CDM Monitoring Report No.1 Rev.5
08 January 2009

Omnia Fertilizer Limited

Nitrous Oxide (N_20) Reduction Project
AM0028 ver. 1

UNFCCC Ref No. 0752

Crediting Period	
Revised Starting date:	26 February 2008

Monitoring period	
From:	26 February, 2008
To:	17 March, 2008

Table of contents

Omnia Fertilizer Limited Nitrous Oxide (N20) Reduction Project

CDM Monitoring Report Nº1.Rev.1

1.0 Introduction

The purpose of this monitoring report is to inform about the GHG emission reduction achieved due to the project activity.

This monitoring report covers the project activity from: 26 February, 2008 to 17 March, 2008 inclusive.

Duration of the project activity 1st crediting period:

Registration date: May 3, 2007

Crediting period: February 26, 2008 to February 25, 2015 (Renewable)

Omnia Fertilizer Ltd. has implemented a project activity aimed at reducing the N_2O emissions from its Nitric Acid plant in Sasolburg, South Africa.

The project activity is under the category large scale, Sectoral scope 5 “Chemical Industry”

2.0 Reference

Approved baseline methodology

AM0028 version 1 “Catalytic N_2O destruction in the tail gas of Nitric Acid Plants”

Approved monitoring methodology

AM0028 version 1 “Catalytic N_2O destruction in the tail gas of Nitric Acid Plants”.

Project Design Document

“Omnia Fertilizer Limited Nitrous Oxide (N_2O) Reduction Project.

Version 5: Sept. 25, 2006

Validation Report

“Omnia Fertilizer Limited Nitrous Oxide (N_2O) Reduction Project” in South Africa.

Report Nº: 2006-1194 Revision 1 by Det Norske Veritas (DNV)

Date: 16 October 2006

CDM Registration

“Omnia Fertilizer Limited Nitrous Oxide (N_2O) Reduction Project” Ref... Nº 0752.

Date of registration: 3 May 2007.

3.0 Description of the Project Activity

The project activity involves the installation of an N_2O catalytic Destruction Facility in the tail gas section of the process downstream of the absorption column at Omnia Fertilizer Limited nitric acid plant in Sasolburg, South Africa. Catalytic reduction of N_2O occurs when the N_2O in the tail gas reacts, in the presence of a reducing agent, with the iron zeolite catalyst in the N_2O catalytic Destruction Facility. The reaction removes the oxygen from the N2O molecules and forms one or more compounds. In this case the reducing agent is natural gas, comprised mostly of methane (CH4).

Nitrous Oxide (N_2O) is an unwanted by-product gas generated from the manufacture of nitric acid. It is formed during the catalytic oxidation of Ammonia. Over a suitable catalyst, a maximum 98% (typically 92-96%) of the Ammonia is converted to Nitric Oxide (NO). The rest is consumed by undesirable side reactions that lead to the production of Nitrous Oxide (N_2O), among other compounds.

Waste N_2O gas from nitric acid production plants is typically released into the atmosphere, as it does not have any economic value or toxicity at typical emission levels. N_2O is however an important greenhouse gas which has a high Global Warming Potential (GWP) of 310.

The current project activity takes place at Omnia Fertilizer Limited nitric acid plant in Sasolburg, South Africa.

4.0 Project participant

Name of Party involved	**Project participant (as applicable)**	**Party involved considered as project participant**
Netherlands	International Finance Corporation Rabo Bank	No
Republic of South Africa (host)	Omnia Fertilizer Limited. Private entity Project Developer.	No

Project Developer

Omnia Group, in business since 1953 and listed in the Chemicals, Oils and Plastics sector of the Johannesburg Stock Exchange will be the project operator.

The Group supplies fertilizer to the agricultural industry, explosives to the mining industry and industrial chemicals. Omnia's operations are located in South Africa, Ghana, Kenya, Mauritius, Tanzania, Zambia, Zimbabwe, Australia, New Zeeland, France and Brazil.

Omnia's strength lies in a strong and distinctive culture, which was inspired by its founders and is still being nurtured by the current management. It is an ethos that combines the values of a family business with the strengths of professional management. There is a total commitment to high standards of service and a constant drive to exceed the expectations of customers and colleagues; investors, suppliers, regulators and community enterprise with a high level of integrity.

The Sasolburg factory operates the following plants:

- a dual pressure UHDE designed Nitric Acid plant producing about 60% concentrated nitric acid
- an ammonium nitrate plant producing 89% ammonium nitrate solution
- a fertilizer granulation complex with two (2) production lines:
- one line to produce LAN (CAN), ASN and NP, NPK and NPKS grades of granular fertilizer (except DAP type grades)
- a second line, based on Grande Paroisse technology and commissioned in 1999, to produce any NP, NPK and NPKS grade including DAP
- a liquid and granular calcium nitrate plant developed in-house
- an ammonium nitrate/calcium nitrate mix plant producing an intermediate for emulsion explosives manufactured by its sister company Bulk Mining Explosives (BME)
- a single Super phosphate plant
- Mannheimer furnace licensed from Norsk Hydro, producing potassium sulphate and hydrochloric acid and marketed by its sister chemical company Protea Chemicals
- several dry and liquid materials handling, blending and packaging units
- animal feed grade mono calcium phosphate
- a liquid fertilizer plant producing both clear liquids and suspensions
- a specialty fertilizer (100% water soluble) blending and packaging operation
- direct ammonia to soil application equipment and technical back-up facility

Project Technology Provider

UHDE GmbH (hereinafter called UHDE), a 100% subsidiary of Thyssen Krupp Technologies AG UHDE, is one of the world market leaders in the field of fertilizer technology engineering and construction. It has constructed many modern fertilizer plants including OMNIA's Sasolburg nitric acid plant. The company has developed a tertiary catalyst based process for removing up to 98% of the N_2O from a nitric acid plant's tail gas stream. This process, called the EnviNOx® process, is installed and used at Omnia's nitric acid plant in accordance with the registered PDD.

5.0 Project Location

The project activity is located at Omnia's nitric acid plant, owned by the Omnia Group, in Sasolburg, Free State, South Africa.

6.0 Project Boundary

The project boundary encompasses the physical geographical site of Omnia's nitric acid plant in Sasolburg and equipment for the complete nitric acid production process from the inlet to the ammonia oxidation reactor, typically referred to as the 'ammonia burner', to the stack.

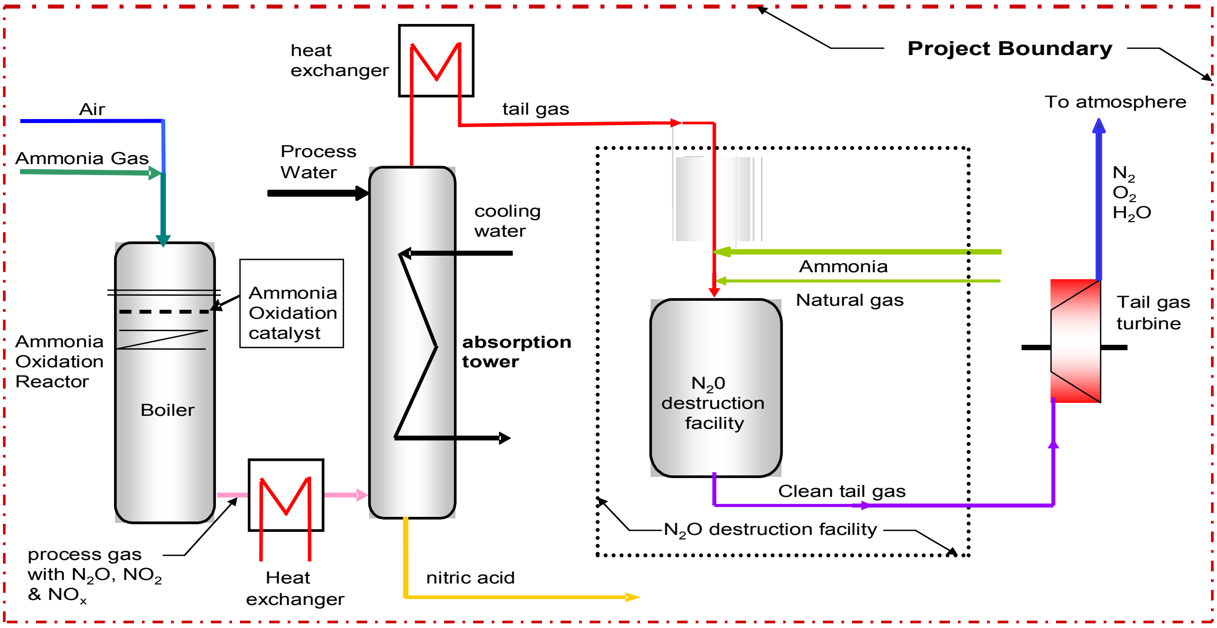
The main GHG emission relevant to the project activity is N_2O contained in the tail gas exiting the stack at the project site. Note that a minimal amount of CH_4 introduced as the reducing agent at the inlet to the N_2O

Destruction Facility is unconverted and escapes in the tail gas as CH_4. The abatement of N_2O is the only GHG emission under control of the project participant.

	Source	**Gas**		**Justification/Explanation**
Baseline	Nitric Acid Plant (burner inlet to stack)	CO_2 CH_4	Excluded	The project does not lead to any change in CO_2 and there is no CH_4 emissions therefore these are excluded.
		N_2O	Included	This is the main emissions source which remains in the tail gas after the N_2O destruction facility
Project Activity	Emissions of N_2O as a result of the side reaction to the nitric acid production	N_2O	Included	Main emission source that remains in the tail gas after the N_2O destruction facility
	Emissions resulting from hydrocarbons used as reducing agent.	CO_2	Included	Project activity injects methane gas (CH_4) as the reducing agent in the tail gas at the inlet to the N_2O destruction facility. The CH_4 reacts with N_2O in presence of catalyst to produce CO_2.
		CH_4	Included	Some of the CH_4, injected into the tail gas as a reducing agent at the inlet to the N_2O Destruction Facility, escapes in the tail gas unconverted.
	Emissions arising from the production of the NH_3 injected into tail gas	CO2e	Included	Project activity injects NH_3 in the tail gas at the inlet to the N_2O Destruction Facility, as a reducing agent together with methane gas, for the reduction of N_2O. CO_2e generated from production of ammonia according to the default factor of 2.14 tCO_2e/ tNH_3 as per the approved methodology AM0028 Version 01
	Emissions Related to the production of the hydrocarbons	CO_2 CH_4 N_2O	Excluded	GHG emissions related to the production of hydrocarbons used as the reducing agent represent less than 0.01% of expected emission reduction and will not be taken into account as per approved methodology AM0028, Version 01.
	Emissions from electricity demand	CO_2 CH_4	Excluded	GHG emissions related to the electricity consumption are insignificant and are

		N_2O		excluded as per approved methodology AM0028

The figure below shows the project boundary for Omnia Fertilizer Ltd., Sasolburg plant.



Project Boundary For N_2O Destruction Facility at Omnia's Nitric Acid Plant Fig.2

More specifically, the project boundary comprises the N_2O destruction facility including the auxiliary ammonia and natural gas input. For monitoring purposes however, the project boundary encompasses the nitric acid plant, to measure the nitric acid production and the operating parameters at the ammonia oxidation reactor.

The possibility that in the future some national, provincial or local regulation governing the emissions of N_2O may occur has been taken into account in the baseline methodology. Accordingly, the baseline emissions will be adjusted at the beginning of the following crediting period following the coming into force of a new N_2O emissions regulation.

7. 0 Monitoring methodology and Plan

7.1 Data monitored

The following tables show the parameters that have been monitored. Note that the project period is defined as the period of time covered by this monitoring report.

Project Emissions

ID No	Data Variable	Description	Source of Data	Data unit	Measured (M) Calculated (C) Estimated (E)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Value of monitored period	Comment
P1	**PE_y** Project Emissions	Project emissions in period y (tCO_2e)	Emerson Model MLT2 and CLD non-dispersive infrared photometry meter	tCO_2e	C	Period	100	Electronic	567.94tCO_2e	
P2	**$PE_{ND,y}$** Project emissions from N_2O not destroyed	Project emissions from N_2O not destroyed in period y (tCO_2e)	Emerson Model MLT2 and CLD non-dispersive infrared photometry meter	tCO_2e	C	Period	100	Electronic	476.07tCO_2e	
P3	**$PE_{DF,y}$** Project emissions from destruction facility	Project emissions related to the operation of the N_2O destruction facility in period y (tCO_2e)	Emerson Model MLT2 and CLD non-dispersive infrared photometry meter	tCO_2e	C	Period	100	Electronic	91.87tCO_2e	
P4	**$PE_{N2O,y}$** N_2O not destroyed by facility	Project emissions of N_2O in period y (tN_2Oy)	Emerson Model MLT2 and CLD non-dispersive infrared photometry meter	tN_2O	C	Period	100	Electronic	1.54tN_2O	
P5	**$F_{TG,i}$** Volume flow of tail gas at N_2O destruction facility	Volume flow rate in the tail gas at the outlet from the Destruction Facility at interval i	Venturi tube, designed and manufactured in accordance with ISO 5167:2003 and converted to standard normal conditions of 1,013.25 Pa and 273.15°K	Nm^3/hr	C	Period	100%	Electronic Crediting Period + 2 yrs	106,983Nm^3/hr	The Delta V DCS automatically converts the venturi tube flow reading to standard conditions, based on the simultaneous reading and recording of the actual temperature and pressure of the tail at the inlet from the N_2O destruction and records it. Readings are recorded in Nm^3/hr and totalized over the project period. The value for the period is 53,919,681 Nm3

ID No	Data Variable	Description	Source of Data	Data unit	Measured (M) Calculated (C) Estimated (E)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Value of monitored period	Comment
P6	$\mathbf{CO}_{N_2O,i}$ N_2O concentration at destruction facility outlet	N_2O concentration in the tail gas at the outlet from the N_2O Destruction Facility	Emerson Model MLT2 and CLD non-dispersive infrared photometry meter	t N_2O/Nm^3	M / Continuously	Every 10 seconds	100%	Electronic Crediting Period + 2 yrs	2.87E-08t N_2O/Nm^3	The concentration of N_2O in the tail gas at the inlet to the N_2O DF is analyzed using non-dispersive infrared photometry in a combined analyzer device, recorded in ppmv and converted by the Delta V DCS.
P7	M_i Measuring interval	Total operating hours for the project period	Delta V DCS Reports.	Hours	M Continuously	Hourly	100%	Electronic Crediting Period + 2 yrs	504hours	Plant operation is recorded and reported in hrs on the daily production reports provided by the Data Monitoring System installed for this project.
P8	$\mathbf{PE}_{NH3,y}$ Emissions from ammonia use in destruction facility	Flow element used to measure ammonia flow	Flow measurement converted to tCO_2e	tCO_2e	C	Period	100	Electronic	39.88tCO_2e	

ID No	Data Variable	Description	Source of Data	Data unit	Measured (M) Calculated (C) Estimated (E)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Value of monitored period	Comment
P9	**$PE_{HC,y}$** Emissions from natural gas use in destruction facility	Flow element used to measure natural gas used	Flow measurement converted to tCO_2e	tCO_2e	C	Period	100	Electronic	52.00tCO_2e	
P10	**$Q_{NH3,y}$** N_2O destruction facility: project ammonia input	Ammonia supply to the N_2O Destruction Facility as a reducing agent	Flow meter – indicate type of flow meter	t NH_3	M	Every 10 seconds	100%	Electronic Crediting Period + 2 yrs	18.63t NH_3	Ammonia flow is metered together with its temperature and pressure and transmitted to the Delta V DCS where flow is converted to standard conditions at 1,025 Pa and 273.15°K. Flow, in Nm^3 is then converted to t NH_3 using the density of NH_3.

ID No	Data Variable	Description	Source of Data	Data unit	Measured (M) Calculated (C) Estimated (E)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Value of monitored period	Comment
P11	**EF_{NH3}** Ammonia Production GHG Emission Factor	Emission factor for ammonia	AM0028 Version 1	tCO_2e/tNH_3	C	Once	100%	Electronic Crediting Period + 2 yrs	2.14t $CO_2e/t\ NH_3$	The emission factor used is as per AM0028 Version 1
P12	**$HCE_{C,y}$** Converted hydrocarbon emissions	Emissions from hydrocarbon (CH_4) converted	Monitoring system	tCO_2e	C	Every 10 seconds	100%	Electronic Crediting Period + 2 yrs	27.51t CO_2e	Natural gas mass flow times the oxidation factor and then converted to CO2e by multiplying total natural gas consumption by 2.77 t CO2e/t CH_4.
P13	**$HCE_{NC,y}$** non-converted methane emissions	Emissions from hydrocarbon (CH_4) not converted	Monitoring system	tCO_2e	C	Every 10 seconds	100%	Electronic Crediting Period + 2 yrs	24.49t CO_2e	The concentration of CH_4 in tail gas at the outlet from the N_2O Destruction Facility is analyzed using non-dispersive infrared photometry in a combined analyzer device. Concentration, in ppmv, is converted to mass flow at standard conditions by multiplying it by the tail gas flow and then to CO2e emissions by multiplying it by the **EF_{HC}**.

ID No	Data Variable	Description	Source of Data	Data unit	Measured (M) Calculated (C) Estimated (E)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Value of monitored period	Comment
P14	**$Q_{HC,y}$** Hydrocarbon input as reducing agent	Hydrocarbon (natural gas) input as reducing agent into the tail gas at the inlet to the N_2O Destruction Facility	Krohne variable area gas flow meter	Nm^3	M	Every 10 seconds	100%	Electronic Crediting Period + 2 yrs	13941.74Nm^3	The natural gas flow input into the tail gas as a reducing agent is measured using a volumetric gas flow meter. The flow is converted to standard conditions of 1,013.25 Pa and 273°K, based on the measurement of the actual temperature and pressure.
P15	**HC** Hydrocarbon density	Density of hydrocarbon used as reducing agent at inlet to N_2O Destruction Facility.	Sasol Gas Limited, specification for natural gas from Mozambique	t/Nm^3	M	Once	100%	Electronic Crediting Period + 2 yrs	0.000796t/Nm^3	None
P16	**EF_{HC}** Hydrocarbon CO_2 emissions factor	CO_2 emission factor for the hydrocarbon input as reducing agent at the inlet to the N_2O Destruction Facility	Sasol Gas Limited or default value	t CO_2e/t CH_4	C	Once	100%	Electronic Crediting Period + 2 yrs	2.77 t CO_2e/t CH_4	The hydrocarbon CO_2 emission factor is calculated from the molecular weight of the CH_4 (methane) used in this case and the CO_2 produced from the chemical reaction when the hydrocarbon is converted.

ID No	Data Variable	Description	Source of Data	Data unit	Measured (M) Calculated (C) Estimated (E)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Value of monitored period	Comment
P17	**OXID**$_{HC}$ Hydrocarbon Oxidation factor	Oxidation factor for the hydrocarbon used as reducing agent.	Delta V DCS	%	C/ Continuously	Every 10 seconds	100%	Electronic Crediting Period + 2 yrs	89.36%	The concentration of CH_4 in the tail gas at the outlet from the N_2O Destruction Facility is analyzed using an Emerson IR/IR/PO2 non-dispersive infrared photometry in a combined analyzer device, recorded in ppmv and converted by the Delta V DCS.
P18	**Type**HC Type of hydrocarbon used	Type of hydrocarbon used as reducing agent at N_2O Destruction Facility and concentration of CH_4 in the hydrocarbon.	Sasol Gas Limited – average composition	%	-na-	Once	100%	Electronic Crediting Period + 2 yrs	Natural gas containing 100% CH_4 (Actual composition ranges from 90 - 98%)	The concentration of CH_4 in natural gas varies in the range from 90 to 98%. To be conservative, it has been assumed that the natural gas is 100% CH_4.

Baseline Emissions

ID No.	Data variable	Description	Source of data	Data unit	Measured (M), Calculated (C), Estimated (E),	Recording frequency	Proportion of data monitored	How will the data be archived? (electronic/ paper)	Value of monitored period	Comment
B1	**P**$_{HNO3, y}$ Plant Output of HNO_3	Total 100% nitric acid produced during the project period	Delta V DCS reports	t $HN0_3$	M	Every 10 seconds	100%	Electronic Crediting Period + 2 yrs	16,525.57t HNO_3 at 100% concentration	The actual nitric acid production is measured using the existing instruments which measure nitric acid temperature, density and mass flow. The concentration is then calculated from this data. The instrument signals will be recorded in the control room by the Delta V Distributed Control System (DCS) and converted to tons 100% HNO_3/hr. Total production over the project period is the sum of all the daily production figures. This value is used to determine whether the nitric acid production is within the totalized plant design capacity for the same period.
B2	**QI**$_{N2O, y}$ Quantity of N_2O at inlet to destruction facility	N_2O concentration in the tail gas at the outlet from the N_2O Destruction Facility	Emerson Model MLT2 non-dispersive infrared photometry meter	tN_2O	C	Period	100	Electronic	94.6tN_2O	

ID No.	Data variable	Description	Source of data	Data unit	Measured (M), Calculated (C), Estimated (E),	Recording frequency	Proportion of data monitored	How will the data be archived? (electronic/ paper)	Value of monitored period	Comment
B3	**CI**$_{N2O,\ y}$ Quantity of N_2O at inlet to destruction facility	Concentration of N_2O in tail gas at inlet to the N_2O Destruction Facility	Emerson Model MLT2 non-dispersive infrared photometry meter	tN_2O/m^3	M/ Continuous	Every 10 seconds	100%	Electronic Crediting Period + 2 yrs	1.75E-06t N_2O/Nm^3	The concentration of N_2O in the tail gas at the inlet to the N2O Destruction Facility is analyzed using non-dispersive infrared photometry in a combined analyzer device, recorded in ppmv & converted by the Delta V DCS.
B4	**QR**$_{N2O,\ y}$ Regulation 1: Annual quantity N_2O Limited	Local and National Regulations related to the Emission Factor for N_2O emission	Local and National Regulations	tN_2O	C	Once	100%	Electronic Crediting Period + 2 yrs	No local or National regulation has been introduced during project period.	At date of introducing or change of regulation.
B5	**RSE**$_{N2O,\ y}$ Regulation 2: N_2O emissions per unit of nitric acid limited	Local and National Regulations related to the Emission Factor for N_2O emission	Local and National Regulations	$tN_2O/tHNO_3$	C	Once	100%	Electronic Crediting Period + 2 yrs	No local or National regulation has been introduced during project period.	At date of introducing or change of regulation.
B6	**CR**$_{N2O}$ Regulation 3: N_2O concentration in tail gas limited	Local and National Regulations related to the Emission Factor for N_2O emission	Local and National Regulations	tN_2O/m^3	C	Once	100%	Electronic Crediting Period + 2 yrs	No local or National regulation has been introduced during project period.	At date of introducing or change of regulation.
B7	**P**$_{HNO3,\ hist}$ Design Capacity	Total 100% nitric acid produced during the project period	Delta V DCS reports	t $HN0_3$	C	Every 10 seconds	100%	Electronic Crediting Period + 2 yrs	15,708t HNO_3 at 100% concentration	

ID No.	Data variable	Description	Source of data	Data unit	Measured (M), Calculated (C), Estimated (E),	Recording frequency	Proportion of data monitored	How will the data be archived? (electronic/ paper)	Value of monitored period	Comment
B8	**$T_{g, hist}$** Historical operating temperature range of the ammonia oxidation reactor	Operating temperature range at the ammonia oxidation reactor	Temperature elements	Degree Celcius	M	Every 10 seconds	100%	Electronic Crediting Period + 2 yrs	883 - 895	PDD Annex 3
B9	**$P_{g, hist}$** Historical operating pressure range of the ammonia oxidation reactor	Operating pressure range at the ammonia oxidation reactor	Pressure element	Kilopascal	M	Every 10 seconds	100%	Electronic Crediting Period + 2 yrs	300 - 450	PDD Annex 3
B10	**T_g** Actual operating temperature ammonia oxidation reactors	Operating temperature range at the ammonia oxidation reactor during the project period	Thermocouple	Degree Celcius	M	Every 10 seconds	100%	Electronic Crediting Period + 2 yrs	883 to 891	Temperature at the ammonia oxidation reactor is measured using the installed monitoring device. Signal from the monitoring device is transmitted to the Delta V DCS for calculations and preparation of reports. Conditions test was done and corrections made in the report that is automatically generated from the Delta V.

ID No.	Data variable	Description	Source of data	Data unit	Measured (M), Calculated (C), Estimated (E),	Recording frequency	Proportion of data monitored	How will the data be archived? (electronic/ paper)	Value of monitored period	Comment
B11	**P_g** Actual operating pressure at ammonia oxidation reactor	Operating pressure at the ammonia oxidation reactor	Pressure transmitter	Kilopascal	M	Every 10 seconds	100%	Electronic Crediting Period + 2 yrs	344 kPa to 442 kPa	Pressure at the ammonia oxidation reactor is measured using the installed pressure sensing device. Signal from the sensing device is transmitted to the Delta V DCS for calculations and preparation of reports. Conditions test was done and corrections made in the report that is automatically generated from the Delta V. The pressure was within range for this period, and no corrections were necessary.
B12	**Reg_{NOx}** National regulation on NOx emissions	Local and National regulations relative to NO_x Emissions	National Regulations, South Africa Dept. of Environmental Affairs & Tourism (DEAT)	t NO_x/Nm^3 (provided as concentration in ppmv)	C	Once	100%	Electronic Crediting Period + 2 yrs	No change to local or National regulations for NOx emission	None
B13	**G_{sup}** Supplier of the ammonia oxidation catalyst	Supplier of the ammonia oxidation catalyst used during the period covered by this monitoring report.	Supplier invoice from Omnia's Accounting Dept.	Name of catalyst supplier W. C. Hereaus	-na-	Once per project period	100%	Electronic Crediting Period + 2 yrs		None

ID No.	Data variable	Description	Source of data	Data unit	Measured (M), Calculated (C), Estimated (E),	Recording frequency	Proportion of data monitored	How will the data be archived? (electronic/ paper)	Value of monitored period	Comment
B14	G_{com} Composition of the ammonia oxidation catalyst	Composition of the ammonia oxidation catalyst used during the project period	certificate from W.C. Hereaus, the catalyst supplier	grams		Once	100%	Electronic Crediting Period + 2 yrs	Pt 37,137.600 g (56.6%) Pd 25,969.350 g (39.6%) Rh 2,493.050 g (3.8%)	None
B15	$\mathbf{G}_{sup, hist}$ Historical supplier of ammonia oxidation catalyst	W.C. Hereaus or Johnson Matthey the catalyst supplier	certificate from W.C. Hereaus, the catalyst supplier of historical data	-			100%	Electronic	Credit Period + 2 years	none
B16	$\mathbf{G}_{com, hist}$ Historical composition of the ammonia oxidation catalyst	W.C. Hereaus, or Johnson Matthey the catalyst supplier	certificate from W.C. Hereaus, the catalyst supplier of historical data	%		February 2008	100%	Electronic	Credit Period + 2 years	none
B17	$\mathbf{SE}_{N2O}$ N_2O emission rate per ton of nitric acid	Rate of N_2O emission per ton of nitric acid produced	Delta V DCS reports & production reports	$tN_2O/tHNO_3$	C	Every 10 seconds	100%	Electronic Crediting Period + 2 yrs	0.00551t N_2O/t HNO_3	The quantity of N_2O at the inlet to the N_2O Destruction Facility is calculated based on the concentration of N_2O and tail gas flow. Nitric acid production is measured using the existing instruments. Ratio is calculated on an hourly basis and averaged over the period covered by this monitoring report.

ID No.	Data variable	Description	Source of data	Data unit	Measured (M), Calculated (C), Estimated (E),	Recording frequency	Proportion of data monitored	How will the data be archived? (electronic/ paper)	Value of monitored period	Comment
B18	$\mathbf{A}_{OR,\ hist}$ Max. historical ammonia flow rate to the ammonia oxidation reactor	Manufacturers Specification	Plant records	tNH_3/day	M/C	once	100	electronic	232tNH_3/day	none
B19	$\mathbf{A}_{OR,\ d}$ Actual ammonia flow rate to the ammonia oxidation reactor	Ammonia flow rate to the AOR (Ammonia Oxidation Reactor) adjusted to standard pressure and temperature conditions of 1,013.25 Pa and 273.15°K	Krohne variable area flow meter	tNH_3/day	M	Every 10 seconds	100%	Electronic Crediting Period + 2 yrs	214 t NH_3/day	The NH_3 flow rate to the AOR is measured using monitoring devices and instrumentation previously in place. Signal from the flow meter is transmitted to the Delta V DCS where it is recorded and reported in the daily reports. The total NH3 used for the period was 4,496.53 tNH_3.

The process data is acquired by the Delta V Distributed Control System which has been programmed to carry out all of the calculations, perform all of the conditions testing, and provide performance reports for the project activity. Note that the excel spreadsheet prepared for the monitoring plan and submitted with the PDD was not used. Instead, all of the formulas together with the various constants were programmed into the DCS wherein all of the calculations were performed and results provided in the form of weekly and monthly reports. As the calculations within the DCS, were performed on the automatically collected data which cannot be manipulated in any way, this system is deemed superior to using the excel spreadsheet format and preferred.

7.2 Good monitoring practice and performance characteristics

7.2.1 Plant Wide Integrated Management System

Omnia, the project operator has created an extensive and thorough plant and company wide Integrated Management System (IMS). This system has been designed to comply with:

- ISO 9001 – 2000
- ISO 14001 – 2004
- OHAS 18001 – 2007

For the project activity, the manual contains all of the procedures to be followed as regards maintaining of all the instrumentation and controls related to the project activity. It also contains procedures for the maintenance and calibration of the sensing devices, flow meters and transmitters as well as the frequency at which these checks are to be made. Omnia's instrumentation technicians received full training by Uhde and Emerson on all aspects of the instrumentation regarding inspection, calibration and maintenance. All work performed on the project monitoring system is recorded on the IMS and a complete history stored therein.

Moreover, Omnia is also a signatory to and member in good standing of the Chemical and Allied Industries Association (CAIA) and participant in the international Responsible Care Program.

7.2.2 Instrumentation & Controls Installed For the Project Activity

The instrumentation and controls installed for the project activity were selected by Uhde, the N_2O reduction system technology provider and installed and calibrated by Emerson of South Africa. The N_2O concentration analyzers, Emerson Analyzer Model MLT 2.3M, were certified by TUV as suitable to perform the indicated analysis in accordance with EN ISO 14956. All of the other instrumentation comprising the pressure and temperature sensing devices, flow meters, transmitters and the Delta V DCS was factory tested and witnessed by Uhde in accordance with the Factory Acceptance Testing (FAT) Protocol. A copy of the witnessed test reports is available at the plant site.

7.2.3 Inspection, Calibration & Maintenance of Installed Equipment

All monitoring equipment has been serviced and maintained according to the manufacturer's instructions and international standards by qualified personnel. The procedures and inspection and calibration frequency for the various components is included in the plant's Integrated Management System manual and a copy is available for viewing upon request.

The EnviNOx system is designed for automatic operation, and under normal operating conditions no operator activities are required. However, all alarms and any action taken by the operating personnel (events) are automatically logged at the engineering and operation station (Alarm and Event list) of the Delta V DCS. Malfunction of system components is indicated on the operator console in the control room as an alarm. Operating procedures require that the operator take immediate action with the occurrence of an alarm. The instrument department will be contacted, who will assess whether external support through Emerson South Africa (Alpret) will be required.

Scheduled maintenance will be performed on the analyzer. Alpret (Emerson's agent in South Africa) will be responsible for maintenance. A maintenance and service contract is currently being drawn up between Omnia and Alpret.

7.3 Data Storage

In accordance with the PDD, all of the data collected for the project activity must be stored in electronic format for the duration of the crediting period + 2 years. To meet these criteria, Omnia provides an extensive data storage system covering both the raw data received by the Delta V DCS as well as the output reports from the Delta V DCS and consists of CDs, hard drives and the main server as follows:

- All data collected by the Delta V DCS is stored on its internal hard drive for 1 month.
- Raw data collected by the DCS is downloaded weekly and stored, in MDI file format that cannot be tampered, on CDs a copy of which is stored in Omnia's on site safe. A second copy of the CDs is sent to Uhde, the technology provider, on a quarterly basis. CDs are stored for the duration of the crediting period + 2 years.
- All data is also backed up on one of the three hard drives on the plant's computer server and retained there for the duration of the year crediting period + 2 years.
- The server is backed up at the parent company's head office and also retained there for the duration of the crediting period + 2 years.

This provides a one electronic copy on CDs stored at the parent company's off site storage facility, a second copy on the hard drive and a third copy on the 'server' at the plant site and at the parent company's head office.

8.0 Request for Deviation

The Request for Deviation was submitted for review and accepted by the CDM Executive Board as listed on the UNFCCC website, stated as follows;

Deviation 1:

The monitoring methodology of AM0028 Version 1 requires that the concentration of N_20 at the inlet (CI_{N20}) and the outlet (CO_{N20}) of the destruction facility be measured continuously using a Gas Chromatography. in the range of 0-5000 ppm.

In the Omnia project the parameters are continuously being measured using NDIR online analysers (Nondispersion infrared absorption analyzer) and the same is in conformance with EN14181.

In addition to the continuous measurement, the N_2O concentration will be tested periodically by third party at the inlet and outlet using gas chromatography/NDIR twice a year as planned by the project proponent. (NDIR has been suggested by Udhe (Technology Supplier) as being more accurate; however Omnia will like to keep both options and will periodically test using either by GC or NDIR).

SGS UKL request this deviation for the above approach because this is not inline with the monitoring methodology AM0028 version 1 but NDIR is allowed in next versions of AM0028 with periodic sampling of the gas for gas chromatography to cross check accuracy levels.

Deviation 2:

The flow meter for the monitoring of tail gas volumetric flow rate is monitored continuously at the outlet of the EnviNox (destruction facility).

As per Equation 11 of the methodology AM0028 version 1; F_{TGi} is the volume flow rate which is required to be measured at the inlet of the destruction facility.

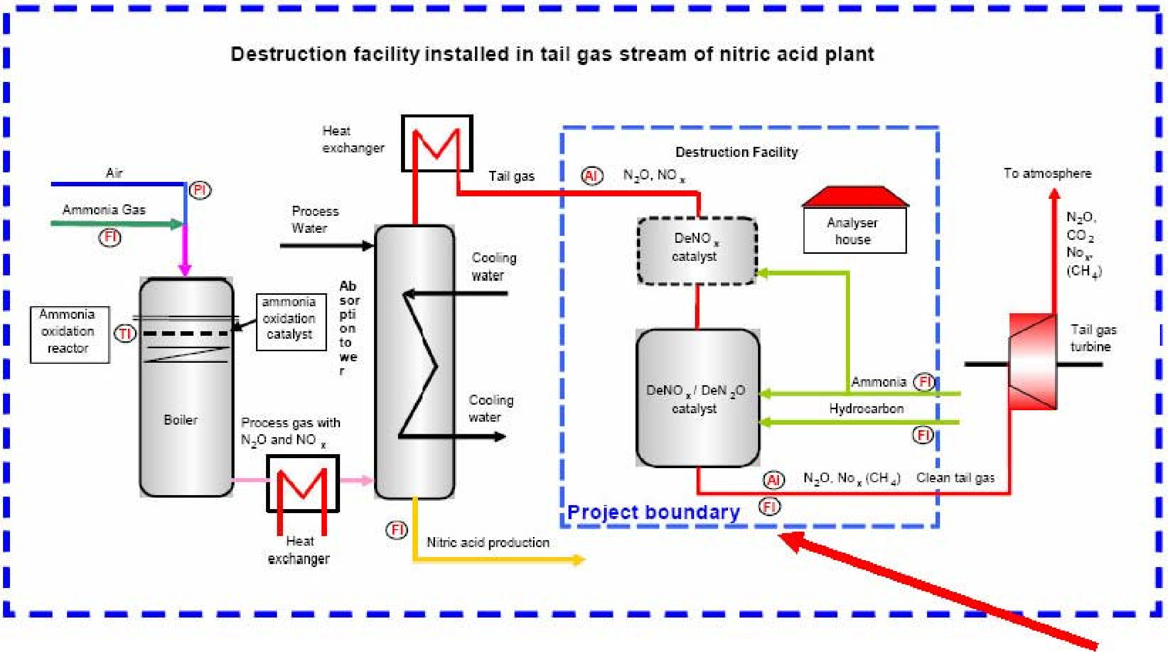
$$QI_{N2O,y} = \sum_{i}^{n} F_{TG,i} \times CI_{N2O,i} \times M_i \qquad \textbf{(11)}$$

where:

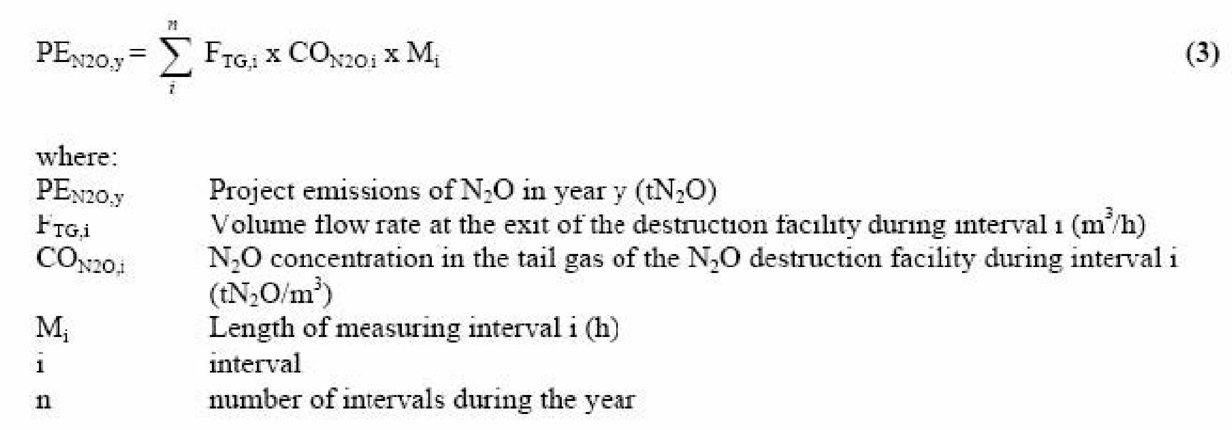
$QI_{N2O,y}$ Quantity of N_2O emissions at the inlet of the destruction facility in year y (tN_2O)
$F_{TG,i}$ Volume flow rate at the inlet of the destruction facility during interval i (m^3/h)
$CI_{N2O,i}$ N_2O concentration a destruction facility inlet during interval i (tN_2O/m^3)
M_i Length of measuring interval i (h)
i interval
n number of intervals during the year

However, the flow diagram in the methodology AM0028 Version 1 suggests that flow measurement is to be at outlet.

Figure 1: Project boundary



Also equation 3 of the methodology AM0028 version 1 suggests that F_{TGi} is the tail gas volumetric flow rate at the outlet of the destruction facility and the destruction facility has been designed and built on the basis of the above diagram. In Omnia project F_{TGi} is measured in Nm^3; and the flow rate is measured in terms of normalised flow taking into consideration the temperature and pressure conditions of the tail gas.



$$PE_{N2O,y} = \sum_{i}^{n} F_{TG,i} \text{ x } CO_{N2O,i} \text{ x } M_i \quad (3)$$

where:

$PE_{N2O,y}$	Project emissions of N_2O in year y (tN_2O)
$F_{TG,i}$	Volume flow rate at the exit of the destruction facility during interval i (m^3/h)
$CO_{N2O,i}$	N_2O concentration in the tail gas of the N_2O destruction facility during interval i (tN_2O/m^3)
M_i	Length of measuring interval i (h)
i	interval
n	number of intervals during the year

Hence, for equation 11, F_{TGi} at the inlet of the destruction facility is calculated by the following formula

<u>F_{TGi} at the inlet of the destruction facility (Nm^3)</u> =

F_{TGi} at the outlet of the destruction facility (Nm^3) – [Normalised Flow of Hydro Carbon into the destruction facility (Nm^3) + normalised Flow of Ammonia into the destruction facility (Nm^3)]

SGS UKL requests this deviation for as F_{TGi} at the inlet of the destruction facility (Nm^3) is derived from measured flow streams (since all three streams have outputs as normalised flow where temperature and pressure are continuously monitored).

This F_{TGi} at the inlet of the destruction facility (Nm^3) parameter will be calculated separately on a daily basis and by including this high level of accuracy is assured for calculation of Emission Reduction.
Please see annex 1 spreadsheet (a weekly data) indicating impact on CERs on a daily basis. The ER impact is well within the materiality threshold of 1%; however SGS UKL would like to attest Emission reductions accurately. Hence this deviation is sought as the methodology is not clear on the F_{TG}i parameter.

Deviation 3:
The hydrocarbon oxidation factor cannot be measured directly, an infrared analyzer is used to measure CH_4 concentration in inlet and outlet of the HC stream and then the hydrocarbon oxidation factor is derived. SGS UKL request this deviation as direct measurement of this parameter is not possible and it is a derived quantity from measured parameters. The methodology specifically mentions that to measure the oxidation factor, which is being calculated in actual by applying the following formula: [(CH_4 in –CH_4 out)/CH_4in] *100 Hence, the oxidation factor must be treated as calculated parameter.

Deviation 4:
For the Hydrocarbon EF, the registered MP and the methodology suggest the use of IPCC value of 2.75 tCO_2/t. The MP in the registered PDD is clear on this ground; however a reference of Sasol (fuel supplier) value of 2.77 tCO_2/t is indicated. The spreadsheet available at the time of validation was verified and for Emission reduction it was found that for the calculation the value of 2.75 had been used. SGS UKL would like to request for a deviation to be able to use 2.77 tCO_2/t as indicated in the PDD page 32 (just above the table D.2.1.3).

9.0 GHG Emission Reduction Calculations

9.1 General

In accordance with Approved Methodology AM0028 / Version 1, the emission reduction (**ER**y) by the project activity during the given period y is the difference between the baseline emissions **BE**y, the project emissions as discussed in the following sections.

9.2 Baseline Emissions

To determine the baseline emissions, N_2O concentration and tail gas volume flow were monitored together with the operating conditions at the ammonia oxidation reactor (AOR), the nitric acid production and the ammonia feed to the AOR throughout the monitoring period. Hourly average readings for N_2O production and concentration, tail gas flow volume, operating pressure and temperature conditions at the AOR and ammonia flow to the AOR (calculated from every 2 second monitored data) were calculated. From these hourly averages, the daily average temperature and pressure conditions at the AOR were calculated and compared to the established operating limits. The total nitric acid production over the entire monitoring period was totalized and compared to the plant design average daily production rate multiplied by the number of operating days in this monitoring period. Likewise, the hourly average NH_3 feed to the AOR was converted to a daily average and compared to the historical maximum limit as per the PDD. Error readings (e.g. downtime or malfunction) and extreme values were replaced in the output data by the lowest value for that day so as to be conservative. Furthermore, the 'conditions test' for average day temperature ((**Tg,d**) and pressure (**P**g,d) was conducted and appropriate corrections made for the days when either temperature or pressure conditions were outside the accepted range.

To determine whether the existing N_2O emissions regulations would limit the quantity of N_2O that could be taken into account for the calculation of the baseline emissions, discussions were held with the South Africa Department of Environment and Tourism (DEAT) inspector. No N_2O emission regulation has been implemented since the registration of the PDD.

Normal operating conditions determination

To ensure that data obtained during baseline campaign are representative of the actual GHG emissions, a set of process parameters known to affect N_2O generation have been set based on plant historical operating conditions and plant design data. Those parameters, called by the methodology normal operating conditions, are: oxidation temperature, oxidation pressure, nitric acid production, ammonia flow to AOR as well as the supplier and the composition of the ammonia oxidation catalyst.

Normal operating conditions for the AOR determined, and provided in the PDD, are as per table 8.1.

Table 9.1 – Normal Operating Conditions		
Parameter	Data unit	Value applied
Normal daily average operating temperature at AOR, $T_{g\ ,hist}$ (temperature range as per section D.2.1.4, Item 3.1 page 40 of PDD)	ºC	885 - 895
Normal daily average operating pressure at AOR, $P_{g,hist}$ (range of pressure as per section D.2.1.4, Item 3.1 on page 40 of PDD)	kPa	300 – 450
Normal design production over the monitoring period, $P_{HNO3,max}$ (total over the monitoring period as per section D.2.1.4, page 36 of PDD)	t 100% HNO_3	15708 (21 days @ 748 t/day)
Maximum ammonia (NH_3) flow to AOR, $A_{OR,hist}$ (maximum NH_3 flow to AOR as per Section D.2.1.4, Item)	t NH_3/day	232
Supplier of ammonia oxidation catalyst, $G_{SUP,hist}$ (as per section D.2.1.4, item 3.3, page 40 of PDD)	supplier	Hereaus
		Johnson Matthey
Composition of ammonia oxidation catalyst, $G_{COM,hist}$	Pt (g)	3,600 to 53,000
	Pd(g)	2,400 to 4,700
	Rh(g)	1,800 to 4,000

Actual operating conditions throughout the monitoring period were as per table 9.2:

Table 9.2 – Actual Operating Conditions		
Parameter	Data unit	Value applied
Actual average daily operating temperature at AOR, $T_{g\ ,d\ (range)}$	ºC	883 to 891
Actual average daily operating pressure at AOR, $P_{g,d}$ (range)	kPa	405 to 428
Normal average daily production over the monitoring period, $P_{HNO3,y}$	t 100% HNO_3	16,525.57
Average daily ammonia (NH_3) flow to AOR, $A_{OR,d}$ (range)	t NH_3/day	214.1
Supplier of ammonia oxidation catalyst, G_{SUP}	supplier	W. C. Hereaus
Composition of ammonia oxidation catalyst, G_{COM}	Pt (g)	37,137.600g (56.6%)
	Pd(g)	25,969.350g (39.6%)
	Rh(g)	2,493.050g (3.8%)

Daily AOR conditions as per table 9.3

Table 9.3
Ammonia Oxidation Reactor

Date	Temperature	Pressure	tNH3	Production
Feb-26	886	405	197	712
27	886	411	203	735
28	885	417	210	761
29	884	419	212	770
Mar-01	883	420	214	775
2	885	419	212	773
3	886	420	214	777
4	891	418	215	787
5	891	423	219	802
6	890	422	217	800
7	889	424	218	798
8	889	420	215	787
9	889	419	214	784
10	888	418	213	781
11	886	418	212	775
12	889	417	212	777
13	888	422	217	803
14	890	423	219	823
15	891	424	220	827
16	890	427	222	842
17	891	425	221	836

According to approved methodology AM0028 Version 1, the baseline emissions are determined on the basis of the quantity of N_2O emitted in the baseline scenario taking into account national regulations for N_2O, nitric acid production levels, operating conditions at the AOR as well as the supplier and composition of the ammonia oxidation catalyst as detailed tables 9.1 & 9.2. The resultant baseline emissions, based on the measurement of the N_2O concentration at the inlet to the destruction facility and the tail gas flow measured at the outlet from the destruction facility less the input natural gas and ammonia flow at the inlet to the N_2O destruction facility, were calculated using the formulae below.

$$\mathbf{BE}_{y} = \mathbf{BE}_{N2O,\,y} \times \mathbf{GWP}_{N2O}$$

$$\mathbf{BE}_{N2O,\,y} = \mathbf{QI}_{N2O,\,y}$$

Where:

$\mathbf{BE}_{y}$	total baseline emissions in period y (tCO_2e)
$\mathbf{BE}_{N2O,\,y}$	Baseline emissions of N_2O in period y (tN_2O)
$\mathbf{GWP}_{N2O}$	Global Warming Potential (GWP for N_2O is 310 in accordance with Article 5, Section 3 of the Kyoto Protocol; as agreed on at COP3)
$\mathbf{QI}_{N2O,\,y}$	Quantity of N_2O supplied to the destruction facility in period y (tN_2O)

The average day operating temperature (**Tg,d**) fell below the normal operating range. More specifically this occurred on February 28, 29 and March 1, 2008.

Moreover, the total nitric acid production ($\mathbf{P}_{HNO3,y}$) during the monitoring period exceeded the plant's maximum allowable nitric acid production ($\mathbf{P}_{HNO3,max}$).

In accordance with AM0028 Version 01, for the days when **Tg,d** was outside the historical range of 885 – 895^{o}C, (Feb. 29 & March 1) the lower of the IPCC default value of 4.05 kg/t HNO_3 or the NO_2 emissions per output of nitric acid ($\mathbf{SE}_{N2O,y}$) for the monitoring period must be used. As the IPCC default value of 4.5 kg N_2O/t HNO_3 was lower than the $\mathbf{SE}_{N2O,y}$ value of 0.0056 t N_2O/t HNO_3 (5.6 kg N_2O/t HNO_3) for the monitoring period the baseline emissions for the two (2) days in question were revised using the 4.05 kg/t HNO_3 factor.

As noted, the total allowable 100% concentrated nitric acid production ($\mathbf{P}_{HNO3,\ max}$) was **15,708** tonnes compared to the recorded production ($\mathbf{P}_{HNO3,y}$) of 16,526 t during this monitoring period. Consequently, as per the registered PDD and approved methodology AM0028 Version 01, the baseline emissions were corrected in accordance with the following formula:

If $\mathbf{P}_{HNO3,y} > \mathbf{P}_{HNO3,max}$

Where

$\mathbf{P}_{HNO3,y}$	production of nitric acid in year y ($tHNO_3$)
$\mathbf{P}_{HNO3,max}$	design capacity ($tHNO_3$)

Then

$\mathbf{BE}_{N2O,y}$ $= \mathbf{SE}_{N2O,y} \times \mathbf{P}_{HNO3,max}$

And

$\mathbf{SE}_{N2O,y}$ $= \mathbf{QI}_{N2O,y}/\mathbf{P}_{HNO3,y}$

Where:

$\mathbf{BE,}_{y}$	total baseline emissions in period y (tCO_2e)
$\mathbf{SE}_{N2O,y}$	specific N_2O emissions per output of nitric acid in year y (tN_2O,y/$tHNO_3$,y)
$\mathbf{P}_{HNO3,y}$	production of nitric acid in year y (tHNO3,y)
$\mathbf{QI}_{N2O,y}$	quantity of N_2O emissions at the inlet of the destruction facility in year y (N_2O)

$\mathbf{BE}_{N2O,y}$ = 86.60 t N_2O

BE,y =26,844.75 t CO_2e

9.3 Project Emissions

To determine the emissions from the project activity the following parameters were monitored:

- N_2O concentration and volume flow rate in the tail gas at the outlet from the N_2O destruction facility together with its temperature and pressure
- Natural gas and ammonia flow at inlet to the N_2O destruction facility together with their respective temperature and pressure
- Nitric acid production and concentration
- Operating temperature and pressure at the AOR
- Ammonia (NH_3) flow to the AOR

Hourly average readings for these monitored data points (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. The results used as follows:

- hourly average readings for N_2O concentration and tail gas flow volume were used to calculate the N_2O emission in the tail gas;
- hourly average natural gas and ammonia flows were used to calculate the project emissions related to the operation of the N_2O destruction facility;
- hourly average nitric acid production was totalized over the entire monitoring period, converted to average day nitric acid production and compared to the plant design capacity to determine whether the plant was operating within the accepted parameters;
- hourly average operating temperature and pressure at the AOR were converted to daily averages and compared to the plant design operating conditions for the AOR;
- hourly average NH3 input to the AOR was totalized over the 24 hr operating period and compared to the historical maximum NH3 input.

The average hourly values were used in the following formulas, based on AM0028 Version 1 and presented in the PDD, to calculate project emissions. The following formulae were used:

$$\mathbf{PE}_{y} = \mathbf{PE}_{ND,y} + \mathbf{PE}_{DF,y}$$
$$\mathbf{PE}_{ND,y} = \mathbf{PE}_{N2O,y} \times \mathbf{GWP}_{N2O}$$
$$\mathbf{PE}_{DF,y} = \mathbf{PE}_{NH3,y} + \mathbf{PE}_{HC,y}$$
$$\mathbf{PE}_{NH3,y} = \mathbf{Q}_{NH3,y} \times \mathbf{EF}_{NH3}$$
$$\mathbf{PE}_{HC,y} = \mathbf{HCE}_{C,y} + \mathbf{HCE}_{NC,y}$$

Where

$\mathbf{PE}_{y}$	Project emissions in period y (tCO_2e)
$\mathbf{PE}_{ND,y}$	Project emissions from N_2O not destroyed in period y (tCO_2e)
$\mathbf{PE}_{DF,y}$	Project emissions related to the operation of the N_2O destruction facility in period y (tCO_2e)
$\mathbf{PE}_{N2O,y}$	Project emissions of N_2O in period y (tN_2O)

$\mathbf{GWP}_{N2O}$	Global Warming Potential of N_2O, set as 310 t CO_2e/t N_2O for the 1st commitment period
$\mathbf{GWP}_{CH4}$	Global Warming Potential of CH_4, set at 21 t CO_2e/t CH_4 for the 1st commitment period
$\mathbf{PE}_{NH3,y}$	Project emissions related to ammonia input to the destruction facility in period y (tCO_2e)
$\mathbf{PE}_{HC,y}$	Project emissions related to natural gas input to destruction facility in period y (tCO_2e)
$\mathbf{Q}_{NH3,y}$	Ammonia input to the destruction facility in period y (tNH_3)
$\mathbf{EF}_{NH3}$	GHG emissions factor for ammonia production, set at 2.14 t CO_2e/t NH_3 as per AM0028 Version 2. This value was used despite it being higher than the IPCC value in order to be conservative).
$\mathbf{HCE}_{C,y}$	Project emissions from methane (natural gas) converted in period y (tCO_2e)
$\mathbf{HCE}_{NC,y}$	Project emissions from methane (natural gas) not converted in period y (tCO_2e)
$\mathbf{EF}_{HC}$	GHG emissions factor for natural gas, set at 2.77 t CO_2e/t CH_4 converted.

And

$\mathbf{HCE}_{C,y} = \rho_{HC} \times \mathbf{Q}_{HC,y} \times \mathbf{EF}_{HC} \times \mathbf{OXID}_{HC}/100$

Where

$\mathbf{HCE}_{C,,y}$	Project emissions from methane (natural gas) converted in year y (tCO_2e)
ρ_{HC}	natural gas density (t /Nm^3)
$\mathbf{Q}_{HC,y}$	natural gas input in year y (Nm^3)
$\mathbf{EF}_{HC}$	Carbon emissions factor of natural gas (tCO_2/tHC)
$\mathbf{OXID}_{HC}$	Oxidation factor for natural gas converted (%)

and

$\mathbf{HCE}_{NC,y} = \rho_{HNC,y} \times \mathbf{Q}_{HC,y} \times \mathbf{GWP}_{CH4} \times (1 - \mathbf{OXID}_{CH4}/100)$

Where

$\mathbf{HCE}_{NC,y}$	methane emissions in year y (tCO_2e)
$\rho_{HNC,y}$	density of natural gas 0.000796 t/m^3
$\mathbf{Q}_{HC,y}$	Methane used in year y, and based on measurements of CH_4 concentration in tail gas & tail gas flow (Nm^3)
$\mathbf{GWP}_{CH4}$	Global warming potential of methane, set at $21tCO_2e/tCH_4$
$\mathbf{OXID}_{CH4}$	Oxidation factor for methane (%)

The project emissions, based on the above formulas, are:

$\mathbf{PE}_y$ = 567.94 t CO_2e

Complete project emission calculations are in the following documents: “Daily average Report.first period. Omnia.rev.3.xls”

9.4 Emission Reduction Calculation

As indicated, the present Monitoring Report involves the following period: From 26 February 2008 to 17 March, 2008.

According to AM0028 version 01, the emission reductions for the project activity over this monitoring period are determined as follows:

$$\mathbf{ER}_y = BE_y - PE_y$$

Values obtained for the project are:

$$\mathbf{ER}_y = 26{,}844.75 - 567.94$$
$$= 26{,}276 \text{ tCO2e}$$

Complete emission reduction calculations are in the following documents: “Daily average Report.first period. Omnia.rev.3.xls”