoring equipment	Presión Transmitter Rosemount 3051S2 G4A2A11A1JE5M5T1. S/N : O144887.
Measuring/Reading/ Recording frequency	Every hour
Calculation method (if applicable)	Not applicable. We do not use this parameter to estimate expected emission reduction.
QA/QC procedures	Critical instruments are calibrated on a routinely basis every campaign.
Purpose of data	Baseline and project emission calculations.
Additional comment	

Data/Parameter	**B.21 GS_{BL}**
Unit	N.A.
Description	Gauze supplier for the baseline campaign
Measured/Calculated /Default	N.A.
Source of data	Procurement office of MCV's plant.
Value(s) of monitored parameter	W.C. Heraeus
Monitoring equipment	N.A.
Measuring/Reading/ Recording frequency	Once for each campaign
Calculation method (if applicable)	N.A.
QA/QC procedures	N.A.
Purpose of data	Baseline and project emission calculations.
Additional comment	

Data/Parameter	**B.22 $GS_{project}$**
Unit	N.A.
Description	Gauze supplier for project campaigns
Measured/Calculated /Default	N.A.
Source of data	Procurement offices of MCV plant.
Value(s) of monitored parameter	W.C. Heraeus
Monitoring equipment	N.A.
Measuring/Reading/ Recording frequency	Each campaign
Calculation method (if applicable)	N.A.
QA/QC procedures	N.A.
Purpose of data	Baseline and project emission calculations.
Additional comment	

Data/Parameter	**B.24 GC_{BL}**
Unit	**%**
Description	Gauze composition for the baseline campaign
Measured/Calculated /Default	N.A. Information provided by the supplier.
Source of data	Nitric plant procurement office and gauze Supplier's Technical Service Department
Value(s) of monitored parameter	58,0 to 60.0 % Pt, 3,4 to 4.4 % Rh, 36,1 to 38,1 % Pd.
Monitoring equipment	N.A.
Measuring/Reading/ Recording frequency	Once
Calculation method (if applicable)	N.A.
QA/QC procedures	N.A.
Purpose of data	Baseline and project emission calculations.
Additional comment	

Data/Parameter	**B. 25 $GC_{project}$**
Unit	**%**
Description	Gauze composition for the project campaign
Measured/Calculated /Default	N.A. Information provided by the supplier.
Source of data	Procurement offices of MCV plant.
Value(s) of monitored parameter	58,0 to 60.0 % Pt, 3,4 to 4.4 % Rh, 36,1 to 38,1 % Pd.
Monitoring equipment	N.A.
Measuring/Reading/ Recording frequency	Once for each campaign
Calculation method (if applicable)	N.A.
QA/QC procedures	N.A.
Purpose of data	Baseline and project emission calculations.
Additional comment	

Data/Parameter	**B.26 EF_{reg}**
Unit	kg N_2O/tonne HNO_3
Description	Emission level set by incoming policies or regulations, local and national regulations on N_2O and NO_X emissions
Measured/Calculated /Default	N.A.
Source of data	Local and national regulations
Value(s) of monitored parameter	No relevant local or national regulations were introduced during the project period (there was a change in NO_X regulations but this change did not imply limitations on N_2O emission levels)
Monitoring equipment	N.A.
Measuring/Reading/ Recording frequency	To be recorded on date of introduction or change of regulation
Calculation method (if applicable)	N.A.
QA/QC procedures	N.A.
Purpose of data	Baseline and project emission calculations.
Additional comment	

The project activity does not generate any leakage

D.3. Implementation of sampling plan
>>

SECTION E. Calculation of emission reductions or GHG removals by sinks
E.1. Calculation of baseline emissions or baseline net GHG removals by sinks
>>

For baseline emission factor determination, N_2O concentration and gas volume flow at the plant were monitored throughout the baseline campaign. Hourly average readings for N_2O concentration and gas flow volume (calculated from every 2 second monitored data) were performed. Error readings (e.g. downtime or malfunction) and extreme values were eliminated from the output data series.

Normal operating conditions determination

To ensure that data obtained during baseline campaign are representative of the actual GHG emissions from the source plant, a set of process parameters known to affect N_2O generation have been set based on plant historical operating conditions, appropriate technical literature and design data. Those parameters, called by the methodology normal operating conditions, are: oxidation temperature, oxidation pressure, ammonia flow to the reactor and ammonia flow to air flow ratio.
Only those N_2O measurements taken when the plant was operating within the permitted range were considered in the calculation of baseline emissions.

After eliminating data measured when the plant was operating outside the permitted conditions, the following statistical procedure was applied.

a) Calculated the sample mean (x)
b) Calculated the sample standard deviation (s)

c) Calculated the 95% confidence interval (equal to 1.96 times the standard deviation)
d) Eliminated all data that lied outside the 95% confidence interval
e) Calculated the new sample mean from the remaining values (volume of stack gas (VSG) and N_2O concentration of stack gas (NCSG))

Then, baseline emissions were calculated using the following formulae

$$BE_{BC} = VSG_{BC} \cdot NCSG_{BC} \cdot 10^{-9} \cdot OH_{BC}$$

$$EF_{BL} = \frac{BE_{BC}}{NAP_{BC}}(1 - \frac{UNC}{100})$$

Where:

BE_{BC}	Total baseline emissions in the baseline measurement period, in, tN_2O
VSG_{BC}	Mean stack gas volume flow rate in the baseline measurement period, in Nm^3/h
$NCSG_{BC}$	Mean concentration of N_2O in the stack gas in the baseline measurement period, in mg N_2O/Nm^3
OH_{BC}	Number of operating hours in the baseline measurement period, in h
EF_{BL}	Baseline emission factor, in tN_2O/ $tHNO_3$
NAP_{BC}	Nitric acid production during the baseline campaign, in, $tHNO_3$
UNC	Overall measurement uncertainty of the monitoring system, in %, calculated as the combined uncertainty of the applied monitoring equipment

Another parameter that is measured and must be compared with the normal value is the campaign length (CL_n).

According to AM0034, version 2, the baseline campaign length (CL_{BL}) must be shorter than or equal to CL_n.

The average historical campaign length, prior to the baseline campaign (Normal campaign, CL_{normal}) is: 83,165 tonnes HNO_3.

Baseline campaign took place between February 15th, 2007 and February 17th, 2008. The operating day was considered from 8:00 AM of the corresponding day to 7:00 AM of the following day. Following this criteria, baseline campaign took place between 8:00 AM of February 15th, 2007 and 7:00 AM of February 18th , 2008.

Aligned with AM0034 Ver2 and complemented with Annex 12 from EB51, when $CL_{BL} > CL_{normal}$:

If $CL_{BL} > CLnormal$ N_2O values that were measured beyond the length of CL_{normal} during the production of the quantity of nitric acid (i.e. the final tonnes produced) are to be eliminated from the calculation of EF_{BL}.

The Board clarified that N_2O values in the above requirement refers to the values of concentration of N_2O of stack gas ($NCSG_{BC}$), therefore, while applying the above requirement of the methodology the project participants should eliminate the values for this parameter beyond the length of CL_{normal} for calculating the mean values for $NCSG_{BC}$.

The baseline emissions (BE_{BC}) was calculated using this mean value multiplied by the mean value of volume of the stack gas (VSG_{BC}) and the total operating hours (OH_{BC}) of the baseline campaign. In

calculating the EFBL, the nitric acid production corresponding to the operating hours of the total baseline campaign length (OH_{BC}) should be used.

For baseline emission factor calculation the following period was used. February 15th, 2007 to November 24th, 2007 (See document "MCV_BLEF_calculation_for_Fourth_project_campaign-ver_1".xls).

In the case of project campaigns, AM0034 states that campaign length must be longer than or equal to CL_n. If CLn < CL_{normal}, baseline emission factor must be recalculated by eliminating all those N_2O values obtained during the production of tonnes of nitric acid beyond CL_n (i.e. the last tonnes produced) from the calculation of EF

As fourth Project Campaign was shorter than normal campaign length, EF_{BL} was re-calculated using $NCSG_{BC}$ values monitored before the day in which the plant exceeded the production of the third project campaign. The following period was included in the calculation: February 15th, 2007 to November 24th, 2007. (See document "MCV_BLEF_calculation_for_Fourth_project_campaign-ver_1".xls)

$$BE_{BC} = 33.439 \cdot 2{,}022 \cdot 10^{-9} \cdot 8.466 = 572{,}54\, tonnes\ N_2O$$

$$EF_{BL} = \frac{572{,}54}{84.823}(1 - \frac{4{,}05}{100}) = 0{,}00647\, tonnes\, N_2O / tonnes\, HNO_3$$

The Baseline Campaign was valid because the plant was operated within normal operating conditions for more than 50% of the duration of the baseline.

E.2. Calculation of project emissions or actual net GHG removals by sinks

>>

For project emission factor determination, N_2O concentration and gas volume flow for each plant were monitored throughout the project campaign. Hourly average readings for N_2O concentration and gas volume flow (calculated from every 2 second monitored data) were performed. Error readings (e.g. downtime or malfunction) and extreme values were eliminated from the output data series.
Next, the same statistical evaluation that was applied to the baseline data series was applied to the project data series.

The mean values of N_2O concentration at the stack gas and volume flow rate at the stack gas were used in the following formula (Eq. 3 from AM0034) to calculate project emissions:

$$PE_n = VSG_n \cdot NCSG_n \cdot 10^{-9} \cdot OH_n$$

$$EF_n = \frac{PE_n}{NAP_n}$$

Where:

PE_n	Total Project emissions of the nth campaign, in tN_2O
VSG_n	Mean stack gas volume flow rate for the nth project campaign, in Nm^3/h

$NCSG_n$	Mean concentration of N_2O in the stack gas for the project campaign, in mg N_2O/Nm^3
OH_n	Number of operating hours in the project campaign, in h
EF_n	Emission factor calculated for the *nth* campaign, in ton N_2O/ton HNO_3
NAP_n	Nitric acid production in the *nth* campaign, in ton 100% HNO_3

The Fourth Project Campaign took place between May 13th, 2011 and March 29th, 2012. The operating day was considered from 8:00 AM of the corresponding day to 7:00 AM of the following day. Following this criteria, fourth project campaign took place between 8:00 AM of May 13th, 2011 and 7:00 AM of May 29th, 2010.

Values obtained are:

$$PE_n = 36.638 \cdot 6.562 \cdot 10^{-9} \cdot 942,74 = 226,65 tonnes N_2O$$

$$EF_n = \frac{226,65}{65.758} = 0,00345 tonnes N_2O / tonnes HNO_3$$

Derivation of a moving average emission factor:
The methodology proposes the calculation of a moving average emission factor in order to take a conservative approach in emission reduction calculation. The maximum value between EF_n for the specific project campaign and the $EF_{ma,n}$ shall be used in the emission reduction calculation as EF_p emission factor.

$EF_{ma,n}$ is calculated as follows:

$$EF_{ma,n} = \frac{EF_1 + EF_2 + ... + EF_n}{n} (tonne N_2O / tonne HNO_3)$$

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

Where:

EF_n	Emission factor calculated for the n^{th} campaign, in tonne N_2O/tonne HNO_3;
$EF_{ma,n}$	Moving average (ma) emission factor after n^{th} campaign, including the current campaign, in tonne N_2O/tonne HNO_3;
N	Number of campaigns to date;
EF_p	Emission factor that will be applied to calculate the emission reductions from this specific campaign, in tonne N_2O/tonne HNO_3;

This process is repeated for each campaign so that a moving average, $EF_{ma,n}$, is established over time, becoming more representative and precise with each additional campaign.

Values obtained are:

$$EF_{ma,n} = \frac{0{,}00193 + 0{,}00248 + 0{,}00337 + 0{,}00345}{4} = 0{,}00281 tonne N_2O / tonne HNO_3$$

As EF_n was higher than $EF_{ma,\,n}$ then, $EF_n = EF_p = 0{,}00345$ *tonnes* N_2O*/tonnes* HNO_3

Complete project emission factor calculation is in document "MVC_Fourth_project campaign ver. 1.0.xls".xls

E.3. Calculation of leakage

>>

No leakage calculation is required.

E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

As indicated earlier, the present Monitoring Report covers the following period: May 13th, 2011 to March 29th, 2012.

According to AM0034 version 2, 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

The value obtained for the project is:

$$\mathrm{ER_n} = (0{,}00647 - 0{,}00345).65.758 \cdot 310 = 61.563 \text{ tonnes} CO_2$$

Complete emission reduction calculation is in the following document: "MVC_Fourth_project campaign ver. 1 0.xls".xls

The NAP for the fourth project campaign did not exceed the design capacity.
The design capacity of MCV plant is 275 tonne HNO_3/day, therefore the nameplate capacity is 100.375 tonne HNO_3 considering 365 days as per definition of nameplate capacity. The total production of fourth project campaign was 65.758,38 tonnes HNO_3 produced during 287 operating days, resulting in 83.630 tonne HNO_3 for a period of 365 days.

Nameplate capacity		
Nitric acid production capacity	275	tonne HNO_3/d
Nameplate capacity	100.375	tonne HNO_3/y

Fourth Project campaign		
Nitric acid produced during 287 days	65.758,4	tonne HNO_3
Nitric acid produced calculated on daily basis.	229,1	tonne HNO_3/d
Nitric acid produced calculated on the basis of 365 days	83.630	tonne HNO_3/y

The whole comparison can be found at document "MVC_Fourth_project campaign ver. 1 0.xls".xls

Time Period	Baseline emissions or baseline net GHG removals by sinks (tCO_2e)	Project emissions or actual net GHG removals by sinks (tCO_{2e})	Leakage (tCO_2e)	Emission reductions or net anthropogenic GHG removals by sinks (tCO_2e)
Total	122.050	61.563		

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

THE TABLE BELOW SHOWS THE EMISSION REDUCTIONS CLAIMED FOR THE FOURTH CAMPAIGN, AS COMPARED AGAINST THE EMISSION REDUCTIONS ESTIMATED IN THE REGISTERED PDD.

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (tCO_2e)	**100,081**	**61.563**

The abovementioned amount of CERs was generated during the monitoring period, from May 13, 2011 to March 29, 2012 (287 operative days).

The amount of CERs estimated in the PDD is 122.050 tCO_2e per year considering 350 operative days, resulting in 61.563 CERs estimated for a period of 287 days equal to the monitoring period.

E.6. Remarks on difference from estimated value in registered PDD

>>

The generated emission reductions during this 4th monitoring period are lower than expected in the PDD. This was mainly due to the fact that the N_2O abatement efficiency of the catalyst for the 4th campaign was lower than the one estimated in the PDD.

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History of the document

Version	Date	Nature of revision
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory **Document Type**: Form **Business Function**: Issuance		

Annex I

Certification provided by the regional authority DAMAB confirming that the Monomeros Colombo Venezolanos S.A. production facilities operate according to Decreto 02 de 1982 Del Ministerio de Salud de la República de Colombia (Decree #02, 1982, Ministry of Health of Colombia):

ALCALDÍA DE BARRANQUILLA
Distrito Especial, Industrial y Portuario

DAMAB

LA SUBDIRECTORA JURIDICA DEL DEPARTAMENTO TECNICO ADMINISTRATIVO DEL MEDIO AMBIENTE DAMA BARRANQUILLA DAMAB

CERTIFICA

La empresa MONOMEROS COLOMBO VENEZOLANO S.A, identificada con Nit No. 860.020.439-5, ubicada en la Vía 40 Las Flores de este Distrito, posee Permiso de Emisiones Atmosféricas otorgado mediante Resolución No. 1420 del 18 de Noviembre de 2009, por un término de cinco (5) años, que ampara las emisiones de todas las Plantas del complejo industrial ubicado en la Vía 40 Las Flores de este Distrito.

Que en la actualidad la empresa ha dado cumplimiento a las obligaciones impuestas en la Resolución No. 1420 del 18 de Noviembre de 2009, así mismo mediante Resolución No. 1287 se Acepta el Estudio de Calidad de Aire en el Área de Influencia de la Sociedad y la Resolución No. 1276 del 4 de Julio de 2012, el DAMAB aceptó el Estudio de Emisiones Atmosféricas para Fuentes Fijas y Calidad de Aire por cuanto la Sociedad MONOMEROS COLOMBO VENEZOLANO S.A, cumple con los parámetros establecidos en la normatividad ambiental vigente, en concordancia con las Resoluciones 2154 de Noviembre de 2010 por el cual se ajusta el Protocolo para Monitoreo y Seguimiento de la calidad de Aire adoptado mediante Resolución 650 de 2010; Resolución 909 de Junio de 2008, Resolución 2153 de 2010 por el cual se ajusta el Protocolo el Control y Vigilancia de Contaminación Atmosféricas generada por Fuentes Fijas, adoptado por la Resolución 760 de 2010 expedida por el Ministerio de Medio Ambiente y Desarrollo Sostenible.

SARA BELEN RODRIGUEZ MANZUR
Subdirector Jurídico – DAMAB
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DAMAB
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